Chapter 12
Ubiquitous and Smart System Approaches to Infrastructure Planning:
Learnings from Korea, Japan and Hong Kong

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ABSTRACT

The robust economic growth across South East Asia and the significant advances in nano-technologies in the past two decades have resulted in the creation of intelligent urban infrastructures. Cities like Seoul, Tokyo and Hong Kong have been competing against each other to develop the first 'ubiquitous city', a strategic global node of science and technology that provides all municipal services for residents and visitors via ubiquitous infrastructures. This chapter scrutinizes the development of ubiquitous and smart infrastructure in Korea, Japan and Hong Kong. These cases provide invaluable learnings for policy-makers and urban and infrastructure planners when considering adopting these systems approaches in their cities.

INTRODUCTION

Socio-economic changes in the knowledge era have an immense impact on societies, built and natural environments, and urban services (Yigitcanlar et al., 2008). Globalization and the knowledge economy, in particular, as well as rising triple bottom line sustainability concerns, are leading urban policy-makers to look for alternative approaches to urban development, infrastructure and service provision.

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Additionally, rapid technology development in the area of digital network and telecommunication has a significant effect on contemporary urban infrastructure planning. Ever since Mitchell (1999) envisaged 'E-topia' at the end of the 20th Century, the development of a robust delivery system for the digital network into infrastructure planning has been rigorously pursued.

Technological advancements and efforts in urban planning have resulted in the emergence of a new form of urban infrastructure (Cohen & Nijkamp, 2002). Considering many local and global environmental and urban development issues, policy-makers and planners in many countries have attempted to develop and apply 'ubiquitous computing systems' into urban infrastructure planning areas. This new, so-called 'ubiquitous infrastructure' (U-infrastructure) provides everyone with an opportunity to access urban infrastructure and services regardless of time and location (Lee, 2005a) by using information technology devices. U-infrastructure is a key component of the ubiquitous city development, and has a significant effect on the emergence of a new paradigm for urban infrastructure planning that is ecologically sustainable, and democratic in nature (Kim, 2008). Nevertheless, the ubiquitous computing system is yet to be addressed in an integrated manner by policy-makers and urban planners (Yigitcanlar, 2006); thus, U-infrastructure development is extremely diluted and not fully integrated into urban planning and urban infrastructure developments. For example, ubiquitous computing has not been widely considered in the design of intelligent building or in their functional improvement (Wong et al., 2005).

Significant progress has, nevertheless, been made in the past two decades as the robust economic growth across South East Asia, and the significant advances in nano-technologies have resulted in the creation of intelligent urban infrastructures. Cities such as Seoul, Tokyo and Hong Kong have been competing to develop the first 'ubiquitous city', a strategic global node of science and technology that provides all municipal services for residents and visitors via ubiquitous infrastructures. This chapter scrutinizes the ubiquitous city experience of South Korea, Japan and Hong Kong, and concludes with recommendations for policy-makers and urban and infrastructure planners when considering the adoption of new forms of urban infrastructure and systems – particularly the concepts of U-infrastructure – in their planning practices and processes.

UBIQUITOUS INFRASTRUCTURE

Information and communication technologies (ICTs) play an increasingly important role in the planning, management and use of urban infrastructure (i.e. transport, waste, power, sewerage and water). South Korea, Japan and Hong Kong are world leaders in the use of ICTs in urban infrastructure planning and management (Cohen-Blankshtain, 2004). For example, Korea has continuously developed local, regional and national strategies for knowledge based and sustainable urban development by incorporating state-of-the-art ICTs during the last two decades. The U-Korea and U-city agendas aim for the convergence of ICTs and urban space for a prosperous and sustainable development. However, the initial idea of ubiquitous computing was limited in the design of smart buildings or in their functional improvement, and not fully integrated within urban infrastructure planning. This is partially because telecommunication and digital network technologies in the early 1990s (i.e. remote sensing, GIS and wireless telecommunication) did not meet the major requirements for constructing a ubiquitous urban infrastructure. In the 2000s, however, technology developed in those areas as a result of tremendous changes in mobile networks (i.e. mobile phone, vehicle navigation, smart card and personal tracking system). In particular, mobile phones became intelligent devices, which are used not only for inter-person communication, but