GUIDELINES FOR THE REGULATORY FRAMEWORKS OF INTELLIGENT TRANSPORT SYSTEMS IN ASIA AND THE PACIFIC
1.1 Background

Transport boosts economic and social development by facilitating the movement of people, goods and resources. Sustainable transport is central to the 2030 Agenda for Sustainable Development adopted by world leaders in September 2015.

However, the transport sector is the fastest-growing contributor to CO$_2$ emissions, as it is the largest global user of energy (36 per cent).\(^1\) It was the second-largest source (24 per cent) of CO$_2$ emissions worldwide in 2015.\(^2\) In particular, CO$_2$ emissions from the transport sector during 1990-2015 increased by 68 per cent, with the road sector accounting for 75 per cent of transport emissions in 2015.\(^3\)

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\(^3\) Ibid.
It is projected that the transport sector’s contributions of CO₂ emissions in Asia will increase from 19 per cent in 2006 to 31 per cent by 2030.\(^4\) Transport is also a major contributor to air pollution. During 2008-2013, from the 20 countries in Asia that recorded data on PM 2.5 levels in cities, only two countries met the levels recommended by the World Health Organization.\(^5\) As of 2017, non-OECD Asian countries, including China and India, accounted for more than 70 per cent of the increase in transport fuel consumption in non-OECD countries, due to the increase in personal mobility.\(^6\)

Promoting sustainable transport systems is a high priority for countries in the Asia-Pacific region, and Intelligent Transport Systems (ITS) are revolutionizing transport in the region by deploying information technology (IT)-based communications and control technologies. These include state-of-the-art smart transport technologies developed in recent years, such as cooperative-ITS (C-ITS), connected vehicles (CVs), smart mobility and autonomous vehicles (AVs or self-driving vehicles). With an increasing number of ITS-related national initiatives, it is expected that demand for ITS deployments will continue growing in the Asia-Pacific region.

Against this backdrop, in 2017 the seventy-third session of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) adopted Resolution 73/4 on the Implementation of the Ministerial Declaration on Sustainable Transport Connectivity in Asia and the Pacific,\(^7\) which recognized the role of transport systems.

Resolutions 72/212\(^8\) adopted by General Assembly in 2017 also stresses “the necessity of promoting the integration of science, technology and innovation into sustainable, integrated, multimodal and intermodal transport systems […] to bring about fundamental, transformative changes to transport systems, including […] information and communications technologies, […]”.

ITS has been adopted in varying degrees by countries in the Asia-Pacific region, with several countries now recognized as world leaders. However, a major obstacle to effective ITS development and operation in the region are challenges to setting up a regulatory framework for ITS.\(^9\) A solid regulatory foundation is a prerequisite to broadly govern the planning, development, implementation and operation of ITS, but the level of understanding of the importance of regulatory foundations is still not high enough in the region.

1.2 Definition of the ITS concept

Because of different priorities in each country for dealing with their transport problems, approaches to ITS development vary that need to be aligned to maximize the benefits gained from ITS. For this, ITS needs to be defined properly to provide intuitive perception about what ITS means to the potential stakeholders.

Given that defining a terminology may reflect practical phenomenon, definitions for ITS also vary by countries and regions, depending on the needs. For example, some definitions for ITS might emphasize the traffic operations perspective,\(^10\) which can be increased by ITS,

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\(^{5}\) Statistical Yearbook for Asia and the Pacific 2016 (ST/ESCAP/2786).


\(^{9}\) ESCAP/CTR/2018/4.

\(^{10}\) “ITS is an overarching tool utilizing electronics, telecommunications and information technology to improve transport system operations, which contribute to increased efficiency, safety, productivity, energy savings and environmental quality.” by Johann Andersen and Steve Sutcliffe, “Intelligent transport system (ITS): an overview”, IFAC Technology Transfer in Developing Countries, vol. 33, No. 18 (July 2000).
or the traffic information perspective, which can be provided by ITS.

ITS entails not just simple hardware systems but also the technologies that implement the services. From the grand scheme perspective, ITS can be the overall system that includes technologies, policies, plans, strategies and regulations for better transport systems to address transport-related issues.

Considering such dynamics and the United Nation’s 2030 Agenda for Sustainable Development, ITS is defined in this report as “Intelligent transport systems are an agglomeration of diverse technologies that enhance the sustainability of transport systems in a safer, smarter and greener way.”

1.3 Purpose of the study

Consideration of the regulatory aspect of ITS is important to enhancing the wider utilization of such technologies in efforts to achieve sustainable transport systems and, eventually, the sustainable development goals (SDGs) in the context of Asia and the Pacific. Given that regulatory challenges and issues are considered to be one of the barriers to ITS development and operation in this region, this report is aimed at providing policy recommendations at the national, subregional and regional levels which help develop ITS regulatory frameworks in Asia and the Pacific. To achieve this goal, the report analyses the current status of ITS development, based mainly on collected inputs from national experts and publicly available sources. The report also presents a methodological assessment of current ITS conditions and future opportunities in order to set up short- and long-term objectives of ITS development and prioritized services for this region.

1.4 Importance of ITS regulatory frameworks

1.4.1 For stakeholders

ITS regulatory frameworks are important for three major stakeholders (figure 1.1)

Public sector

ITS regulatory frameworks help the public sector to define the core role and responsibility of each government agency as well as that between the Government and other public agencies. Such concrete definitions are necessary for the public sector to be able to plan and drive ITS-related initiatives and projects. ITS is an aggregate of multiple components in nature. Given that the initial stage of ITS development projects in most countries is led by the public sector, it is important to clearly identify the ITS priority areas. ITS regulatory frameworks can contribute to the effective selection of the leading public agency in specific areas of ITS. For the same reason, as some ITS-related industries may cause conflicts with other existing industries, it is crucial to provide guidelines for ITS industries by designating the responsible public agencies through the regulatory frameworks in order to avoid any potential conflicts in advance.

Private sector

Alleviating investment uncertainty for ITS development is a major contribution by regulatory frameworks for the private sector. During the initial phase of ITS development, industrial growth is heavily dependent on guidance by the Government. Therefore, the private sector needs to understand in detail the role and responsibility of the public and private sectors, the fields in which public and private sectors work together, and the standards of relevant technologies for consideration in making their business investment.
In particular, for existing ITS-related industries, including telecommunications service providers and transport construction companies, identifying industrial fields that the public sector would pursue is also crucial to determining whether they will participate in such sectors for the ITS business.

**Academic sector**

ITS regulatory frameworks can provide overall direction of research for the academic sector. Based on the understanding of the fields that the public and private sectors plan to pursue, the academic sector can develop practical technologies to satisfy actual needs. Further, a well-defined ITS regulatory framework will contribute to securing research funds by having the public sector assign the proper budgets for supporting consistent research for ITS development, including ITS-related technologies and human resources. Given that efficient collaboration among the public, private and academic sectors is required for ensuring better ITS development...
and operation, such regulatory frameworks can effectively define the scope of ITS, the roles and responsibilities of each relevant entity concerned and the future directions of development.

1.4.2 Bridging gaps in ITS deployment in the region

From the viewpoint of Asia and the Pacific, ITS regulatory frameworks in particular can address the limitations in ITS development and operation resulting from various conditions in this region related to economic, cultural and geographical characteristics, and technological preparedness. In particular, countries in the Asia-Pacific region have various differences in terms of ITS advancement. While there are world-renowned ITS leaders that have achieved their developments within the past 20 years, many countries in the region are still at the initial stage of adopting ITS technologies or yet to have opportunities to initiate such technologies. In this regard, ITS regulatory frameworks can contribute to bridging this gap among countries of the region by providing regulatory guidance that can form an effective basis for ITS development and operation, especially in the case of developing and least developed countries.

1.4.3 Integrating emerging ITS technologies

New ITS technologies are being developed rapidly with supporting techniques, such as artificial intelligence, the Internet of Things and big data analytics. Some countries in the Asia-Pacific region are quickly transforming their traditional use of ITS into more automated systems. Even relatively less developed countries are striving to leapfrog the technology gap by absorbing such smart technologies. C-ITS, AVs (or self-driving vehicles) and smart mobility are the representative forms currently being discussed in the Asia-Pacific region, using various approaches. Considering such drastic changes, ITS regulatory frameworks can act as a pillar of mutually inclusive development of ITS during the technological transition period of interoperability and compatibility, and may also be helpful in determining the direction of such changes.

1.5 Potential benefits from ITS regulatory frameworks

With regard to the above-mentioned potential roles of ITS, two main feasible benefits are expected to be gained from ITS regulatory frameworks:

(a) Better integration for current and future ITS technologies. Given that ITS regulatory frameworks can act as the backbone of regulations that define the direction of technology and policy development, including standardization, this can contribute to developing ITS technologies in a coordinated manner. Considering the fact that new ITS technologies are already being introduced, ITS regulatory frameworks will play a pivotal role in bridging previous and new ITS technologies. In addition, enhanced integration can lead to seamless ITS services, both on the country and regional scale, by ensuring smooth exchanges of data and other information;

(b) More efficient and effective ITS development and operation. ITS regulatory frameworks can lead to ITS development and operation in an efficient and effective way. In order to maximize the benefits, various ITS technologies should be merged and operated systemically, for which ITS regulatory frameworks can guide the roles and responsibilities of the relevant entities. Also, ITS regulatory frameworks can support the sustainability of ITS-related investment and research activities by providing long-term strategies and plans.

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