Chapter 12
Smart, Sustainable, and Safe Urban Transportation Systems:
Recent Developments in the Asia–Pacific Region

Hoong-Chor Chin
National University of Singapore, Singapore

Yueying Wang
National University of Singapore, Singapore

ABSTRACT

One of the fastest growing areas in the world is the Asia-Pacific region. With anticipated acceleration in motorization and potentially-damaging unplanned urban sprawl, the region will be threatened by problems of traffic congestion, pollution and road hazards. Several countries in the region have taken a variety of proactive measures to ensure that the urban transportation systems are designed and operated in a smart, sustainable and safe manner. This chapter identifies the policies and practices in South Korea, Japan, China, Taiwan, Singapore and Australia, and seeks to draw lessons from these on how transportation schemes can be implemented elsewhere in Asia.

INTRODUCTION

One of the fastest growing areas in the world is the Asia-Pacific region, accounting for about 40% of global growth and one-third of global trade in 2013. Rapid economic growth and the large population base mean that the demand for transportation in the domestic sector, particularly in urban areas, is expected to rise in tandem. The World Bank estimates that in the next decade, the region will attract some additional 500 million residents, with more than half of these in urban areas. With anticipated acceleration in motorization and potentially-damaging unplanned urban sprawl, the region will be threatened by problems of traffic congestion, pollution and road hazards.

Yet several countries in the Asia-Pacific Region have taken on a variety of proactive measures to ensure that urban transportation systems are designed and operated in a smart, sustainable and

safe manner. This chapter identifies the urban transportation policies and practices in South Korea, Japan, China including Hong Kong SAR, Taiwan, Singapore and Australia, and seeks to draw lessons from these to establish whether and how these transportation schemes can be implemented elsewhere in Asia.

These practices will be examined following 3 components: smart urban transportation, sustainable urban transportation and safe urban transportation.

Overview of Asia-Pacific Countries

The Asia-Pacific Region generally comprises countries in East Asia (China, Hong Kong SAR, Japan, Republic of Korea and Taiwan), Southeast Asia (Brunei, Cambodia, Indonesia, Loa People's Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam) and Oceania (Australia, New Zealand and the Pacific Islands).

For the purpose of this chapter, seven Asia-Pacific countries (including Hong Kong SAR) are examined. They represent a wide range of population sizes, per capita GDP and degree of urbanization. Singapore has a population of only 5.3 million, which with a 100% urbanized land mass gives a population density of 7,300 people per km^2. It enjoys a per capita GDP of US$50,000 which is projected to increase at a rate of 5.5% in 2014. On the other hand, China has a population of 1.35 billion with 50% urbanization along with a per capita GDP of US$5,900 which is projected to grow at 8.2%.

SMART URBAN TRANSPORTATION

Worldwide, smart urban transportation has been progressively developed with improvements in the following aspects:

1. Sensor technologies, including the use of cameras, lasers and Radio Frequency [RF] sensing and interaction with imaging technologies;
2. Control systems with enhanced sensing technologies, to promote autonomous functions particularly within vehicles;
3. Processing capabilities with supercomputers processing large amounts of data and advanced analytics for big data, offering real-time, responsive solutions;
4. Communication technologies including mobile network technologies, allowing greater use of ubiquitous devices, resulting in more flexible and personal travel choices.

Naturally such systems, championed as Intelligent Transport Systems [ITS], are more likely to be found in the highly urbanized, more developed major cities, like Singapore, Tokyo, Hong Kong and Seoul, where there is a high level of mobile network connectivity. While advanced technologies have been long employed in managing transportation in many Asian Pacific cities, modern sensor devices and their integration in vehicle-to-vehicle [V2V] and vehicle-to-infrastructure [V2I] systems are primarily confined to countries with strong research and development in the automobile industry, such as Japan, and increasingly in Korea and China. There is therefore considerable scope for smart transportation applications in Asian Pacific cities.

Early Developments in Smart Transport in Asia-Pacific Area

A number of developed nations, like Japan, Australia and Singapore, have initiated smart traffic control systems since the 1970s. In 1973, Japan first established the traffic control center on the Metropolitan Expressway marking the start of the nation's ITS era (Ministry of Land, Infrastructure,

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