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" A Smart City Development Concept : The Songdo Experiences"

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ABSTRACT:
The main objective of this paper is to, Study the development of Smart city Songdo with public-private partnership and also focus on the Ubiquitous city concept. Songdo , a city is the world's first smart city situated in South Korea. Planning and urban development in Songdo city have developed the city with help of information and communication technology (ICT), with the help of these technologies to improve the quality of life and the ease of life. Songdo city is the first smart city which has been developed on Ubiquitous City (U-City) concept. Green city approach and public participation are also involved in the development of urban infrastructure for smart city development. Management of whole infrastructure facilities are done with new smart technologies. This Mega scale infrastructure project is developed with public private partnership (PPP model).

KEYWORDS: *Smart city, Public Privet Partnership, Ubiquitous city, Urban infrastructure*

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I. INTRODUCTION

Over the last decade number of people have migrated from the rural area to urban areas so a new opportunity is faced by the government of the developing country, the opportunity is to develop more infrastructure facilities and maintain them. That opportunity of developing the infrastructure is solved out on small scale. That period is now over and a new opportunity arises which is "Existing infrastructure should be combined with smart technology". This opportunity happened because of the IT Revolution. Some developed countries connected their own infrastructure with the help of information and communication technology. This ICT technology connected with most of the city infrastructure and managed them easily. This includes traffic management, waste management, electricity management, sewerage and water quality, monitoring fire and crime, etc... The first smart city in the world is Songdo IBD.

1.1 Feature of smart city

The smart city project of Songdo city is divided into six categories which includes transportation, environment, citizen interaction, crime prevention, provide smart applications. Other services which were developed are home, store, car, learning, health, money. For example, The area of the city is just 600 hectares, and 308 CCTVs cameras installed in the city. [1] Use of radio-frequency identification technology prevents crime in the city. Vehicle registration number detection cameras are able to spot the stolen vehicle, unpaid loan or tax vehicle, and criminal vehicle. The operation center is continuously connected with various disaster-related organizations for the mitigation of it and effectively engage with citizens of the city.

Energy conservation is also a major focus point in smart city development. Utilization and implementation of various sensors like PNR motion sensor in street lights. When there are no moving vehicles or pedestrian then at that time the lights are switched off. In sanitation, junk jars and the Internet of Things (IoT) technologies are used . Sensors where use to measure water parameters and the quality of drinking water at front end of the system [2]. Other sensors were used in the water distribution pipeline to detect leakages and increase the efficiency for the water administrative department. City administration uses these type of smart technologies to improve energy conservation. Another major aspect to implement is to promote sustainability in the smart city development plan. Now the scenario of urbanization in the world is 80% .Cities account for more than 70% of the carbon emission and 70-80% energy consumption. Municipalities and government are developing smart cities with the help of ICTs and other technologies. This technologies helps to sustain an easy life for citizens.

II. PUBLIC PRIVATE PARTNERSHIP IN URBAN DEVELOPMENT

Many difficulties arise in mega scale urban development project throughout many cases around the world. The most common difficulties are problems with case flow, more risk potential, limited resources available to the government. Therefore in recent decades the global attention has sifted to Public Private Partnership for urban development projects. Usage of PPP model pools the private sources in the urban project so that burden on the government reduces. For private sectors, partnering with the government sector provides new development projects and reduces uncertainties of projects, faster approval of development projects as well as help with legislation and policies.

The private sector faces challenges too. One major challenge is the bearing of financial burdens and even more difficult circumstances. For Urban development projects, completion time is generally up to few years. During a long time period of completion, unforeseen circumstances may occur like policy changes, market changes, political discontinuities, or additional demands by the government sector. These circumstances may impact the project cash flow. Some events may bring critical financial consequences to project developers .

A large time period and more amount of capital investment requirement poses greater challenges to both sectors. Typically, projects are characterized by a high level of public attention and an extended amount of uncertainty due to unforeseen events during the time span of development of projects. These unforeseen circumstances arises in contracting of PPPs greatly increase the risk potential of the project.

2.1 Benefits and challenges of public private partnership in the Songdo City development

The deal between public authorities and the private sector in the case of Songdo city was to some extent clear. On one hand, for public benefits, the city government supplied land at cheap rates, so the project cost was reduced and private developer supplied money for the development of projects. The city also provides accessibility to the sites, infrastructure, and government facilities.

The main advantage of the public sector engagement with private parties is to support investment power. In addition, to secure private capital, the public sector expects to benefit from marketing knowledge of the private sector and experience so that public goals can be achieved more accurately and effectively. In the case of the new Songdo city, the Korean government anticipated that the US developers would develop a high-quality environment, which would serve to the need of international residents and international businesses. Although the public-private partnership has its benefits, monitoring the private sector during the development of the project is more challenging. In the case of New Songdo City, we witnessed that both levels of central and city governments monitored the development activities in the project and placed additional constraints and obligations upon the developer as the project progressed.[3] For example, the city government is used to more influence for the approval of public plans and permits regulate the development schedule for city properties. The central government also monitored the operation of the project and instructed the city government. The city government takes action to ensure private developer's contract fulfilment. It also revised with government law developer's development rights cancelled when project delay. That is the public benefit.

III. UBIQUITOUS CITY

The Ubiquitous city (U-city) is defined as a city that applies substructure of "Ubiquitous computing" to the serviceability of the whole urban system. It can be an integration of Information and communication technology (ICT) with social systems: every device, component, and services within city links to wireless networking channels. Intelligent services like home banking, intelligent transport system, remote sensing, monitoring urban development, and control activities in urban areas are always available in U-city. U-city concept was also helpful to encourage citizens and participate in government activities like policy development, policymaking, voting. It is a rapid growth technology to sustain citizen life and the ease of life for the citizens and government also. ICT provides a healthy and secure environment in the city. U-city refers to an environmentally friendly, secure, healthy, smart, and sustainable city. Ubiquitous computing amongst the elements such as people, building, infrastructure, road networks, open space. U-city created by smart computer chips and sensors, that inserted in urban elements. So that continuously connected and communicated with peoples to people, people to object, object to object. Where computer devices are invisible to prospects.

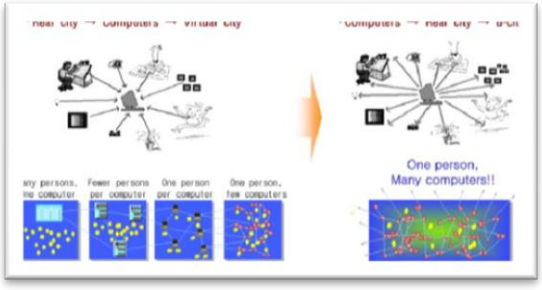

Figure 1. Difference between the virtual city and U-city [4]

Virtual city and U-city both is a different concept. U-city in that person is just one and many computers work for citizens and in virtual city urban elements or person is more, they work only on one computer. The main difference is that the virtual city needs computer and technology demand and U-city need to connect urban element with the administration of the city.

3.1 Smart services in U-city Songdo

In Songdo many types of smart services available to users like transportation and Urban mobility, safety and citizen security, emergency and response, environment, energy-saving, integrated facility management, citizen interaction, and communication mechanisms.

Figure 2 . Service provided in Songdo U-city[5]

3.1.1 Illegal parking control

In the case of the illegally parked vehicle, the driver is informed through guided the other parking space available with an area or SNS or through an announcement. If a driver refuses to follow directions then the illegal parking control board is enforced. During night times surveillance cameras use for crime prevention and illegal parking. The city's CCTVs monitor the whole activity during day and night.

3.1.2 Provide public transport information

To maximum conveyance of using public buses, the bus arrival time shows on bus stops along with subway information to nearby stations. All information not shows in Korean only but shows different international languages. CCTVs install in every bus stop it not just monitoring movement but they show facilities problems on this spot. If citizens press the alarm bell in the case of any emergency immediately connect with the operator at that station. During night time automatic sensors start to save electricity. Where there is no person automatic light was deemed or off.

3.1.3 Abnormal Sound Monitoring

If a citizen sought or screen in an urgent situation, the sound sensor detected this and CCTVs turn on their angle to show the center operator's image of the situation on hand. The operator checks this video footage and spreads the location and emergency organizations are swift to in actions.

3.1.4 Environment

Environment detected sensors are placed in parks, school areas, shopping areas, playgrounds, housing areas. Weather sensors can measure the weather condition of a city, wind direction, wind velocity, temperature, humidity in the air, moisture content. Where environment sensors are measuring the level of dust, oxygen, carbon monoxide, sulfur dioxide, ozone amount. Weather sensors are installed on the main road. That can also measure fog and frozen surfaces on road. That all data collected by sensors and analysis of all data after that this information was spread out in citizens via news channels or applications.

3.1.5 Citizen interaction

Through the mobile device of citizens are provide all information related to the administrative department. This information delivering in public that the main goal is public satisfaction on government movement. Citizen communication services, customized administrative services for citizens, etc… are providing to the citizen, and the system was expanded more and more.

3.1.6 Safety and security of citizen

To provide a safer living in the city, IFEZ(Incheon Free Economic Zone) collect all footages from crime prevention, disaster prevention, etc... Songdo CCTVs footages share for different purposes for citizen safety. In Songdo city cameras loaded with automatic number plate, recognize (ANPR) is installed at a major intersection of the city. These cameras collected the all details via vehicle number. This collected data to find not taxpayer vehicle or vehicle with an outstanding loan. This information was sent to a police station or tax department or loan department of a bank and related organization swift action on it.

IV.CONCLUSION

The Ubiquitous city or U-city is a new idea for urban planning to sustain the city environment. This smart city concept is really promising but that could vary from city to city and country to country. The major role of developing the infrastructure is public participation so that the public could easily influence what they would need for living an easy life. The usage of more technologies promises an easy and healthy life for citizens. Songdo city is a really encouraging example for many public and private services aiming to for sustainable life.

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