Chapter 10
Creating Smart Cities with Intelligent Transportation Solutions:
Experiences from Singapore

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ABSTRACT

Transportation is often the bane of urban societies. Traffic gridlocks and inadequate availability of a comprehensive and affordable public transportation system further accentuate the problem. This chapter focuses on the Singapore experience with intelligent transportation solutions to alleviate a range of problems, thus contributing to its positioning as a smart city. We focus on seven issues: public transportation using modern mass rapid transit trains; congestion control using electronic road pricing; electronic monitoring advisory systems to guide road users on adverse conditions or incidents on roads; computerized traffic signaling systems to streamline the throughput of vehicles in roadways; intelligent dispatch of taxis, which helps to minimize idle cruising time; parking guidance systems to alert motorists of the nearest car park, in the process decreasing the level of floating traffic on roads; and integrated ticketing systems to promote inter-modal transfer. A unique funding mechanism that has led to the evolution of a modern and efficient public transportation system is also elaborated. Being a city state and a living laboratory of intelligent transportation systems that have attracted international attention, it is suggested that there are some lessons to be drawn from the Singapore experience in managing transportation problems in smart cities.

INTRODUCTION

The proliferation of cities in the past fifty years has caught many urban planners by surprise. Cities have become congested due to migration from rural areas, emigration from overseas as a result of globalization, and the proliferation of industries and amenities. Municipal and transport infrastructures are barely able to keep pace with such developments, let alone support the cause of sustainable development. Especially the transport system in most cities has been stretched to inequitable levels, with the result that the quality of living of the people has been affected significantly.

For cities to retain their vibrancy, especially in this age of increasing concern for the environment, they need to embrace models of sustainability to a reasonable extent (Brenner, 1998; Brotchie, Batty, Blakely, Hall & Newton, 1995). Being the engines of growth in a country, they have the additional responsibility of ensuring that development activities over the long term are sustainable. With growing international concerns for the environment and increasing awareness among people about sustainable living, there is a need to ensure that economic and other activities are not distanced from environmental considerations.

With the emergence of the information and communication technology (ICT) revolution, the term 'smart city' has become popular in the urban planning literature. Though it is recognized that attainment of this stage would be a natural progression for a city as a result of increased urbanization, it needs to be borne in mind that this term is quite different from 'intelligent city' or 'digital city' (Nicos, 2002), where the emphasis is overly on the use of information and communication technologies in various aspects of societal endeavors. The term 'smart city' is thought to involve the operation of at least six dimensions with the prefix 'smart' (Giffinger, Fertner, Kramar, Kalasek, Pichler-Milanovic & Meijers (2007): *people*, with the emphasis on quality of human resources and the arising social dynamics; *living*, with the emphasis on quality of life; *economy*, with the emphasis on national competitiveness with respect to the reigning international economic order; *mobility*, with the emphasis on connectivity via transportation as well as information and communication technologies; *environment*, with the emphasis on a livable city geared towards sustainability; and *governance*, with the emphasis on participative citizenry in the affairs of the state. Not all cities score well in all of these six dimensions but the deficit in attainment is a useful indication of the extent to which improvements are needed. There is also a school of thought that feels that excessive reliance on these frameworks to categorize 'smart cities' can contribute to the sidelining of other models for promoting urban growth as well as mask the possible deleterious effects of technologies that make cities smart (Graham & Marvin, 1996; Odendal, 2003). Notwithstanding the foregoing, there are several examples of cities which have been labeled as smart: Dubai, Kochi, Amsterdam, Singapore and Malta.

For the purpose of this chapter, we will focus only on the *mobility* aspect of what constitutes a smart city – in particular with respect to transportation. It is an area where smart technologies can play a useful role. With the phenomenal increase in vehicle population, causing road capacity to be strained beyond manageable limits, congestion is taking a toll on the economy and the environment in cities. The externalities imposed by congestion: man-hours wasted by cars idling, monetary value of time lost, environmental deterioration arising as a result of pollution, and the spill-over effects down the economic value chain, call for new approaches to tackle traffic problems. Transportation planners have come to realize that whilst policy tools do have their advantages, they need to be complemented by technologies leveraging on intelligent transportation solutions along the entire process chain. Such systems can broadly be defined as the use of information processing and communication technologies to tackle traffic problems.

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