

## URBAN MANAGEMENT IN THE ERA OF FOURTH INDUSTRIAL REVOLUTION

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### ABSTRACT

*The 4th Industrial Revolution is a new wave of digital innovation. Driverless cars, smart robotics, internet of things (IOT), and other technological changes are happening in our daily life. The notion of smart cities is closely related to the new industrial revolution. We might think of the emergence of smart cities as the realization of the 4th industrial revolution in the spatial context. Many cities around the world are preparing to be smart cities via urban regeneration. In recognizing these changes, this paper tries to understand what the new industrial revolution brings to us, how the new digital revolution acts in our cities, and how urban regeneration can utilize the advent of the new wave of the groundbreaking innovation. This study was conducted to illuminate the relevance of smart technologies are necessary in the urban regeneration process, and what the opportunities and threats in the decentralized and self-generating framework in the new era through essentially the in-depth review of literature. We observed that the top-down decision-making procedure might be inefficient. Equally, the fully decentralized and fragmented system will increase the level of risk in the urban regeneration projects. The key element of success is the capacity of the central and local government to build the communication infrastructure, as well as to facilitate the interplay among the participation in the projects.*

**KEYWORDS:** *Urban Management, Planning System, Green Infrastructure, Industrial Revolution*

### 1.0 INTRODUCTION

In accordance with the huge innovation in the carrying capacity in the digital manufacturing, information gathering, and sharing, the mode of spatial development changes its form from reconstruction in the 1950s and 1960s, renewal in the 1970s, and redevelopment in the 1980s to regeneration in the 1990s. Until the 1980s, the main actors in the spatial reformulation were the governments and large real estate enterprises. The public-private partnership then enabled the renewal projects finished faster, covering vast areas all

together in cities. However, there were side effects. Many projects were developed without being linked to the existing spatial context, which created a disharmonious urban landscape. The opposition against the fast, one-size-fits-all approach was obvious. The new movement in the urban redevelopment appeared to advocate the social empowerment of citizens and to promote the people's participation.

Hence, as the role of community evolves in the process of the development, the governments should provide the arena to communicate each other. Now,

the concept of public-private partnership is transformed to the notion of public-private-people partnership (Bolici and Mora, 2015). Nowadays, the 4th industrial revolution is a ubiquitous phenomenon around the globe. Our way of life is already deeply linked to this digital revolution, and it seems that we cannot get out of it. While it is in our daily life, the use of smart phones in many occasions is one form of the revolution, like breathing in the air. As we already step into the era of the 4th industrial revolution, there has been a continuous debate on how we should prepare for the change not only in a variety of industrial sectors, but also in every corner of our normal life all over the world. The most important element of the revolution has been the use and development of IT technology, which makes the world wired and connected within a second beyond the boundaries. What makes a city “smart”? There were many previous forms in tandem with the current one: ‘virtual city’, ‘wired city’, ‘informational city’, ‘telecitey’, ‘intelligent city’, ‘urban cybernetics’, ‘digital city’ and others (Thompson, 2016). Making cities smarter is usually achieved via Information and Communication Technology (ICT)-intensive solutions (Cavalcante et al., 2016).

## 2.0 LITERATURE REVIEW

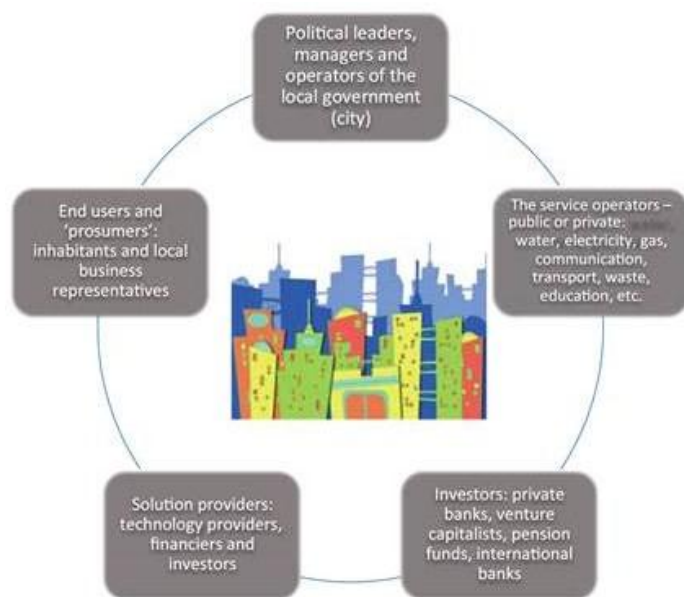
Flexible buildings would be one of the most advanced technological innovations in the era of smart homes and smart cities. The construction of a building involves a large amount of initial cost with a significant of time. Moreover, working environment for constructing buildings is not safe in general. In the advent of the new era, we expect a new form of home: the whole structure can be easily assembled and detached in just several days. It can also be equipped with some parts that change their

forms without complete interior renovation (Wang, 2016). Urbanization of megacities meets a lot of different environmental, economic and social problems and risks (Kötter et al. 2009). As a remedy to some of these negative consequences of urbanization, the installation of green infrastructure as opposed to grey infrastructure is identified as an alternative nature-based and cost-effective solution for improving the sustainability of the urban development (Ahern 2013; Alberti 2008).

Green infrastructure is defined generally by the scientist and planners as the physical green environment within and between our cities, towns and villages. It is a network of multi-functional open spaces, including formal parks, gardens, woodlands, green corridors, waterways, street trees and open countryside. It comprises all environmental resources, and thus a green infrastructure approach also contributes towards sustainable resources management and highlights the importance of the natural environment in decisions about land use planning. According to a report by Forest Research (2010), Green Infrastructure (GI) can mitigate risks from climate change by protecting urban regions against floods and other negative effects of changing weather patterns (Krause et al., 2011). In addition to the environmental benefits, there are also potential well-being benefits of GI like increased life expectancy, better mental and psychological health (Nordh et al., 2009).

The smart infrastructure can make our economy smarter, and our activities more accessible. Using Information Communication Technology (ICT) as a smart means to enhance competitiveness of cities, to deliver ever-growing information faster and lead to the technological development with higher productivity. The development of our cities as being smart via the 4th industrial revolution should bring

about innovations covering physical environment, sustainable natural resources, cultural and creative activities, for economic performance. The efficient and effective formulation and transformation of our cities will ultimately yield smart governance, which promotes citizens' participation in the decision-making process, related to the operation and management of every corner of the city. Figure 1 illustrates the interplay among stakeholders involved in shaping the smart city.



**Fig. 2.1: Stakeholders in the Smart City (SEC, (2014)**

The 4th industrial revolution is also expected to lead to significant changes in the residential environment. According to Skouby and Lynggaard (2014), stated that 5G connectivity will arrived in around 2020 and innovations in connectivity will change many perspectives in our residential spaces. Smart homes will enjoy better internet services and always-connected mobile services.

Flexible buildings would be one of the most advanced technological innovations in the era of smart homes and smart cities. The construction of a building involves a large amount of initial cost with a significant of time. Moreover, working environment for constructing buildings is not safe in general. In the advent of the new era, we expect a new form of home: the whole structure can be easily assembled and detached in just several days. It can also be equipped with some parts that change their forms without complete interior renovation (Wang, 2016). These prefabricated homes can easily transform their shapes and be customized to the residents' needs. We can also relate this innovation to home building via 3D printing technology, smart grid, and zero-energy technology.

Joichi Ito, the director of M.I.T. Media Lab, predicted that future cities will have a higher population density with a healthier ecosystem. At the Innovative City Forum in Tokyo, Japan in 2013, he noted that technology is transforming where we live, as highly-advanced technologies are common in our normal life and in building new infrastructures (Ito, 2015). The most noticeable form is of course information technology. Urban planning and urban design are reflecting these technological changes into our cities. What we need to do is to look at the city in a completely different way from the perspective of information technology. We cannot depend upon automakers only when we want to make a success in inventing and manufacturing electric cars and autonomous vehicles – in order to step forward to the 4th industrial revolution. Many relevant sectors should be jointly involved to build lightweight and shareable electric vehicles, and networks.

Therefore, it is in respect of what the trend in the recent years has brought to the fore, which seeks to corroborate “green infrastructure planning” in the opinions of Benedict and McMahon (2006), Kambites and Owen (2006), Mell (2009), as well as Hansen and Pauleit (2014), which have recognized as a tool for safeguarding sustainable development on the basis of a holistic understanding of combining ecological, social and economic benefits, that culminated in the crux around which this present study was conducted.

### 3.0 MATERIALS AND METHODS

#### 3.1 Conceptual Paradigm for Urban Regeneration and Development

Urban regeneration is the attempt to reverse that decline by both improving the physical structure, and, more importantly, the economy of those areas (The Guardian, 2001). In some developed countries such as the United Kingdom and the United States, the rapid suburbanization of large cities began in the 1950s. It resulted in many urban problems, including the waste of energy resources, decline in the commercial activities, traffic congestion, and pollution. However, since the 1990s across the Europe, the new approach to urban regeneration appeared. It emphasized the environmental and economic perspectives, and more integrated approaches to urban redevelopment. It related the stimulation of economic activities and environmental improvements to wider social and cultural elements (Colantonio and Dixon, 2011). In other words, urban regeneration is a concept that emphasizes the comprehensive treatment to reviving the city's physical, environmental, industrial, economic, social, and cultural sectors.

The key recipe for successful urban regeneration is the combination of (1) the enhancement of social and economic mobility, and (2) the promotion of local values, and (3) the participation of the third sectors. Roberts (2000) provided a broader definition as follows:

*“...a comprehensive and integrated vision and action which leads to the resolution of urban problems and which seeks to bring about a lasting improvement in the economic, physical, social and environmental conditions of an area that has been subject to change.”*

In his terminology, urban places are centers of political power with complex and dynamic systems. Cities are in the middle of physical, social, environmental and economic transition. They change by external forces or by internal pressures. In this regard, urban regeneration can be considered as the outcome of the interaction between many activities and opportunities.

**Table 3.1: Digital urban renewal initiative categories**

Category	Description
Citizen Services	Using ICT to make existing processes involving interaction between the municipality and citizens better, cheaper, or both.
Regional/ Economic Development	ICT-oriented economic development or regeneration. Aimed at attracting digital industries or residents that make real estate decisions based on the availability of broadband.
Community	Using ICT and crowd-sourcing to increase community cohesion, or influence and improve the political system. Typically started by civil sector organizations or social enterprises.



Law Enforcement	Using ICT to improve law enforcement and/or crime prevention through surveillance or improved communications for operatives.
Resource Management	The use of ICT to improve the functioning of citywide systems to use energy and other resources more efficiently.
Behavioral Change	Using ICT to facilitate behavioral change by providing information or tools that make the desired behavior easier or more attractive.
Health	The use of ICT to promote or deliver healthcare, and control illness or disease.

**Source: OVUM (2011)**

The smart technologies can regenerate our cities as green, decentralized but connected places with sustainable residential and commercial environment. The term “garden cities” is still abstract, derived from the Victorian era. The central government’s planning for garden cities mainly focuses on homes, with jobs being specifically identified as an element to “make places great to live in” (The Guardian, 2014). The garden city must be operated with strong local jobs. We should manage to renovate the transportation with capital costs being minimized in urban regeneration.

#### 4.0 CONCLUSION

This study takes a perspective approach relating to the 4th industrial revolution to smart spatial development and the recent urban regeneration phenomenon. The new digital revolution enables us to build smart cities via the highly-advanced technologies, such as wireless connected appliances, interactive and predictive devices, and more broadly innovative ideas themselves. There is no doubt that these technological advances will bring about more

efficient way of life in our urban settings. In fact, the concept of smart city is beyond technological tools. The new revolution will change the city administration from the physical, societal, environmental, economic, and psychological perspectives.

We should make our cities self-generating and sustainable via smart urban regeneration. Smart technologies enable us to study our own behavior on how we consume our spaces and interact among ourselves. The way of our living can be accumulated into the cluster of storage as the big data form, and the data in turn help predict the pattern of the movements of economic activities in our cities. This positive feedback will further help step forward to another round of digital innovation.

The digital democracy and its individual efficacy match well with the concept of urban regeneration. Urban regeneration has arisen as an alternative to the massive deconstruction and the large-scale land assembly with eminent domain, which sometimes invoked strong disagreement and violent disruption during the deconstruction and rebuilding process. Now, the urban development in the digital era is processed with the agreement and consensus from all of the participants, who are influenced by the regeneration projects. Urban regeneration will be a good test bed for advancing our information technologies with tailored physical and non-physical infrastructures.

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