REVIEW OF DEVELOPMENTS IN TRANSPORT IN ASIA AND THE PACIFIC 2015

TRANSPORT FOR SUSTAINABLE DEVELOPMENT AND REGIONAL CONNECTIVITY

UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific
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2015

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EXECUTIVE SUMMARY

This latest biennial Review sets out transport developments in the Asia-Pacific region and serves as a mechanism for reporting on the provision of transport infrastructure and services; the challenges remaining in regional, urban and rural connectivity; and public health issues, such as road safety and emission pollutions.

The Review finds that regional connectivity has been placed high in policy agenda of many countries in the region. This has resulted in the strong demand for strengthened regional transport connectivity, largely emanating from the desire to have smooth flow of goods movements within the region that also provides inclusive access for the emerging development opportunities to all countries in the region, in particular those with special needs such as least developed countries, landlocked developing countries and small island developing states.

2015 saw the adoption of the global mandate in the 2030 UN development agenda and the agreement to the Sustainable Development Goals (SDGs). Of the 17 goals and 169 targets, transport is specifically mentioned in four targets and indirectly in seven others. SDGs targets for transport include the subjects of resilient and transborder infrastructure; road safety; energy efficiency; safe, affordable, accessible, and sustainable transports systems, notably by expanding public transport; and increased investment in rural infrastructure to achieve an integrated transport network.

To achieve the SDGs, transport’s contribution will need to focus towards achieving an integrated intermodal transport system that provides balanced integration of the three pillars, economic, social and environmental, of sustainable development. Integrated intermodal transport system provides access to economic and social opportunities while accommodating the need of better living environment. The Review examines how an integrated intermodal transport system allows for better optimization in energy efficiency and minimization of harmful emissions to environment and how an integrated transport system also strengthens economic, environmental and social outcomes. The Review also shows that in some subregions, such as South-East Asia, the share of road transport, a heavy polluting mode of transport, is relatively high at 55 per cent, and extremely high in some countries, accounting for more than 90 per cent of the total transport activity. In that regard, the Review highlights the benefits for the region of an integrated intermodal transport system that uses the benefits of a seamless approach to connect and capture the comparative advantages of the different modes of transportation.

The Review shows adoption of overall policy on developing the integrated intermodal transport systems in a number of countries. Increasing investment in environmentally sound railway and intermodal transport hubs has been seen in these countries. Many countries have made substantial efforts to upgrade their road connectivity networks within the region with an increase in the percentage of higher class Asian Highway roads such as class I and II and decrease in the percentage of lower class Asian Highway roads such as class III and below. For the Trans-Asian Railways overall, this upgrading has been slow, with missing links still remaining, which impedes the use of more efficient railway for regional backbone transport.

In the context of SDG 11 on more sustainable cities, the Review reports on the initiatives of the cities of the region to stem the social and economic losses from the burden of increasing congestion and pollution caused by private vehicles. The Review acknowledges the increasing role of intelligent transport systems for urban and inter-city mobility.
The Review recognizes the role of rural accessibility as a key component of success in connecting production with consumption, another SDG, to end hunger and promote sustainable agriculture. Greater connectivity is needed for rural and remote communities in the region where around two thirds of a billion people do not have all-weather access, and further onwards connection to the regional networks, such as the Asian Highway and Trans-Asian Railway.

The Review also reports the region’s greater interest and the need in further improving road safety, which resulted in social and economic loss from road traffic fatalities with some 733,000 deaths on Asia-Pacific roads in 2013, especially in East and North-East Asia and the Pacific subregions where their fatality levels have increased from 2010.

PART I – INTRODUCTION

Asia and the Pacific region has become less dependent on its traditional markets in Europe and North America with more than half of its trade now conducted within the region. This situation calls for enhancing regional connectivity. Structural bottlenecks, such as poor quality transport infrastructure, are hindering the potential for more trade within subregions. By strengthening cross-border overland links with their neighbours, the region can achieve a more balanced distribution of trade flows. The need for better intraregional transport systems is being addressed with several regional initiatives paving the way with the help of infrastructure-focused funds for boosting connectivity among ESCAP member States.

PART II – TRANSPORT AND SUSTAINABLE DEVELOPMENT

Sustainable development is one of the key issues facing policymakers today, a fact underlined by four of the seventeen new United Nations Sustainable Development Goals — which come into effect from 2016 — including targets that make specific reference to transport and infrastructure. Demographic trends, such as rapid urbanization and the increase in disposable incomes, are pushing up demand for private vehicles. This, in turn, has resulted in several negative environmental externalities. Motorization also has negative social consequences, such as an increasing number of traffic accidents and possibly greater inequality, both within urban areas and between urban and rural areas. The key to making the transport sector more sustainable is to encourage both passenger and freight transport to shift to more sustainable modes of transport. For passengers, the provision of infrastructure to facilitate non-motorized transport (walking and cycling) and high quality public transport systems are the way forward. Road transport remains the dominant mode for freight transport, accounting for an ever-increasing proportion of fossil fuel consumption. Governments must consider measures to encourage more intermodal transport, which would allow shippers to take advantage of the environmental and economic efficiencies of railways, maritime transport and inland waterways and the flexibility and reliability of road transport. The promotion of railways for long-distance freight movement and intermodal transport and the use of intelligent transport systems are essential for improving sustainability in the region.
PART III – INTEGRATED INTERMODAL TRANSPORT SYSTEM

CHAPTER 1 - REGIONAL TRANSPORT CONNECTIVITY

INFRASTRUCTURE NETWORKS
Over the past fifty years, infrastructure networks in the ESCAP region have grown faster than in any other region in the world. Significant progress has been made in linking major production and consumption centres with intensive transport network. Governments have put a lot of effort in upgrading and improving the quality of these networks, with the region now boasting world class highways, high-speed railway systems and some of the busiest ports and aviation hubs in the world. In particular, progress has been made under the frameworks of the intergovernmental agreements on the Asian Highway, Trans-Asian Railway, and dry ports. However, the region has yet to achieve the kind of “seamless connectivity” that would allow countries to make the optimal use of regional infrastructure networks, and thereby bring down transport and logistics costs. This chapter provides an update on the status of those networks and a number of major ongoing and planned highway and railway projects, while also discussing several major dry port development projects and the prospects for further development.

TRANSPORT FACILITATION AND LOGISTICS
Non-physical barriers to transport add to logistics costs. The facilitation of transport and the improvement of logistics performance would enhance the competitiveness of the region’s developing countries, particularly its landlocked developing countries. One of the most effective means to facilitate transport is through harmonization of norms, standards, processes and procedures, which can be accomplished through: accession to international legal instruments; subregional facilitation agreements; and implementation of facilitation models. Innovative approaches and technologies are available to help governments expedite cargo, crew and vehicle processing times at borders while allowing them to maintain control. These include integrated check posts, automated customs processes, and the use of radio-frequency identification and intelligent transport systems to track cargo and vehicles. Various “e-logistics” systems, are directed at streamlining logistics procedures and improving logistics performance.

INTER-ISLAND SHIPPING IN THE PACIFIC SUBREGION
The maritime sector plays an important role in many countries of the ESCAP region, but it is especially critical for the maritime countries of the Pacific subregion. This subregion is heavily dependent on shipping services for the domestic and international transport of cargo and passengers. Inter-island shipping is also central to the lives of Pacific islanders, often providing the only means of access to and from the smaller outer islands, as well as being a major source of employment. Given its importance, governments in the region have formulated a number of cooperation frameworks to strengthen the maritime sector. The efficiency of services has also been enhanced with the emergence of several hub ports as major transhipment points, resulting in relatively good north-south and east-west international shipping connections with major trading partners for all categories of cargo. However, a number of challenges remain, including the poor safety record of the sector, insufficient budgets to invest in new infrastructure and lack of effective maintenance regimes for existing ports. The chapter reviews policy options for overcoming these challenges.

CHAPTER 2 – URBAN TRANSPORT

The Asia-Pacific region is home to more than two billion urban residents, representing 55 per cent of the world’s urban population. Unprecedented population growth and the expansion of Asian cities is putting tremendous pressure on urban public transport systems, while the rapid growth of private vehicle ownership has led to worsening traffic congestion and greater road crashes, emissions and air pollution. An increasing number of poor people inhabit urban areas, as more and more people migrate to cities from rural areas. However, Asian cities feature a colourful array of urban transport modes, such as para-transit, public transport, taxi
services, and non-motorized transport (walking and cycling). Drawing on the examples from the region, some of the main policy options which would be effective in developing sustainable urban transport systems are presented.

CHAPTER 3 – RURAL TRANSPORT

Many of the region’s poor population do not have access to safe and affordable means of transport, particularly in rural areas where the majority of the poor live. As a result, they remain excluded from socioeconomic activities and services, which could help them overcome their poverty. The level of rural connectivity varies from country to country, with people living in least developed countries having the lowest levels of access to all-weather roads. Access to rural roads alone, however, will not lead to sustainable development results. Selected national rural road development programmes demonstrate innovative techniques for promoting the involvement of local people and using locally sourced materials, including some aimed at integrating other development targets, such as resilience and employment generation.

CHAPTER 4 – ROAD SAFETY

Road safety now fully acknowledged as being important development objectives. Goal 3 of SDGs: Ensure healthy lives and promote well-being for all at all ages, includes a specific target to halve the number of global deaths and injuries from road traffic accidents by 2020. The growing epidemic of road injuries and fatalities has made traffic crashes the leading cause of death among young people (15-29 year olds) globally. In addition to the “human” cost, road crashes result in tangible economic losses to victims, their families, and nations as a whole. In response, many governments in the ESCAP region have initiated road safety policies, but statistics reveal that they have had mixed success. Effective measures are being taken to address the causes of road crashes, including safer infrastructure, more harmonized traffic signs, and behavioural factors, such as reducing speeding, drink-driving and promoting the wearing of seatbelts.

CHAPTER 5 – TRANSPORT FINANCING

The Asia-Pacific region is facing soaring demand for transport infrastructure to support its economic development and burgeoning population. To meet this demand, the investments required are considerable and governments are exploring ways to mobilize both public and private financial resources. With regard to public finance, governments have to consider how to mobilize greater domestic resources, access new external resources and improve public expenditure management. Concerning private finance, public-private partnerships have become a key mechanism for channelling private resources for infrastructure development. These partnerships have a long history in the transport sector across the ESCAP region, with approximately $230 billion being mobilized during the period 2000-2014 through this mechanism. Developing successful public-private partnership projects is, however, challenging. In response to the need for sustainable development, the region shows increase of investment in more economical and environmentally sound railway infrastructure.
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The term “East and North-East Asia” in this publication refers collectively to: China; Hong Kong, China; Democratic People’s Republic of Korea; Japan; Macao, China; Mongolia; and Republic of Korea.

The term “North and Central Asia” in this publication refers collectively to Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Russian Federation, Tajikistan, Turkmenistan and Uzbekistan.

The term “Pacific” in this publication refers collectively to American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.

The term “South and South-West Asia” in this publication refers collectively to Afghanistan, Bangladesh, Bhutan, India, the Islamic Republic of Iran, Maldives, Nepal, Pakistan, Sri Lanka and Turkey.

The term “South-East Asia” in this publication refers collectively to Brunei Darussalam, Cambodia, Indonesia, the Lao People’s Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste and Viet Nam.

Values are in United States dollars unless specified otherwise.

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INTRODUCTION

1. INTRODUCTION

Asia and the Pacific continues to be the world’s largest trading region, accounting for almost 40 per cent of the world’s exports and imports. Despite turbulence in the global economy caused by the 2008/09 financial crisis, many countries in the region managed to maintain positive growth. This growth has been the result of many factors. Among others, this has partly been achieved through steps to liberalize trade taken by countries over the last twenty years, which have deepened trade and investment ties within the region, and through the development of transport infrastructure and services, which has connected newly emerging production and consumption centres across a wider range of countries.

When trade expands, demand for freight transport also grows. Maritime transport has been the backbone of international trade. Furthermore, the development of a complex web of transport and logistics networks on land has been an equally important factor sustaining the export-driven growth of many countries, with roads, railways and inland waterways playing a vital role in moving goods to and from the ports.

Part I of this review looks at some of the major international trade trends in the region that are likely to affect regional transport demand and investment in the near future. It then describes selected regional initiatives that help enhance efforts on regional connectivity and sustainable transport, including collective financing mechanisms established to implement those initiatives.

2. TRANSPORT TRENDS

The integration of the economies in Asia and Pacific into the global market and supply chains has resulted in continuous economic growth, with the region’s share of global exports and imports reaching nearly 40 per cent. While the adage “supply from the East, consume in the West” has long been known as a model that has driven growth both in the region and globally, recent figures on the proportion of merchandise exported from the Asian and Pacific region reveal the increasing trends.

As transport demand can be expected to increase in line with growing trade volume, it is critical to enhance distribution networks by improving the availability and quality of infrastructure and its operational capacities. The region’s economic growth is dependent on transport connectivity to allow more efficient and greater trade flow, as many countries’ economies are heavily reliant on exports for fiscal revenues and foreign exchange inflows. In the Asia-Pacific region, the commodity export to GDP ratios exceeds 30 per cent in Azerbaijan, Brunei Darussalam, the Islamic Republic of Iran, Kazakhstan, Mongolia, Myanmar, Papua New Guinea, Timor-Leste, and Turkmenistan. The example of the extent of
Figure 1.1 Destinations of merchandise exports from Asia and the Pacific, 2002-2014


Figure 1.2 Freight transport intensity by mode in percentage of total tonne-km for East and North-East Asia (2012), South-East Asia (2012) and North and Central Asia (2013)

East and North-East Asia is represented by key dominant countries: China, Japan and Republic of Korea. North and Central Asia is represented by countries with available data: Azerbaijan; and Russian Federation. South-East Asia is represented by countries with available data: Lao People’s Democratic Republic; Myanmar; Thailand; and Viet Nam.

Note: Freight data for certain modes are missing for some countries. The totals for Japan and Republic of Korea are only for road, rail, and coastal shipping. For member countries of the Association of Southeast Asian Nations (ASEAN), air transport data are missing for Thailand and Viet Nam. Road transport data are missing for Indonesia.

BOX 1.1. DECLINING OIL PRICES — A THREAT AND AN OPPORTUNITY

The recent collapse in global oil prices has had an uneven impact on countries in the Asia-Pacific region, providing major opportunities for some while putting others under severe budgetary strain. Oil-exporting countries are expected to reduce government spending as the value of their oil exports falls: Malaysia and the Russian Federation, for example, set their budgets based on expectations of oil prices of $100 per barrel, and have since been forced to trim them. This is likely to affect infrastructure spending, including on transport; the Government of the Russian Federation has already suggested social spending will be prioritized and long-term investment in improving transport connections will be cut.

With the value of their exports falling, pressure has been placed on the currencies of oil-exporting countries. The currencies of Malaysia and the Russian Federation have depreciated considerably, despite efforts to support the currency, which include spending more than 20 per cent of their respective foreign currency reserves. Kazakhstan, which operates a fixed exchange rate system, has been forced to devalue its currency. Currency depreciation could adversely affect the ability of countries to finance future transport infrastructure projects, as their ability to enter foreign currency debt markets becomes restricted.

On the other hand, the fall in oil prices could have positive effects on oil-importing countries, boosting both manufacturing and domestic consumption; this, in turn, is likely to increase transport demand and activities. Furthermore, many oil-importing countries in the Asia-Pacific region, such as India and Indonesia, have significant fuel subsidy programmes. The reduction or removal of subsidies releases budgetary resources, which, in turn, could be invested in infrastructure and development. In that regard, India recently pledged to reallocate funds towards infrastructure investment.

At the regional level, the Review of Maritime Transport 2015 published by the United Nations Conference on Trade and Development (UNCTAD) shows that in 2014, seaborne trade volume in Asia was 3.8 billion tonnes loaded, which is nearly 40 per cent of the total global figure. The unprecedented growth in containers moving through Chinese ports in the 1990s and 2000s has provided a visible example of the close relationship between investment, trade, transport and economic growth. Even today, eight out of the top ten Asian container ports are located in China, together with Singapore and Busan in the Republic of Korea (figure 1.3). Maritime transport and its connectivity have important roles to play in helping the region meet the increasing demand for transport.

In the Asian and Pacific region maritime transport plays an important role in regional trade. However, it should be noted that the region has 12 landlocked countries. Four of them are among the least developed countries and the rest are still economies in transition that do not have direct access to maritime transport. For landlocked developing countries, cross-border trade often commands the dominant share: India, for example, accounts for 50 per cent of exports from Nepal. Efforts to improve transport infrastructure in both landlocked developing countries and their transit neighbours will enable landlocked countries to reach maritime ports in other countries at lower costs and in faster times, and thereby allow them to diversify their import and export markets. Land transport still plays an important role in connecting these countries to the sea. Among the options for land transport, railways have proven to be the most economical.

The need for intraregional connectivity is highlighted through the increasing share of intraregional trade. However, due to different geographical conditions, infrastructure statuses and trade patterns, the demand for transport differs for each inter-subregional trading pair depending mainly on the availability of a service and its efficiency, as well as on transport cost.

Comprehensive freight data are scarce. This section reviews freight transport intensity in subregions based on available data. Figure 1.2 shows that in the East and North-East Asia subregion, land transport is the most dominant mode with road transport accounting for nearly half of total transport volume, followed by rail transport with almost a quarter of the share. The share of land freight in China represents more than 95 per cent of total land freight in this subregion, while Japan has a dominant share in coastal shipping, at nearly 70 per cent.
Figure 1.3 Shipping throughput in top 20 Asian ports in 2014

(1,000,000 TEU)

Source: Lloyd's List Intelligence (2015).
Despite the slowdown in growth in the world’s manufacturing heartland, Asia still dominates the list of the top 100 container ports in the world. There are 48 Asian ports on the list of the Containerisation International Top 100 Ports. Chinese ports, including Hong Kong, China and those in Taiwan Province of China, continue to dominate the list, making up no fewer than 12 of the top 20 Asian ports. The key results are presented in figure 1 (a) and (b).

Shanghai held the top spot for the fifth consecutive year, with volumes climbing 5 per cent, from 33.6m twenty-foot equivalent units (teu) to 35.3m teu. The container port benefited greatly from a surge in transshipment traffic heading up the Yangtze River, the country’s main economic artery, which stretches for thousands of miles. Singapore retained second place after reporting another successful year in 2014, with volumes increasing 5.1 per cent to 33.9m teu. Outside of Singapore, other ports in South-East Asia, namely Ho Chi Minh City in Viet Nam, Port Tanjung Pelepas in Malaysia and Port Klang, and Laem Chabang port in Thailand were experiencing increasing volumes. The transshipment hub for the Republic of China, Busan, and the Tokyo port, also make the list. The geographical distribution of the region’s top 20 ports is shown in figure 1.7.

Source: Lloyd’s List Intelligence (2015)

The data compiled for the South-East Asia subregion is slightly different as it also contains data on maritime transport, which the others lack. The figure shows a slightly different pattern for the South-East Asia subregion. While the share of land transport is still prominent, rail transport has a much smaller role in this subregion when compared to East and North-East Asia and North and Central Asia.

Land transport also has a prominent role in North and Central Asia with a share of about 64 per cent. However, unlike East and North-East Asia, rail freight has a much higher share, with more than 57 per cent of total volume. Pipeline transport has the second highest share; it accounts for nearly one-third of the total freight volume in this subregion.

Although the figures for South and South-West Asia and the Pacific subregions are not included due to insufficient data, freight transport intensity by mode can be drawn from geographical positioning; the Pacific island countries naturally rely far more on maritime transport than land transport. South and South-West Asia faces a bottleneck in realizing the full potential of rail transport, while inland waterway transport is heavily dependent on road transport.7
Asia-Pacific Economic Cooperation Blueprint
The 2013 Leaders’ Declaration on APEC Framework on Connectivity and the 2014 APEC Connectivity Blueprint for 2015-2025 envisions connectivity as a means to encourage balanced, secure and inclusive growth. The Asia-Pacific Economic Cooperation (APEC) leaders chose three pillars to define connectivity: physical connectivity, institutional connectivity, and people-to-people connectivity. The APEC Blueprint proposes two strategies — capacity-building and private sector cooperation —, which are based on economic and technical cooperation (ECOTECH) and public-private partnerships (PPPs), respectively. The Blueprint includes yearly reviews of the status of implementation and allows the addition of new policy initiatives.

Association of Southeast Asian Nations Economic Community
ASEAN member States are currently implementing their Master Plan on ASEAN Connectivity, which was adopted by their Heads of State/Governments in 2010. The Master Plan aims to enhance national and regional connectivity to reduce development gaps and improve the socioeconomic conditions of member countries. Transport infrastructure and regional transport agreements are crucial parts of the Master Plan. Key infrastructure initiatives include the expansion of the Asian Highway and the completion of the missing links in the Singapore-Kunming Rail Link project. Notable ASEAN deals to facilitate transport and investment include initiatives pertaining to the transport of goods, multimodal transport, interstate transport, and the

Claudine Van Massenhove / Shutterstock.com
integration of air and maritime travel, some of which are discussed further in parts II and III. The implementation of the Association’s various free trade area agreements with its main trading partners, and the launch of the ASEAN Economic Community at the end of 2015, will provide further impetus to ASEAN members to push for improved connectivity.

Eurasia Initiative
At the 2013 International Conference on Global Cooperation in the Era of Eurasia, the President of the Republic of Korea proposed the “Eurasia Initiative” as a “set of directions for making Eurasia into a single united continent, a continent of creativity and a continent of peace.”9 The Initiative seeks to reinvent the Silk Road through integrating different modes of transport, including railroads, roads, aviation and maritime transport. A major focus of the initiative is the development of the “Silk Road Express” (SRX) to connect China, the Democratic People’s Republic of Korea, the Republic of Korea, and the Russian Federation with Europe.10 It is expected that upon completion of SRX, it will take only 14 days to transport goods through to the Suez Canal instead of the current 45 days. The key component of the SRX is the construction of the Trans-Korean Railway, linking the Republic of Korea and the Democratic People’s Republic of Korea.

“Belt and Road” initiatives
One of the most ambitious initiatives to improve connectivity and cooperation among Asian countries is the China’s vision to restore the old Silk Road trade routes. Often referred to as the “Belt and Road” Initiatives, the two main projects are the Silk Road Economic Belt spanning China, Central Asia, the Middle East and Europe; and the 21st Century Maritime Silk Road linking southern China to South-East Asia, South Asia, West Asia and Europe.

Central Asian countries are involved in the creation of the Silk Road Economic Belt, while countries in South-East Asia and South and South-West Asia are involved in the Maritime Silk Road Initiative through their ports. These ports will be linked to the
hinterland with highways and roads that connect the Maritime Silk Road to the Silk Road Economic Belt. China has established a $40-billion fund in support of the Silk Road initiative, which will be invested in infrastructure, industrial and financial cooperation projects.

**China-Pakistan Economic Corridor**
The China-Pakistan Economic Corridor (CPEC) involves the construction of highways, railways, and oil and gas pipelines along the 3,000-km route connecting Kashgar in China to the port of Gwadar in Pakistan, through the Pakistani cities of Lahore, Islamabad and Abbottabad. The project will be financed and built mainly by China, which aims to transport oil via pipelines and highways to Xinjiang province, while Pakistan will use the infrastructure to help address its own energy shortages. In November 2014, the Government of China announced plans to finance about $33.8 billion in energy and $11.8 billion in infrastructure projects, including $622 million for the further development of Gwadar Port. Further details of CPEC are given in part III, chapter 1.

**South Asian Association for Regional Cooperation Connectivity Decade**
The South Asian Association for Regional Cooperation (SAARC) has designated the 2010-2020 decade as the “Connectivity Decade” to prioritize intraregional connectivity in South Asia. Key infrastructure projects include the Petropil-Benepole corridor, Bagdogra Airport, the Wagua-Lahore rail links and the Colombo Port Expansion. However, in late 2014, during the 18th SAARC Summit, India proposed three SAARC connectivity pacts — an electricity grid and trade in electricity, and road and rail connectivity plans. This led to the signing of the SAARC Framework Agreement for Energy Cooperation (Electricity) at the Summit. Progress in achieving greater connectivity in the subregion is dependent on reaching a broader consensus among SAARC member countries.

**Framework for Pacific Regionalism**
The Framework for Pacific Regionalism is the master strategy designed by the Pacific islands to strengthen regional cooperation and integration. The Framework aims to establish “a region of peace, harmony, security, social inclusion and prosperity, so that all Pacific people can lead free, healthy and productive lives”. It focuses on improving coordination, cooperation, collaboration, harmonization and integration among member States. To monitor progress, implementing agencies identify measurable outcome indicators and ensure that every initiative has a detailed implementation and monitoring plan. The Forum Secretariat monitors the progress, and reports on it annually. Further details on transport cooperation are given in part III, chapter 1.

**b. New financing initiatives for infrastructure development**
As has been noted in various studies, the Asia-Pacific region suffers from a significant “infrastructure deficit”, with about $8 trillion in national infrastructure and $290 billion in regional infrastructure needed to be invested between 2010 and 2020 in order to sustain growth. Part of the challenge for the region is in creating attractive investment opportunities that would encourage investors to keep their money in the region.

For example, infrastructure investment in the five major South-East Asian economies, namely Indonesia, Malaysia, the Philippines, Thailand and Viet Nam, was only $25 billion in 2010, compared with $38 billion in 1997. It has been posited that these low investment rates can be explained, to some degree, by governments’ attempts to maintain current account surpluses and build up foreign exchange reserves in order to prevent a rerun of the 1997 Asian financial crisis. As a result, government reserves are being invested in short-term developed economy bonds as a safety measure to counter any capital outflows, rather than being directed to domestic investment projects, such as in infrastructure development.
To overcome these tendencies, efforts are being made to tap regional capital markets, for example, by ensuring the development of local currency bond markets. Many governments are also encouraging PPPs in infrastructure projects to leverage financing and skills in the private sector, a topic which is described in greater detail in part III, chapter 5.

Another promising source of financing is expected to come from various infrastructure-focused funds, which have been established to support the initiatives described above, as well as the establishment of the Asian Infrastructure Investment Bank. These funds are seeking to benefit from the growth of the region’s infrastructure market, which one study estimated would expand 7 to 8 per cent a year between 2014 and 2024, approaching $5.36 trillion annually by 2025.17

Asian Infrastructure Investment Bank

In 2013, President Xi Jinping of China proposed the creation of a development bank focused on providing loans for developing Asian infrastructure, an idea which became the Asian Infrastructure Investment Bank (AIIB). In June 2015, fifty founding members signed the Articles of Agreement to establish the bank, including some non-regional members, such as France, Germany, Italy and the United Kingdom of Great Britain and Northern Ireland. Other prospective founding members have until December of 2015 to sign it. To reflect the regional character of the bank, the regional members will hold 75 per cent of shares.18 With a capital base of $100 billion, AIIB is expected to significantly increase the infrastructure funding available to developing Asian economies (in comparison, the capital base of the Asian Development Bank (ADB) is $165 billion). China will be the largest shareholder with a 30-per cent stake in the bank.19 AIIB could start operation after the Articles of Agreement enters into force, which requires that ten countries holding not less than 50 per cent of the initial capital stock have deposited their instruments of ratification, acceptance or approval.

Association of Southeast Asian Nations Infrastructure Fund

In 2013, ASEAN established the ASEAN Infrastructure Fund (AIF) to provide financing to sovereign and sovereign-guaranteed projects. All AIF-funded projects are co-financed by ADB, which also acts as the AIF administrator. The ten members of ASEAN are members of the Fund, including Myanmar, which joined in 2014. AIF is financially self-sustaining, with operations financed by equity contributions from member countries and, starting in 2017, by debt issuance. The selection criteria for projects include economic and financial returns, in addition to having an impact on poverty reduction. In 2014, ADB announced that it had approved a $172.7-million loan for an electricity infrastructure upgrading project in Ha Noi and Ho Chi Minh cities in Vietnam, which is being co-financed with a $100 million ASEAN Infrastructure Fund loan.20

Pacific Region Infrastructure Facility

The Pacific Region Infrastructure Facility (PRIF) is a multi-agency funding facility launched in 2008 to support the development of infrastructure that enhances growth and improves living conditions in small Pacific island developing economies.21 PRIF coordinates with countries to develop and finance strategic projects, and provides research assistance in developing long-term national infrastructure investment plans. It expects that between 2008 and 2009 and 2016 and 2017, PRIF partner agencies will have provided about $1.7 billion to fund infrastructure development.

Global Infrastructure Facility

The Global Infrastructure Facility (GIF) became operational in April 2015.22 With initial capitalization of $100 million, GIF is administered by the World Bank in partnership with the private sector and regional and multilateral development banks, such as the Eurasian Development Bank, the Islamic Development Bank and the Japan Bank for International Cooperation. This new lending capacity seeks to involve the private sector in financing emerging countries’ infrastructure
projects that governments and commercial banks alone cannot finance. The GIF platform will also provide assistance in preparing and designing projects.

During the three-year pilot phase, GIF will support projects with regional or global public good characteristics that are “trade-enabling”, “facilitate or enhance interconnectivity and trade” and “climate smart” (“low carbon-emitting, encourage energy and/or carbon efficiency in the provision of infrastructure services, and/or strengthen climate resilience”). From a regional perspective, GIF may become a useful facility for financing multi-country transport projects, because it gives particular attention to complex projects that require multi-party involvement to secure the necessary commitment and financial support. Within the transport sector, GIF will target airports, maritime ports, railways, mass transit systems and highways.

**Silk Road Fund**
The Silk Road Fund, established in December 2014, supports investments in infrastructure and financial cooperation projects under the Belt and Road Initiative.\(^{23}\) The Fund is set to function as a China-controlled private equity venture for financing the development of roads, ports and other transport facilities along an integrated land and maritime corridor. Most of the funds are expected to be allocated to South Asian and Central Asian countries in line with efforts to strengthen connectivity between its western inland regions and neighbours to the west of the country.

The first project under the Silk Road Fund is the $1.65-billion Karot hydropower project in Pakistan in April 2015. Additional projects are expected following the signing of a memorandum of understanding in September 2015 between the Silk Road Fund, the Russian state development bank and the Russian Direct Investment Fund to jointly invest in infrastructure construction and industrial cooperation projects, especially in the electricity and energy sectors.\(^{24}\)
Endnotes

1 ESCAP (2015a).
2 ESCAP (2015a).
3 ESCAP (2015b), chap. 1.
5 Lloyd's List Intelligence (2015).
6 The least developed landlocked countries of Asia are Afghanistan, Bhutan, the Lao People’s Democratic Republic and Nepal. The landlocked countries with economies in transition are Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan and Uzbekistan.
7 See www.unescap.org/sites/default/files/connectivity%20policy%20dialogue%20highlights%20final.pdf
10 SRX is a rebranding and expansion of the old Trans-Korea Railway concept.
11 Ashgar (2014).
14 ADB and ADBI (2009).
15 ESCAP (2014b).
16 ESCAP (2015b).
17 PriceWaterhouseCooper (2014).
18 Asian Infrastructure Investment Bank (AIIB).
20 ADB (2014a).
21 See www.theprif.org/.
23 Carsten and Blanchard (2014).
1. INTRODUCTION

Given the success of the Millennium Development Goals in achieving a decline in global poverty and health problems by 2015, a new set of goals have been drawn up to build upon those achievements while addressing their perceived gaps and accounting for the world’s growing population. The Sustainable Development Goals deal with the challenges facing a new generation and include among its targets a number of key transport targets.

To maintain and foster the positive growth exhibited across Asia and the Pacific, transport is of paramount importance as the region increasingly recognizes the need to embrace more sustainable growth. Policymakers are becoming increasingly aware of the need to integrate the three pillars of sustainable development — economic, social and environment — into their transport planning and policies. Understanding the ways in which those three pillars are interlinked in this new era will help to ensure that these policies make transport more, and not less, sustainable.

Rising per capita incomes have resulted in a surge in the number of cars and motorcycles in both rural and urban areas. The resulting scourge of road traffic crashes — the main cause of death globally and the leading cause of death among the young — and their associated injuries must be tackled to mitigate the unacceptable effects on both the families of those involved and on the economies of the region’s countries. Meanwhile, the population in Asia and the Pacific is ageing, presenting a new set of transport challenges for the region’s governments.

Ensuring the safety and long-term sustainability of transport options is essential for the current and future movement of people, goods, labour, resources, and products for consumers and for producers. With the transport sector accounting for almost a quarter of global carbon dioxide (CO₂) emissions in 2012 and the Commission for Global Road Safety referring to the deaths and injuries resulting from road traffic crashes as a “growing public health epidemic”, the arrival of the Sustainable Development Goals could not be more timely. The need to address the sustainability of the region to cater for the future health of its citizens while also providing for economic progression and social equity has never been more pressing.

Making the right choices is critical. Part II of this review presents the options available to policymakers seeking to improve the social, environmental and economic outlook of their citizens.
2. TRANSPORT AND THE THREE PILLARS OF SUSTAINABLE DEVELOPMENT

If planned and managed in a sustainable way, transport can improve the quality of life for people all over the world. In 2012, the United Nations Conference on Sustainable Development recognized “the importance of the efficient movement of people and goods, and access to environmentally sound, safe and affordable transportation as a means to improve social equity, health, resilience of cities, urban-rural linkages and productivity of rural areas”.

More recently, in September 2015, the United Nations Sustainable Development Summit adopted 17 new Sustainable Development Goals, successors to the Millennium Development Goals, which had a significant effect on the health and wellbeing of the world’s citizens. The Sustainable Development Goals will come into effect on January 1, 2016; four out of the 17 Goals include targets that make specific reference to transport and infrastructure (table 2.1), a development that recognizes the vital role in progressive, sustainable and long-term development.

### Table 2.1 Goals and targets relating directly to transport under the Sustainable Development Goal

<table>
<thead>
<tr>
<th>SUSTAINABLE DEVELOPMENT GOAL</th>
<th>TARGET RELATED TO TRANSPORT AND INFRASTRUCTURE</th>
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<tbody>
<tr>
<td>GOAL 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture</td>
<td>Increase investment, including through enhanced international cooperation, in rural infrastructure, agricultural research and extension services, technology development and plant and livestock gene banks in order to enhance agricultural productive capacity in developing countries, in particular least developed countries</td>
</tr>
<tr>
<td>GOAL 3. Ensure healthy lives and promote well-being for all at all ages</td>
<td>By 2020, halve the number of global deaths and injuries from road traffic accidents</td>
</tr>
<tr>
<td>GOAL 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</td>
<td>Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all. Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States</td>
</tr>
<tr>
<td>GOAL 11. Make cities and human settlements inclusive, safe, resilient, and sustainable</td>
<td>By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons</td>
</tr>
</tbody>
</table>
Governments now face the challenging task of designing effective policies to help achieve those targets. Given the tremendous diversity of the region, each government will have to take into consideration the specific circumstances of their country. Nevertheless, there are several common social, economic and environmental issues that governments must address in order to ensure that current and future transport systems are sustainable and inclusive.

**a. Growing demand for transport from economic growth and demographic trends**

As shown in part I, the region has, on average, enjoyed a positive growth trajectory over the past decade. Increases in per-capita income have historically been strongly associated with a rise in demand for transportation, most notably for road vehicles and motorcycles. Within developing countries in the ESCAP region, per capita income rose, on average, from $417 in 1973 to $2,834 in 2013 (as measured in US 2005 dollars), fuelling the strong growth in demand witnessed for motorcycles and cars, particularly in urban areas.

While motorization rates generally rise in line with levels of disposable income, the relationship between income growth and vehicle ownership is not necessarily so linear. One study found rates of ownership to be growing slowly at the lowest levels of per-capita income, about twice as fast as income growth at middle-income levels, in line with income growth at higher income levels and then reaching saturation at the highest levels of income. According to this study, China will have 269 vehicles per 1,000 people by 2030 — comparable to the vehicle ownership levels of Japan and Western Europe in the early 1970s. Vehicle ownership in India and Indonesia is also projected to grow nearly twice as fast as per-capita income, though not as quickly as in China.

With the region’s economies shifting towards industrial and service-oriented models, a growing proportion of their populations are expected to move into cities. As of 2012, it was estimated that 46 per cent of the region’s population lived in urban areas. Between 2010 and 2020, the urban population across the ESCAP region is expected to grow by some 455 million people, which equates to a 25 per cent rise in the urban population within a decade. This has contributed to the proliferation of motorcycles and cars in Asian cities.

Rapid motorization has resulted in serious congestion, which has been estimated to cost Asian economies 2-5 per cent of GDP every year due to lost time and higher transport costs. Though difficult to quantify because of insufficient data, a study conducted in the Republic of Korea found that the costs of congestion have been rising by more than 8 per cent per annum since the beginning of 2000. As urbanization trends continue, policymakers need to reconcile the challenge of developing long-term transport policies for cities that are transforming rapidly in the short term (see also part III, chapter 2 for the issues on urban transport), while also seeking to minimize pollution and its effects both locally and globally.

Another long-term demographic change in the ESCAP region is its ageing population. It is projected that the elderly population, defined as those aged 65 or older, will grow by 41 per cent between 2012 and 2022, from 315 million to 445 million. As the transport requirements of the elderly differ to those of the rest of the population, improvements in physical access to transport infrastructure, as well as the adaptation of services for less-mobile populations, will be needed. Recognizing this trend, the Governments of Japan and the Republic of Korea have already enacted legislation to make transport more accessible for the elderly and people with disabilities by introducing improvements, such as step-free facilities in major rail and bus stations and sea and air terminals.

The rapid expansion of travel and tourism services in the region along with increasing number of passengers travelling by air are also linked to this rise in disposable incomes.
In 2014, air carriers in the Asia-Pacific region recorded an increase of 5.8 per cent in passenger numbers on the previous year, and by 2034, the International Air Transport Association (IATA) expects that nearly half of all air travel (some 2.9 billion journeys) will incorporate the Asia-Pacific region.\(^\text{11}\)

Another indicator of the region’s growth is that intraregional tourism flows now account for a growing share of the tourism market. As intraregional travel becomes cheaper and more popular, tourism is expected to become an increasingly important source of foreign exchange earnings for many countries in the ESCAP region, particularly for the Pacific island countries.\(^\text{12}\)

**b. Environmental externalities caused by the transport sector**

According to the International Energy Agency (IEA), oil use is increasingly concentrated in just two sectors: transport and petrochemicals (IEA 2013).\(^\text{13}\) Within the ESCAP region, road transport consumes approximately 83 per cent of the petroleum products used by the transport sector, with aviation following at 12 per cent and rail at 4 per cent (figure 2.1). As noted above, the number of private vehicles in the region is expected to increase as wages and incomes rise, while road freight transport is forecast to maintain strong growth through 2035.\(^\text{14}\)

As a result of its high level of fossil fuel consumption, the transport sector accounted for almost a quarter of total global carbon dioxide (CO\(_2\)) emissions in 2012. In the ESCAP region, road transport produces about 1,800 million tonnes out of a total of approximately 2,150 million tonnes, or 80 per cent of total CO\(_2\) emissions, followed by aviation and rail. Transport emissions also include particulate matter (PM), nitrogen oxides (NO\(_x\)), sulphur oxide (SO\(_x\)), ozone (O\(_3\)) and volatile organic compounds (VOCs), which cause damage not only to human health but also to ecosystems and buildings.\(^\text{15}\)

Noise pollution often had been often overlooked as an environmental externality, but it is now more widely recognized that continual noise pollution is harmful to physical and mental health, particularly for urban residents living near highways. For example, a 2011 World Health Organization (WHO) study estimated that at least one million healthy life years are lost every year from traffic-related noise in Western Europe.\(^\text{16}\) Though similar studies are not available for the Asia-Pacific region, one study in Malaysia found that in the Sunway residential area near Kuala Lumpur, residual noise from highway traffic was normally in excess of 60 dBA, above the regulatory ceiling of 55 dBA.\(^\text{17}\)
Residents near international airports also suffer from annoyance, sleep disturbance and increased stress due to the residual noise of airplane take-offs and landings. An increasing number of airports located in densely populated urban areas are now subject to night time curfews. According to the International Civil Aviation Organization (ICAO), only 15 out of the 241 airports subject to night flight restrictions are located in Asia.

c. Poverty reduction and growing inequality

In recent years, research has found that lack of access to transport services excludes some groups and individuals in Europe and the United States from participation in economic and social activities. Less is known about the relationship between transport and social exclusion in Asia, but it is generally recognized that people with a low income cannot afford to own private vehicles and have less transport options than those with higher levels of income. In that regard, the persistence of poverty and the widening of income inequality in the Asia-Pacific region, as measured by the Gini coefficient, means that some societal groups are in danger of becoming even less mobile in the future.

Another dimension of increasing inequality is the gap in living standards between people living in urban and rural areas. In most low-income countries in the Asia-Pacific region, many rural households lack access to all-season roads; for example, only 39 per cent of rural households in Bangladesh and 30 per cent of those in Nepal are believed to have access, while about 40 per cent of villages in India are cut off from market centres and the main road network in wet seasons. Meanwhile, even those living close to roads may not own any form of private vehicle with which to use the road. Given the importance of road transport in allowing labour mobility as well as access to health care, education and other social services, lack of all-season roads and reliable and affordable transport services exacerbates the disadvantages faced by poor farmers and other low-income groups in rural areas (see part III, chapter 3 for a discussion on issues related to rural transport).

It should also be noted that depending on the topography of the area, other modes of transport can be as or more important than road transport. For people living in island countries, such as Indonesia, Maldives, the Philippines and those in the Pacific, inter-island shipping is the main means of transporting goods and people between islands (see part III, chapter 1 for a discussion on the issues related to inter-island shipping in the Pacific).

Air transport is also important for those countries, as well as for people living in very remote communities, such as those found in mountainous regions. Meanwhile, inland waterways are an important transport resource for people living in delta areas and those living along rivers, canals or lakes. As governments increasingly concentrate on the development of better road systems, they should not neglect these other modes of transport because of their critical role in the lives of the poor.

d. Road safety

The rapid increase in the number and severity of road traffic crashes has led the Commission for Global Road Safety to refer to deaths and injuries from those events as a “growing public health epidemic”. As reported in the Global Status Report on Road Safety 2015, road traffic injuries are the main cause of death globally, and the leading cause of death in young people (15-29 year olds). Globally, 90 per cent of road traffic deaths occur in low- and middle-income countries, yet those countries have just 54 per cent of the world’s vehicles. In the ESCAP region, more than 733,000 lives were lost to traffic crashes in 2013. Those deaths were due to various factors, such as poor quality or poorly maintained road networks, mixed traffic, poor road user behaviours, limited traffic engineering expertise, lack of enforcement of traffic regulations and the rapid increase in motorcycle use.
Vulnerable road users, such as pedestrians, cyclists and motorcyclists, represent some 55 per cent of all road traffic deaths in Asia. Many of the poorest income groups are therefore bearing a disproportionate share of the burden of traffic crashes. Furthermore, traffic crashes have a wider social impact than on the victims alone. In only the past five years, more than 22 million families in the Asia-Pacific region have been subjected to a death or permanent disability from a road crash. The women of families affected by road crashes typically become the caregivers of disabled family members, usually having to give up work or school to do so and thereby limiting their own chances of leading productive and fulfilling lives. Inadequate road safety standards are threatening to undo many of the gains made by development efforts in the ESCAP region (see part III, chapter 3 for the issues on road safety).

3. SHIFTING TO MORE SUSTAINABLE MODES OF TRANSPORT

In recent years, sustainable transport advocates have promoted the concept of “Avoid-Shift-Improve”, or ASI, as the basis for sustainable transport initiatives. The United Nations Climate Summit, which was held in September 2014, for example, featured many discussions on the need to encourage a shift towards public transport in cities and the need for improved and more sustainable technologies for railways and electric vehicles. The ASI framework can be summarized as follows:

- Avoid unnecessary transport;
- Shift to more sustainable modes;
- Improve transport practices and technologies.

Figure 2.2 Modal split of passenger transport in 12 major cities in the Asia-Pacific region, 2012

Sources: Sun and others (2014); Bureau of Transport Statistics (2014).
One of the main public transportation systems used in megacities is the metro, or underground rail transit services. The Asia-Pacific region has the longest network in the world, with 4,900 km of track in 50 cities, and has the top six busiest such networks in terms of total passenger numbers.

Some cities are considering another alternative to metros or rail transit services. Tehran has both a metro and a bus rapid transit (BRT) system, which daily provide three million and two million passenger trips, respectively. Bus rapid transit systems are economical compared to metros and subways, and easier to develop and implement. Similar to metros, they can also handle high passenger volumes and as they use a road designated solely for their use, long travel times arising from traffic congestion can be avoided. In part III, Chapter 2 some of the BRT systems being planned in the ESCAP region are described.

<table>
<thead>
<tr>
<th>CITY</th>
<th>ANNUAL PASSENGER TRIPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOKYO</td>
<td>3,294</td>
</tr>
<tr>
<td>SEOUL</td>
<td>2,467</td>
</tr>
<tr>
<td>MOSCOW</td>
<td>2,464</td>
</tr>
<tr>
<td>BEIJING</td>
<td>2,460</td>
</tr>
<tr>
<td>SHANGHAI</td>
<td>2,289</td>
</tr>
<tr>
<td>GUANGZHOU</td>
<td>1,841</td>
</tr>
<tr>
<td>NEW YORK CITY</td>
<td>1,661</td>
</tr>
<tr>
<td>MEXICO CITY</td>
<td>1,609</td>
</tr>
<tr>
<td>PARIS</td>
<td>1,541</td>
</tr>
<tr>
<td>HONG KONG</td>
<td>1,482</td>
</tr>
</tbody>
</table>


While governments are at different stages of implementing measures to avoid unnecessary transport and the private sector is actively investing in the development of new technologies to reduce emissions from vehicles, the most immediate means of making transport more sustainable is to shift demand to more sustainable modes.

Among the Asia-Pacific countries and territories, there are varying degrees to which governments have achieved a shift towards sustainable transport. While private vehicles are the dominant transport mode in cities such as Sydney, Taipei and Beijing, rail transport comprises a significant share of more than one-third in Tokyo, Seoul and Osaka (box 2.1 and figure 2.2). Public transport, including road and rail, is the dominant mode in cities such as Hong Kong, Seoul, Mumbai, Tokyo and Singapore. Notably, in Shanghai, Osaka and New Delhi, the share of non-motorized transport is between a 40 and 50 per cent.

The picture is also mixed for the freight sector. Worldwide, road transport is the most commonly used mode, accounting for some 10,500 billion tonne-kilometres, with sea transport coming in a close second at 9,750 billion tonne-kilometres. Rail services also are heavily used in in many countries (figure 2.3), with rail freight the most prevalent form in Australia, the Russian Federation and in several Central Asian economies. The share of rail freight in the Russian Federation is notably higher than the share of road freight, with coal, oil and oil products comprising about 50 per cent of the country’s total rail freight. Similarly in Australia, the growth of iron ore and coal exports has fuelled the growth in rail freight transport. These goods currently comprise up to 80 per cent of freight carried along the country’s railways.

Road freight transport is used extensively in Azerbaijan, India, Japan, Kyrgyzstan, New Zealand, the Republic of Korea, Tajikistan, Thailand, Turkey and Uzbekistan. In Japan, both road freight and maritime freight transport are used heavily. In the case of India, road transport overtook rail in the early 1990s and its share of freight transport has been growing ever since. With a greater level of investment being allocated to the road network in India, the quality of its rail infrastructure has deteriorated, adding to the decline in the share of rail freight being used to transport freight.

In China, the modal split is more evenly balanced. When the National Trunk Highway
project was proposed, China only had 147 km of expressways. This number mushroomed to some 35,000 km of trunk highways at the completion of the project. The country’s inland waterways and coastal services also play a significant role in movement of domestic freight. Between 2000 and 2005, the transport of containers by inland waterways grew at an annual average rate of 35 per cent, while the transport of raw materials for industrial use – mainly mineral ores and coal – more than tripled during this period on the Yangtze River.35

The determinants of modal choice differ between passenger and freight transport. As cities account for an increasingly sizeable share of energy consumption and emissions, part III chapter 2 gives further details of the various policy options for shifting urban transport to more sustainable modes. The remainder of this chapter focuses on the prospects for modal shift in freight transport.

4. DETERMINANTS AND IMPLICATIONS OF MODAL CHOICE FOR FREIGHT TRANSPORT

Traditionally, the three main determinants of modal choice for shippers have been price, speed and reliability, with the relative importance of each of these factors hinging on the type of products being transported and their physical attributes. For example, mineral resources, agricultural commodities, such as grains, cotton and sugar, and other heavy products are well suited to transportation via railways or inland waterways; non-bulk commodities, which comprise the majority of all commodities, are mainly transported domestically via roads.

If time is the critical factor, air transport naturally remains the mode of choice. A study conducted in 2006 comparing the transport costs and transit times for the door-to-door transport of a 40-foot container moving between China and Western Europe, illustrates well the choices business have to make when
Choosing a freight option (Table 2.2). Low-density, high-value commodities, such as electronics, newspapers or perishables, are increasingly being transported by air due to the time sensitivity of those products. Perishable goods are particularly time sensitive, an example being that fresh fish delayed in transit by 48 hours in the European Union were found to lose between 20-25 per cent of their value.

Though significantly cheaper, rail and maritime transport are less flexible than road transport because both operate to and from fixed points, station to station in the case of railways and port to port in the case of shipping. Road transport allows delivery directly to the door of the customer, thereby avoiding the need to transfer operations from road vehicles to other modes of transport. With containerization, road transport has become a crucial link in freight distribution. The use of trucks is preferred by light industries from which the rapid movement of freight in small batches is the norm.

However, based on broad acceptance that transport emissions have a negative impact on the planet, governments are increasingly examining their transport sectors from an environmental perspective, while looking for ways to reduce their carbon footprint, strengthening the case for modes other than road transport. Railways and inland waterways have a much lower energy intensity per mile transported compared to that of roads. For example, in China, the energy consumption of a 40-tonne truck is about four times higher than that of a double-stack container train carrying the same weight, while smaller trucks consume even more energy.

The distribution of modal shares has a direct relation to a country’s total level of fossil-fuel consumption, and therefore to its level of greenhouse gas emissions. A case study conducted on the CO₂ per tonne-mile of a single container found that air transport emits almost 1,200g of CO₂ per tonne-mile, followed by trucks at nearly 120g, railways at 40g, and shipping at 11g of CO₂ per tonne-mile.

From the perspective of sustainable transport, shipping and railways are clearly less energy-intensive per tonne-mile shipped. The two modes may be considered priority modes and air transport also play an important role in connecting networks and facilitating trade. Table 2.3 summarizes the comparative advantages and disadvantages of the different transport modes used for freight transport.

In the ESCAP region, the Ministerial Conference on Infrastructure in 2001 requested members and associate members to give priority attention to “the formulation, development and improvement of integrated intermodal international transport”. This request was further articulated as the long-term regional vision of an international

<table>
<thead>
<tr>
<th>TRANSPORT MODE</th>
<th>COSTS ($)</th>
<th>TRANSIT TIMES (DAYS)</th>
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<tbody>
<tr>
<td>SEA</td>
<td>3 000</td>
<td>28</td>
</tr>
<tr>
<td>ROAD</td>
<td>11 000</td>
<td>19</td>
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<tr>
<td>RAIL</td>
<td>7 500</td>
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<td>AIR</td>
<td>45 000</td>
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integrated intermodal transport and logistics system in the Busan Declaration on Transport Development in 2006. It was reaffirmed by the Commission in its resolution 68/4 of 23 May 2012. This vision is poised to contribute to achieving sustainable development within the transport sector.

The integrated intermodal transport and logistics system optimizes the needs of transporting goods and passengers; minimizes consumption of energy, land and other resources; generates low emissions of greenhouse gases, ozone depleting substances and other pollutants; and minimizes the adverse social impacts arising from transport operations. It is an intermodal-multimodal network of well-balanced, designed, built, maintained and interconnected highways, railways, inland waterways, sea ports, river ports, airports or dry ports which:

**a. At the city level,** provides motorized and non-motorized transport systems that are safe, efficient, reliable, frequent, affordable and include integrating public and private systems and as a result, offer rapid transport times and access to all groups, including the poor, women, children and people with disabilities;

**b. At the national level,** provides access to and between rural areas and the deeper hinterlands, and is well served an integrated intercity transport that is safe, efficient, reliable, frequent and affordable;

**c. At the regional level has capacities appropriate to traffic volumes,** allowing safe, efficient, smooth flow of people, goods and transport means between and among countries of the region and across the borders of its subregions with an efficient and user-friendly transport facilitation regime, allowing unhindered and safe movement of people, goods and transport means with other regions.

Such a system requires balanced development of different transport modes with the following key aspects:

**Interconnected infrastructure**
The most basic and essential component of integration is physical integration. To make modal interchange possible, road, railways, seaports and airports systems must be interconnected. Interconnected infrastructure also refers to the provision of physical infrastructure that allows and facilitates modal interchange. Such facilities may include intermodal terminals or dry ports for freight transport and transfer points or stations, transit shelters, parking and ride facilities for passenger transport.

**Utilization of two or more modes of transport**
The system must utilize, based on comparative advantages, the different modes of transport through shifting from one, especially road transport, to more environmentally friendly mode(s) of transport. Rail transport is a considerable potential mode in this region as a number of countries have extensive railway networks including, among others, China, India and the Russian Federation. Improving physical rail infrastructure and operational competitive pricing are major policy measures that can influence modal shift towards increased use of rail.40

For passenger transport, non-motorized transport (NMT), such as cycling and walking, are considered the most environmentally friendly mode of transport as it consumes zero fossil fuel and causes no emission. Clearly, public transport and infrastructure for NMT need to be improved to encourage passengers to give up private vehicles and use public transport.

**Efficient operations at modal interchange point with minimal cost and time involved**
Modal change can happen only if it meets shippers’ logistical requirements, and fits into their logistical chain requirements. Modal choice of individual shippers is largely determined by three factors, namely transport cost, transport quality (including safety, security, speed, frequency, reliability and accessibility) and habits.41 Thus, cost and time spent at modal change points should be kept at the minimum level and must not
exceed savings gained from shifting to other modes, otherwise there will be no economic incentive for a transport operator to use intermodal transport.

In addition to integrating physical transport infrastructure integration, formalized arrangements must be made regarding the operation and facilitation of the modal interchange. At the national level, professional capacity in terms of human resources must be made to support the development of efficient land (road-rail) and land-sea intermodal transport and logistics.

**Uninterrupted/facilitated border crossing (case of international freight transport)**

At the regional level, the need to promote a harmonized legal regime for cross-border and transit transport across the region is important. Regional common facilitation frameworks as well as simplification and harmonization of transport documentation along all routes and across the region will yield immediate benefits in terms of efficiency in time, cost and reliability.

A uniform legal framework for integrated intermodal transport and logistics system for the region is also required. At the regional and international levels, there is no legal framework regime in force that’s particularly addresses the nature of an integrated intermodal transport and logistics system. The existing conventions on international transport of goods focus on unimodal transport, such as the United Nations Convention on the Carriage of Goods by Sea (Hamburg, 31 March 1978). In the case of multimodal transport, despite efforts to push forward the United Nations Convention on International Multimodal Transport of Goods, 1980, the Convention failed to receive the required number of ratifications to enter into force.

**Use of new technology to enhance capacity and operations**

There is an inherent complexity tied to an integrated intermodal transport and logistics system, as it is multifaceted in nature and involves multiple operators from various transport modes. Lack of information connectivity among those multiple operators can potentially serve as obstacles in developing a smooth and transparent supply chain. Transport and logistics operators operating in an integrated intermodal transport system require full access to real-time data and effective and efficient information connectivity. In the context of passenger transport, intelligent transport systems (ITS), such as multimodal travel information and smart ticketing can be promoted and deployed to improve efficiency and encourage a modal shift.

<table>
<thead>
<tr>
<th>COMPARATIVE ADVANTAGE / DISADVANTAGE</th>
<th>COST</th>
<th>SPEED</th>
<th>RELIABILITY</th>
<th>FLEXIBILITY</th>
<th>ACCESS</th>
<th>CONGESTION</th>
<th>ACCIDENT</th>
<th>ENERGY INTENSITY</th>
<th>CO₂ EMISSION</th>
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<td>Very good</td>
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<td></td>
<td>Low</td>
<td>Moderate</td>
<td>Good</td>
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<td>Minimal</td>
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<td>Electric</td>
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<td></td>
<td>Low</td>
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<td>Good</td>
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<td></td>
<td>High</td>
<td>Very High</td>
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<td>Medium</td>
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5. POLICIES TO PROMOTE INTERMODAL TRANSPORT NETWORKS

To save on fuel consumption, reduce pollution and cut CO₂ emissions, modal shifts towards more sustainable modes of transport are a particularly pressing issue for countries with a high intensity of road traffic. To encourage such shifts, policymakers have to realign their transport policies and strategies in an integrated manner, taking into account the effects of policy changes on other aspects of sustainable development. Some governments are already taking steps towards a modal shift in freight transport, prompting the emergence of a number of promising trends.

a. Encouraging the use of railways for long-distance freight

In the ESCAP Review of Developments in Transport in Asia and the Pacific 2013, there is a discussion on some of the reasons why a modal shift to the railways was moving slowly in the ESCAP region. One reason was because regional railways were not viewed by shippers as one continuous, reliable transport system, but rather as a conglomerate of disparate parts. In recent years, railways have been countering this perception by establishing long-distance freight routes, with fixed schedules and guaranteed times.

For example, since the introduction of the Leipzig – Shenyang route by BMW in 2010, railways have proven to be an efficient and reliable alternative mode of transport within the trans-Eurasia logistics network. Along this route, rail transport is two times faster than sea transport and half of the cost of air cargo, in addition to being lower on energy consumption and emissions. Newly introduced services focus on the “east-west interregions” connection, namely East Asia to Europe, and the “north-south intraregion” connection, which connects Central Asia to ports situated in the Persian Gulf and the Arabian Sea. These services contribute significantly to the accessibility and logistics connectivity of landlocked countries, particularly in Central Asia. Some recently launched services are described in more detail in box 2.2.

b. Promoting intermodal transport networks

To counter the dominance of the road sector in freight markets, several ESCAP member States are implementing policies that encourage the private sector to make greater use of intermodal transport. In the United States, the Department of Transport has initiated the use of waterborne traffic to alleviate the density of road-haulage traffic and the wear forced upon the highway network through the America’s Marine Highway Corridors initiative. Similarly, many countries in Asia have promoted a comprehensive transport policy plan by taking significant steps towards the promotion of intermodal transport networks.

Boxes 2.3 to 2.5 show the transport policies of China, India and Thailand.

Intermodal transport, by definition, involves the transshipment of goods from one mode to another. This transshipment may incur additional costs and time, which, in some cases, will discourage shippers from choosing multi-modal routes. To incentivize modal shift, the transport and logistics system should support the efficient and reliable movement of cargo throughout. In that regard, countries in the region need to develop intermodal facilities, such as dry ports, and implement concrete measures to facilitate trade and transport processes. Recent progress in these areas is described in more detail in part III, chapter 1.
**BOX 2.2 LONG-DISTANCE RAIL SERVICES LINKING EAST ASIA AND EUROPE**

**Yiwu, China – Madrid, Spain**
Dubbed the “21st century Silk Road”, this service started out in November 2014 as the first direct rail link between Yiwu, China and Madrid, Spain. Covering more than 13,000 km, this route has become the longest freight rail link in the world. The train takes three weeks to cross China, Kazakhstan, the Russian Federation, Belarus, Poland, Germany and France to reach Spain, compared to the six weeks it would take by sea. Although the locomotives have to be changed every 800 km and transported freight has to be transshipped three times because of incompatible gauge sizes, rail transport is considered by many to be less expensive, more environmentally friendly and faster than maritime transport for this specific route.

**Suzhou, China – Warsaw, Poland**
The first train service was introduced by the Far East Land Bridge Ltd. in September 2013. Its path takes it from Suzhou in China through the Russian Federation and Belarus, to Warsaw. As can be seen in figure 2.4, the entire journey takes only 14 days. Due to increasing demand, in June 2014, the frequency of service grew from its initial two times per month to a once weekly trip. Significant savings in transit time have been achieved through close cooperation with the Transport Development Group, a Russian customs representative body. With the introduction of electronic documents and a new software package, border crossings have been streamlined to only two hours.

**Japan – Europe**
In October 2014, DHL introduced an inter-modal service connecting Japan to Europe, using rail transport as its principal mode. Cargo is picked up anywhere in Japan by truck, loaded onto 40-foot containers and then moved to one of four major ports: Tokyo, Nagoya, Osaka or Hakata. Containers are then transported to China by sea and onwards to Europe by rail. According to DHL, this new service cuts freight costs by up to 85 per cent compared to air freight, and reduces delivery time by half compared to using solely ocean freight, down to between 10-21 days.

**Yunnan – Central Europe**
In July 2015, the first Yunnan – Central Europe international freight train departed from the Wangjiaying Container Center in Kunming, China, for Rotterdam in the Netherlands. According to local newspapers, the train takes only 15 days, making it an attractive option not only for Chinese shippers but also for countries in South-East Asia that have transport links to Kunming. The first train carried 100 containers of Yunnan coffee, an important export commodity of the area.

Sources: Agence France-Presse (2014); China DHL (2014); Russian Railway Logistics (2013); Shujuan (2015).

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<table>
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<tr>
<th>PROCESS</th>
<th>TIMELINE</th>
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<tbody>
<tr>
<td>Releasing empty containers</td>
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<tr>
<td>Trucking from depot to the loading place</td>
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<td>Export customs clearance procedure</td>
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<tr>
<td>Collecting documents and issuing railway bill</td>
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<td>Train departure exit Suzhou</td>
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<tr>
<td>Transit China</td>
<td></td>
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<td>Adapting way bill to Russian documentation</td>
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<tr>
<td>Border crossing: Manzhouli/Zabaikalsk</td>
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<tr>
<td>Train departure exit Zabaikalsk</td>
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<tr>
<td>Transit in Russia</td>
<td></td>
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<tr>
<td>Changing way bill from SMGS to CIM</td>
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<tr>
<td>Border crossing: Brest/Malaszewicze</td>
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<tr>
<td>Arrival at final terminal in Warszewicze</td>
<td></td>
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</tbody>
</table>

Figure 2.4 Suzhou – Warsaw routing transit time

Source: See http://felderworld/transit-time.
c. Employing intelligent transport systems for “smarter” freight distribution

In their simplest form, ITS represents any technology applied to the transport sector in order to transfer information between transport systems, vehicles and users. More recently, ITS have focused on information and communication technologies that connect vehicles and infrastructure, as well as vehicles to other vehicles. Wireless communications, computational technologies encompassing vehicles and sensing technologies, including video detection and loop detection, are some of the technologies that gather data from vehicles and transmit them to servers, from which they are processed and fed back into the system. The application of ITS has become more widespread in freight logistics and transport services as the tracking and tracing of cargo across international supply chains has become an integral part of services offered by logistics companies. The use of ITS also allows truck drivers to access real-time information on traffic conditions, allowing them to reduce time and fuel wasted in congestion. Furthermore, electronic pricing and payment systems are reducing the time spent at toll booths. Chapter 1 of part III provides further information on the development of “e-logistics” in the ESCAP region.

1. LONG-TERM DEVELOPMENT STRATEGY

In its ninth Five-Year Plan (1995 to 2000), China set out to accelerate the development of an integrated transport system to form a number of east-west and north-south corridors with high transport capacity. This plan laid out a transport strategy, which made the integration of transport corridors, main hubs and intermodal systems a priority. The goal of achieving sustainable development in the integrated transport system was stipulated in the following Five-Year Plan for the years 2001 to 2005, with market forces designated as the guiding force for achieving sustainability in setting up of an intelligent, integrated and high-speed passenger and freight transport system.

The plan for the proceeding five years stated its objective as being to build a "convenient, smooth, efficient and safe integrated transport system" that would necessitate coordinated planning, the rationalized distribution of transport infrastructure and the inter-connection of various modes of transport. As a result of this rationale, and in what essentially steered the country’s transport plans for its twelfth Five-Year Plan (2011 to 2015), the Medium- and Long-Term Development Plan of the Integrated Transport Network was drawn up in 2007 with the aim to complete 42 national transport hubs and their connecting five east-west and five north-south corridors, totalling 4.9 million km in length.

2. COORDINATED PLANNING OF THE INTEGRATED INTERMODAL TRANSPORT NETWORK

The 2007 Medium- and Long-Term Development Plan for the Integrated Transport Network outlined the action plan for China for the construction of integrated transport corridors and hubs. Each integrated transport corridor uses at least two modes of transport to form a network of routes between the country’s regional economic centres and its important industrial or energy production bases. The country’s national integrated transport hubs include all of its important seaports, airports, railway and highway hubs. In the plan there are also:

Five north-south trunk corridors: North-South Corridor along the Coast; Beijing-Shanghai Corridor; Manzhouli-Hong Kong/Macao/Taiwan Province of China Corridor; Baotou-Guangzhou Corridor; and Linhe-Fangchen Port Corridor; and

Five east-west trunk corridors: Northwest Corridor to the Sea; Qingdao-Lhasa Corridor; Landbridge Corridor; Corridor along the Changjiang River; and Shanghai-Ruili Corridor.

3. RESTRUCTURING OF NATIONAL MANAGEMENT SYSTEM FOR TRANSPORT

Previously, transport in China was managed by many different agencies in a sectoral approach. These agencies were the Ministry of Railways; the Civil Aviation Administration; the Ministry of Communications for highways and waterway; city governments; and the Ministry of Construction for urban transport. In 2008, China established the Ministry of Transport, to which it allocated the former agencies’ planning, policy and standards responsibilities for highways, waterways and aviation.

Further restructuring in 2013 resulted in the Ministry of Transport also being given jurisdiction over the country’s railways, its urban transport and postal services, integrating the country’s transport management processes all under one roof.

Sources: China, (2008); China (2010); China (2011); China (2012); China (2013); China (2014); China’s Institutional Restructuring Plan (2008) — 11th National People’s Congress.
In India, there is an urgent need to expand existing transport network capacity to meet rapidly growing passenger and freight demands. To significantly improve the network's overall productivity and efficiency, it is essential that future development be aimed at better integrating transport modes.

Enhancing intermodal connectivity in India presents several challenges. Roads are currently the dominant mode of transportation, carrying almost 90 per cent of the country's passenger traffic and 65 per cent of its freight.1 It is estimated that for 2016–2017, the modal shares of rail and road in total freight traffic will be 35 per cent and 65 per cent, respectively. At present, railways carry approximately 36 per cent of the country's total freight traffic, while for the United States and China, the figures are higher, at 48 per cent and 47 per cent, respectively. Railways in the country are incurring losses to the tune of about 250 billion Indian rupees ($3.7 billion) in the passenger segment, meaning it has to be cross-subsidized by freight earnings.2

Maritime transport plays a relatively small role for a country that has a coastline of nearly 7,500 km, with shore-side shipping transporting only around 160 million tonnes of cargo in 2012–2013. The modal share of water transport in the movement of domestic cargo in India is also low compared to in other countries, 7 per cent compared to 20 per cent in China, 24 per cent in Brazil and more than 42 per cent in Japan. A major contributory factor that places a prohibitively high premium on coastal shipping is the lack of connectivity of non-major ports to the road and rail networks.

The Government of India is making a substantial effort to implement a forward-thinking transport policy and to increase investment in order to modernize, expand and integrate the country’s transport services. To that end, the National Transport Development Policy Committee was set up by the Government in 2010 to oversee the development of a coherent transport strategy for the years 2012-2032, taking the country from the start of its twelfth Five-Year Plan up to the end of its fifteenth such plan. Many infrastructure developments are planned, such as the Diamond Quadrilateral Network of High Speed Railways, which will connect metropolitan areas to regional townships. To promote shipping, the Government plans to subsidize the shipment of bulk and containerized cargo, and to develop an online portal run by the National Informatics Centre to automate the process of subsidization.

A prime example of the Government’s efforts is the Kaladan Multi-Modal Transit Transport Project (KMMTTP), which seeks to improve connectivity between India and Myanmar and facilitate access to the sea for the landlocked states of north-eastern India. Launched in 2009 as part of the then government’s "Look East" policy and now being pushed under the current Government’s "Act East" programme, the overall KMMTTP entails the construction of the 90-km National Highway 502A from Lawngtlai town in Mizoram to the Zochachhuah village at the India-Myanmar border; the construction of a 140-km route from there to Paletwa town; the development of a river port at Paletwa on the Kaladan river that will be connected through a 160-km waterway to Sittwe; and the construction of a deep water port at Sittwe to open up a sea route to the Haldia port of Kolkata, roughly 540 km away. Construction work on this project has been beset by challenges, such as heavy rainfall and difficulty in carrying out road works in the mountainous terrain. Once constructed, this route will reduce the distance between Haldia Port in Kolkata and Lawngtalia in Mizoram through the chicken neck corridor from 1,880 km to 930 km, thereby shortening the cargo shipment time to Mizoram by three to four days.

Sources: World Bank webpage — India Transport Sector (http://go.worldbank.org/FUE8JM6E40); The Times of India (2014); Paladhi (2014); India (2014); Halliday (2014).
The transport sector in Thailand accounts for more than one third of the country’s total energy consumption — equivalent to 700 billion baht (B) ($20 billion) — and is a major contributor to its air pollution as well as being a factor behind a number of its environmental issues. With an average freight volume of 805 million tonnes per year, the cost of transportation in general has been estimated at more than 7 per cent of GDP. The majority of freight movement in the country is road transport based, even though its relative cost is higher than that of rail and water transport. The table below shows the diseconomy of transport mode choice.

**MODE** | **SHARE** | **COST (BAHT PER TON-KM)**
--- | --- | ---
ROAD | 87.5 | 2.12
RAIL | 1.4 | 0.95
WATER | 11.08 | 0.65
AIR | 0.02 | 10


In an effort to improve social security, economic productivity, transport safety and security while also enhancing competitiveness and ensuring that Thailand optimally benefits from its membership of the ASEAN Economic Community (AEC), the Infrastructure Development Strategy for 2015 to 2022 was designed with five key strategies:

1. **Inter-city Rail Network Development:** to upgrade and expand rail infrastructure and the overall system with six main double-track lines expanding out to link up with neighbouring countries (including China) at their borders;

2. **Public Transport Network Development:** to solve traffic congestion in the greater Bangkok region; extend the mass transit railway system in Bangkok and its surrounding areas; improve the quality of service and the safety of the bus transit system; and to improve environmental standards;

3. **Enhancing Highway Competency:** to link the country’s main production bases with those of neighboring countries; develop a four-lane road network linking the country’s key economic regions and border areas; construct new motorways; and develop facilities along main roads;

4. **Water Transport Network Development:** to upgrade seaport facilities on the Thai Gulf and the Andaman Sea;

5. **Enhancing Air Transport Capability:** to expand the capacity of the country’s airports, enabling them to become regional centres for air transportation; and establish aviation industrial estates.

Work has already started on some of the high-priority projects, such as the mass-transit railway extension and six double-track projects of existing meter gauge railway lines. The completion of the 10 mass transit lines is expected by 2022. The first phase of the double track project, covering 903 km costing approximately 129.3 billion baht, is expected to be completed in 2018. In the next phase, eight routes will be added, expanding the length of the existing double track network by 1,629 km. According to the plan, the double track work is expected to be completed by 2020. With this expansion, Thailand is aiming to increase the average speed for freight trains from 39 to 60 km/hr, and for passenger trains from 60 to 100 km/hr. After completion, ridership is projected to increase from 45 million person-trips per year to 75 million person-trips per year, while the share of rail freight as a transport mode is expected to more than triple from 1.5 per cent to 5 per cent. The strategy also aims to reduce the modal share of intercity car travel from 59 per cent to 40 per cent, and to cut oil consumption by a target saving of more than 100 billion baht per year.

In addition, the plan also provides for the construction of two new standard gauge double-track rail lines, with a total length of 1,545 km. One line is intended to connect southern China and Maptaput port through the Lao People’s Democratic Republic for the purpose of transporting freight transport. The objective of the other one is to promote high-quality passenger rail travel through the introduction of high speed rail between Bangkok and Chiang Mai.

Endnotes

2. General Assembly resolution 70/1.  
5. ESCAP (2015c).  
6. Ibid.  
7. See www.adb.org/sectors/transport/key-priorities/urban-transport,  
10. In Japan, the Law for Promoting Easily Accessible Public Transportation Infrastructure for the Elderly and Disabled Persons (Law No. 68), which was enacted in 2000, calls on public officials and service providers to make stations, roads and other public facilities accessible for the elderly and people with disabilities. Further steps to improve access were also contained in the Law 17: Law for Promoting Easily Mobility for the Aged and the Disabled, which was enacted in 2006. In the Republic of Korea, the Government passed the Act on Promotion of the Transport Convenience of Mobility Disadvantaged Persons, which included provisions to expand transportation modes and improve passenger facilities and pedestrian environments for the elderly.  
12. In 2013, intraregional passenger arrivals in the Asia-Pacific region grew by 3.6 per cent, compared with total global arrivals which grew by 3.3 per cent. ESCAP (2014a).  
18. A study published in the British Medical Journal in 2013 suggests that exposure to high levels of aircraft noise are associated with an increased risk of stroke, coronary heart disease, and cardiovascular disease. For more details see Hansell and others (2013).  
21. ESCAP research has found that about 84 per cent of the region’s population now lives in countries with a Gini coefficient ranging from 33.9 (India) to 42.1 (China), based on the most recently available data. Meanwhile, the Asia-Pacific least developed countries have seen an increase in the income inequality level from 30 in the 1990s to 34.5 in the 2000s, while the landlocked developing countries have experienced an increase from 32.7 to 35.7 during the same period.  
23. For various action statements and plans by city mayors and organizations to reduce greenhouse gas emissions, including in transport, see the website for United Nations Climate Summit 2014 (www.un.org/climatechange/summit/).  
24. For a comprehensive discussion on policies which promote ASI in the ESCAP region, see ESCAP (2013) and Review of developments in transport in Asia and the Pacific, Chapter 4. Results come from travel surveys made by independent agents which do not necessarily use common, standardized methodologies. Hence, the private transport criterion gathers data from private cars, motorbikes and other privately-held vehicles. The public transport criterion gathers bus, tram and rail mode data and is used when the data on the specific mode used is not sufficiently precise. For more information on the methodology see Sun and others (2014). RACE2050 (2013). Brunswick Rail (2014). Australia (2014), p.3. India (2014), p.4.  
25. In 1990, the Government of China launched the construction of a National Trunk Highway System, resulting in the growth of the length of expressways from less than 150 km in 1990 to more than 35,000 km 2007. It includes north-to-south and east-to-west expressways that link major cities and provincial capitals. For more information see www.roadtraffic-technology.com/projects/national-trunk-highway-system. Amos (2008).  
A. Infrastructure networks

1. INTRODUCTION

Over the past fifty years, infrastructure networks have grown more rapidly in the Asia and the Pacific than in any other region in the world. Significant progress has been made in linking major production and consumption centres with roads, railways, airports and seaports. At the same time, governments have put a lot of effort in upgrading and improving the quality of those networks, with the region now boasting world class highways and high-speed railway systems, as well as some of the busiest ports and aviation hubs in the world.

The Asia-Pacific region has been at the forefront of initiatives tailored to improving the connectivity and quality of main transport arteries. It has passed legislation and provided and maintained platforms needed for countries to acquire the skills and know-how that will help them to improve their infrastructure, efficiency and competitiveness. The region, however, has yet to achieve the kind of “seamless connectivity” that would allow countries to make optimal use of regional infrastructure networks and thereby bring down transport and logistics costs.¹²

As many governments are experiencing a squeeze on their budgets due to the high upfront capital costs associated with infrastructure projects and the long time to plan and construct them, a push in the right direction is often not enough. Many regional projects touching all modes of transport have been initiated through alternative financing options. Part III details some of the projects to date.

It can be argued that the approaches taken by many government agencies to develop and plan infrastructure projects are hindering progress. New transport infrastructure is often viewed in isolation of each other, rather than as part of a larger transportation network.³ This narrow planning perspective is partly responsible for the high level of competition among the modes, with the road and rail sectors in particular vying for the same transport markets. Further expansion of those networks is still necessary, particularly in developing countries and in countries that are isolated from established transport routes and infrastructure. Notably, the pace of infrastructure development has not kept up with increasing demand.

While a great deal of progress has been made in the sharing of knowledge and good practices, bringing about ever more tangible results in the region, there are still areas that require attention. The isolation of the Pacific island developing economies directly affects their economies, making them prime candidates for development strategy attention in the coming decade. Similarly, landlocked developing countries and low-income countries are unable to diversify their economies due to high transportation costs. Those costs are the result of several factors, including, among others, limited market size, lack of competition in the transport services market, low skills in logistics management, distance from international markets, and poor quality infrastructure. Government policies
may also be inadvertently favouring less efficient modes rather than targeting the least costly and most sustainable intermodal solutions to container and cargo haulage between trade sources and seaports.

The importance of improving intermodal connectivity was reiterated in the Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014-2025, the outcome of the second United Nations Conference on Landlocked Developing Countries, which was held in Vienna in 2014 (see chapter 1.B Transport facilitation and logistics). To overcome these challenges, governments in the region are starting to focus on the integration of different modal networks, in particular, road and rail. However, from the perspective of both cost-effectiveness and environmental sustainability, rail and water-based transport offer the best transport solutions for long-distance freight transport, as long as they are connected to efficient intermodal interfaces, such as dry ports and container terminals at seaports. Relatively new components to the transport itinerary, those ports and terminals are increasingly being seen as essential to the continued emergence of intermodal transport. Where railways exist, the road sector plays an important role in completing last-mile services; where railways do not exist, the road sector is a critical provider of transport services.

Time lost at borders has long been the bane of transport, but advances in technology are helping countries to share data on freight itineraries and driver documentation, cutting deeply into waiting times. Similar advances are being made in the movement of passengers, with countries sharing data to facilitate border crossings and ITS technologies, such as electronic toll collection. This has, consequently, reduced waiting times, improved traffic circulation and mitigated the environmental impact.

Phase II (2012-2016) of the Regional Action Programme for Transport Development in Asia and the Pacific was adopted by the Ministerial Conference on Transport, which was held in Bangkok in March 2012. It mandated the promotion of regional and interregional connectivity through the further development of the Asian Highway and Trans-Asian Railway networks as well as through dry ports. This chapter reviews the current status of those networks, and provides information on selected infrastructure projects that are expected to enhance the connectivity of regional infrastructure networks.

2. ASIAN HIGHWAY NETWORK

a. Status of the Asian Highway Network

The Intergovernmental Agreement on the Asian Highway Network facilitates the coordinated planning and upgrading of highway routes of international importance, both within Asia and between Asia and neighbouring regions. Currently, the network comprises 143,000 km of roads in 32 member countries. The network extends from Tokyo in the east to Kapikule, Turkey in the west, and from Torpynovka, the Russian Federation, in the north, to Denpasar, Indonesia in the south.

The Intergovernmental Agreement sets out the minimum standards for four classes of highways: Primary; Class I; Class II; and Class III (the minimum desirable standard). Between 2010 and 2014, all classes of road were improved, resulting in Class I roads covering roughly 15 to 20 per cent of the total network, and Class II roads making up 38 to 41 per cent. Meanwhile, the proportion of Class III roads declined from more than 23 per cent to 19 per cent, although roughly 8 per cent still remained below Class III. It has been proven that there is a strong correlation between infrastructure designs and the number and severity of road accidents, therefore upgrading highways will undoubtedly make them more safe (see chapter 3).
The network’s road surface condition is an important indicator of the quality of the Asian Highway because it has a direct impact on vehicle operating costs. Road surface condition data currently being collected on the Asian Highway fall into one of four categories: a) good; b) fair; c) bad; and d) poor. Figure 3.2, in which the latest available data for selected member countries have been plotted, shows the variations in road surface conditions in member States. The Islamic Republic of Iran, Japan, the Republic of Korea, Singapore, Sri Lanka and Thailand reported that more than 70 per cent of their roads were in “good” condition. Afghanistan and the Philippines reported that more than one third of their Asian Highway road surfaces were in “poor” or “bad” condition.
In a bid to further enhance the efficiency and safety of their highway networks, some countries in the region are deploying new types of information and communication technologies. Intelligent transport systems improve vehicle and infrastructure safety by providing information that manages the interactions between highway systems, vehicles and drivers. The automatic collection of tolls on highways also provides a rich source of data for authorities to analyse when planning expansion, as well as identifying black spots and problem areas. As of 2012, in the Republic of Korea, all 3,906 km of its expressways and 2,552 km of the country’s national roads were equipped with ITS. The installation of automatic traffic enforcement (ATE) and electronic toll collection (ETC) as part of the national policy of ITS deployment have already brought substantial dividends. With its ability to monitor traffic law violations, the installation of ATE has reduced the number of road accidents and fatalities while also bringing down the economic costs of accidents. In the six-month period prior to the installation of the system, the number of accidents totalled 1,405, while in the six months following the installation the number had dropped to 999. In terms of maximizing traffic flow, the introduction of ETC at toll gates has brought the average per-vehicle processing time down from 45 seconds to 9 seconds, thereby reducing the environmental impact of road transport while processing traffic volumes four times higher than before.\[\]
b. Selected highway projects

Faced with budgetary constraints, most governments in the region have made attempts to diversify modalities for financing major highway projects, including through the use of public-private partnerships (PPPs) (see part III, chapter 5). In order to derive greater value from investments in their transport systems, several governments are also developing their highways as part of broader economic corridor development programmes, often with the support of multilateral development banks.

i. Armenia North-South Road Corridor Investment Program

The Armenia North-South Road Corridor Investment Program aims to expand and improve the alignment of 556 km of highways from the border with Georgia at Bavra, through Gumri, Ashtarak, Yerevan, Goris and Kapan, to Meghri on the border with the Islamic Republic of Iran (AH82). Costing approximately $1.5 billion and spanning the period 2009-2019, the project will provide an additional option for goods moving between the Islamic Republic of Iran and Europe through the Black Sea ports of Poti and Batumi.9

A Framework Financing Agreement was signed between the Government of the Republic of Armenia and the Asian Development Bank (ADB) on 15 September 2010 stipulating an ADB commitment to finance the project in the amount of USD 500 million. In November 2013, the European Investment Bank approved financing for the 145-km road section between Yerevan and Bavra towards the Georgian border, with a target completion date of 2019.10 With the completion of the project, the Yerevan — Gumri and Yerevan — Ararat sections will become four-lane class 1 roads, while
the project’s other road sections will also meet international standards for safe road corridor traffic management. Meanwhile, the concrete lining of the 31-km Artashat to Ashtarak stretch of the North-South Road Corridor was completed in 2014, with the section expected to be commissioned before the end of 2015.11

ii. China-Pakistan Economic Corridor (CPEC) (AH4)

As mentioned in part I, the China-Pakistan Economic Corridor (CPEC) is a major development initiative that will connect Gwadar Port in southern Pakistan to the north-western autonomous region of Xinjiang in China. The Agreement, signed by China and Pakistan in May 2013, includes a broad spectrum of projects across the energy, transportation, and information communications technology (ICT) sectors, with $5.9 billion earmarked for road projects and $3.7 billion for railway projects.12

A central component of the Corridor is the 2,700-km highway from Kashi, China to Gwadar through Khunjerab (AH4). In February 2014, China and Pakistan signed an agreement to upgrade a section of the 1,300-kilometre Karakoram Highway, which connects to Islamabad.13 Work on a highway linking Havelian to Thakot, part of the Islamabad-Raikot section of the Corridor and financed by China, was initiated in December 2014.14

iii. Padma Multipurpose Bridge Project and Dhaka–Chittagong Highway in Bangladesh

The Government of Bangladesh is pressing forward with two major projects, the Padma Multipurpose Bridge Project and the upgrading of the Dhaka — Chittagong Highway. In early 2015, river training works and the construction of approach roads to the Padma Bridge were more than 30 per cent
complete. Meanwhile, in June 2015 the Government reported that 138 km, or about 70 per cent of the 192.3 km of the Dhaka – Chittagong Highway, had been widened from two to four lanes, with the widening of the remaining area to be completed by the end of the year. As the key corridor linking two largest cities of Bangladesh, the highway complements the Government’s plans to upgrade the Dhaka – Chittagong railway (see Section 3 below).

**iv. Nepal Road Connectivity Projects**

In the wake of the April 2015 Nepal Earthquake, the importance that the road transport sector plays in mountainous countries became more evident than ever before. With various plans under way to reconstruct damaged roads across the country, work has also resumed on two of the Government’s priority projects, the Mid Hill Highway project and the Kathmandu – Nijgadh Expressway. The Mid Hill Highway project is a 1,760-km road running east to west and connecting 27 of the country’s 75 districts. Meanwhile, a detailed feasibility study was completed for the 76 km Kathmandu – Nijgadh Expressway, which includes 9 km of bridges and 1,350 metres of tunnels. As of the beginning of 2015, land acquisition had already been completed and a contract document based on a PPP model was under preparation. Once the project is completed, the length of the AH42 will be reduced by 142 km.

**v. GMS Kunming (China) - Hai Phong (Viet Nam) Transport Corridor (AH14)**

In September 2014, the Prime Minister of Viet Nam inaugurated the Noi Bai-Lao Cai Highway, part of the Greater Mekong Subregion (GMS) Eastern Economic Corridor linking Kunming in China to Hai Phong Port in Viet Nam. Spanning 245 km, the construction of the Noi Bai-Lao Cai Highway began in 2009. The Noi-Bai to
Yen Bai section is designed as a four-lane dual carriageway, while the Yen Bai to Lao Cai section is a two-lane single carriageway. The estimated cost of the project is $1.44 billion. It is expected that upon completion, some international container traffic will be diverted away from domestic network in China and onto this route, as Hai Phong Port will become the closest major international port to Kunming.

3. TRANS-ASIAN RAILWAY NETWORK

a. Status of the Trans-Asian Railway Network

The Intergovernmental Agreement on the Trans-Asian Railway Network entered into force on 11 June 2009. Spanning 117,600 km, China, India, and the Russian Federation are the top three countries in terms of the length of their Trans-Asian Railway lines.

Beyond the completion of feasibility studies and detailed design studies on most of the Trans-Asian Railway missing links, work has also been accomplished on the ground to put in place some of the missing links. This is most significantly the case in the ASEAN region, including Yunan Province of China.

Reconnecting the railway networks of Cambodia and Thailand necessitated the completion of two projects, namely a 48-km section in Cambodia between Sisophon and Poipet and a 6.5-km section in Thailand between Aranyaprathet and Poipet. The former was completed in 2015, while 95 per cent of the latter is completed with the remaining 5 per cent scheduled for completion in the first half of 2016.

Meanwhile, work is ongoing to bring the railways of China to the borders of (i) the Lao People’s Democratic Republic and (ii) Myanmar as part of the Trans-Asian Railway network and the Singapore-Kunming Rail Link project, as described below:

- China – Lao People’s Democratic Republic: Capacity expansion on the Kunming – Yuxi line is expected to be completed by the end of 2015. Construction work to extend the line to Mohan at the border with the Lao People’s Democratic Republic is expected to start in 2015 with the completion date set for 2021.
- China – Myanmar: Work on the Dali – Ruili line to rail connect China and Myanmar has also progressed. Capacity expansion work on the existing Kunming – Guantong line was completed in 2014. Similar work on the Guantong – Dali section is expected to be completed in 2017. The 330-km Dali – Ruili section, which will bring rail to the China-Myanmar border, is expected to be completed in 2021.

**i. North and Central Asia**

In Central Asia, rail routes that will serve freight moving in both the east-west and north-south directions are currently being developed. In October 2014, Kazakhstan inaugurated a 988-km line between Zhezkazgan and Beineu, which cut around 1,000 km from the traditional east-west route between the Chinese border at Dostyk/Alashankou and the Caspian Sea port of Aktau.

### MAP 3.4 SELECTED RAIL PROJECTS IN CENTRAL ASIA

The map shows selected rail projects in Central Asia, including the boundaries and names shown and the designations used on the map do not imply official endorsement or acceptance by the United Nations.

**b. Selected railway projects**

It is widely recognized that railways can play a greater role in promoting regional integration and cross-border connectivity. The construction of cross-border linkages and “missing links” is particularly important for attracting long-distance intraregional and interregional freight to the railways. In this regard, the region has witnessed a renewed push for railway development, particularly in South and South-East Asia.

From Aktau, freight can be carried either across the Caspian Sea to the port of Alyat in Azerbaijan, or down the eastern side of the Caspian Sea along a newly opened rail link. Opened in December 2014, the 925-km rail link connects Uzen in Kazakhstan to Bereket-Etrek in Turkmenistan, and travels onward to Gorgan in the Islamic Republic of Iran. The $1.4-billion route is about 600 km shorter than the more easterly route through Sarakhs, and is, therefore, expected to become a major transit route between Central Asia and the sea ports on the Persian Gulf.
Freight that is ferried to Alyat Port will soon be able to move to Georgia and Turkey along the Baku – Tbilisi – Kars rail project that will connect the rail networks of Georgia and Turkey. As part of this project, Azerbaijan Railways have invested heavily in modernizing the section of the line between Baku and Beyouk Kesik at the border with Georgia. The Government of Georgia is also increasing capacity on the country’s main railway lines leading to the ports of Batumi and Poti, including a Tbilisi bypass.

On the western side of the Caspian Sea, Iranian Railways are continuing to work towards the completion of the 372 km Qazvin – Rasht – Astara link. The 205-km section between Qazvin and Rasht is expected to be finished by the end of 2015, while work on the 167-km section from Rasht to Astara at the border with Azerbaijan remains subject to the resolution of funding issues.22

In Armenia, authorities are still eyeing the construction of a 316-km railway linking Gavar, 50 km east of Yerevan, with the Iranian border near Meghri, although the $3.2 billion cost of construction explains why the project has so far failed to leave the drawing board. A Dubai-based investment company expressed interest in the project and, in 2012, was granted a fifty-year concession to manage it, with the project slated to commence in 2016 and to finish in 2022.23 If built, the line will facilitate access to the Black Sea for goods coming from the Islamic Republic of Iran, as well as benefit the economy of Armenia by enabling access to the Middle East as well as ports on the Persian Gulf.

Other countries in Central Asia are also taking steps towards improving their regional rail connections. Kyrgyzstan and Tajikistan are collaborating with Afghanistan and the Islamic Republic of Iran on a line that will link with China; the Iranian Engineering company METRA has already completed the feasibility study for the section set to pass through Tajikistan and has started similar work for the Kyrgyzstan section.24

**ii. South and South-West Asia**

Following the successful commissioning of the 75 km section of line between Khairaton and Mazar-i-Sharif, the Government of Afghanistan is moving forward with the implementation of the Afghanistan National Railway Plan. In 2014, the Government of Afghanistan attempted to have its plan recognized as part of the Trans-Asian Railway network.

Note: The rail lines indicated in grey are currently not part of the Trans-Asian Railway network.

**MAP 3.5 SELECTED RAILWAY PROJECTS AROUND THE CASPIAN AND BLACK SEAS**

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
Topmost among the routes is the 1,250-km east-west corridor, which will start at Shirkhan Bandar, on the border with Tajikistan, and travel along the northern part of Afghanistan to Herat, which is expected to be connected to the rail network of the Islamic Republic of Iran. In addition to the existing branch line from Mazar-i-Sharif to Heiraton (border with Uzbekistan), two more branch lines are planned to create connections with Aqina and Torghondi, both on the border with Turkmenistan. Other routes in Afghanistan under discussion are a rail link from Kundus to Torkham (Pakistan) via Kabul, and a branch line from Pakistan to Spin Boldak with a future extension to Kandahar.

Pakistan is embarking on a “National Vision-2025” master plan, which aims to increase the current market share of rail from 4 per cent to 20 per cent in the country, through the modernization of its infrastructure and the refurbishment of its rolling-stock. The most prominent project under consideration is the construction of a 662-km line from Havelian to Khunjrab that will link with the railhead of China at Kashgar. The plan also calls for the construction of a 900-km line section to connect the port of Gwadar to the existing network at Mastung on the Spezand – Koh-i-taftan line, at an estimated cost of $1.5 billion, along with two cross-border sections with Afghanistan from Chaman to Kandahar and from Peshawar to Jalalabad. Despite the high construction cost of $10.5 billion, the project has received renewed interest under the China-Pakistan Economic Corridor project.

The railways in India are being upgraded through an ongoing policy to carry out track doubling, gauge conversion and electrification. In addition, construction has begun on an initial 343-km double-track electrified section between Kanpur and Khurja, which will form part of the Eastern Dedicated Freight Corridor stretching from Ludhiana to Kolkata (box 3.1). Work is also progressing on the Agartala – Akhaura rail link in cooperation with the Government of Bangladesh, as well as on the Jiribam – Tupul – Imphal rail section, which forms the first phase of the project to rail-connect with Myanmar at Moreh. The first section of the project, which covers the 84-km section between Imphal and Tupul, is expected to be completed in March 2016, while the second phase, which covers the 27-km section between Tupul and Impha, is expected to be completed in March 2018. With numerous bridges and tunnels to be built, the Jiribam – Tupul – Imphal project represents an ambitious development scheme aimed at improving connectivity in the north-eastern states of India, as well as between India and the ASEAN region network.
Indian Railways has a history of running mixed traffic, with unprofitable passenger services receiving operational priority over revenue-earning freight. In addition, instead of contributing to corporate profitability, freight revenues cross-subsidize non-remunerative passenger services.

In 2005, in a bid to create additional capacity for freight and meet customer demand for more efficient and reliable services, Indian Railways opted to build two dedicated freight corridors.

The Eastern Dedicated Freight Corridor will run from Ludhiana to Kolkata with a route length of 1,839 km. It will consist of an electrified double-track segment of 1,392 km and an electrified single-track segment of 447 km and be used to transport coal, finished steel products, food grains, cement, fertilizers, limestone and other general cargo.

The Western Dedicated Freight Corridor will run from Jawaharlal Nehru Port (JNPT), the country’s largest container port east of Mumbai, to Dadri, a container handling facility close to New Delhi. Traffic on the corridor will mainly comprise the movement of 20 ft ISO containers from JNPT and Mumbai Port to inland container facilities in northern India, such as Tughlakabad, Dadri and Dandharikalan. The rail share of container traffic on this corridor is projected to increase from 0.69 million TEUs in 2005-2006 to 6.2 million TEUs in 2021-2022. Containers will move in double-stack configuration with electric traction. The average speed of trains will increase to 70 km per hour compared with 25 km per hour currently, and the unit cost of transport is also expected to decrease by 40 per cent. Once the corridor is completed, freight consignments that now take two to three days to move between New Delhi and Mumbai will cover the distance in less than 24 hours. A series of logistics parks will also be built along the corridor.

Excluding the Sonnagar-Dankuni section being built under PPP modalities, the $12-billion cost of the corridors is being funded by the Rail Ministry through debt and equity, with 1, 133 km of the Eastern Dedicated Freight Corridor funded by the World Bank. The Western Dedicated Freight Corridor is being funded by Japan International Cooperation Agency.

Phased commissioning of the two corridors is expected to start in 2018 and to be fully completed in 2019. An analysis conducted by Indian Railways found that the corridors will generate 2.25 times less greenhouse gas emissions over a thirty-year period compared to the current transport situation.

Sources:
Dedicated Freight Corridors Corporation of India Ltd. webpage (http://www.dfccil.gov.in/dfccil_app/About_Us.jsp); World Bank (2014b); Singh (2015).

The railways in Sri Lanka are also enjoying a revival. In the north of the country, India’s state-owned infrastructure group IRCON International completed the 38- km Pallai – Jaffna section in October 2014, and the 18-km Jaffna – Kankasanthurai section in January 2015. The two projects bring to completion the restoration of the country’s Northern Railway under a concessionary credit line of about $800 million, provided by the Government of India. Meanwhile, the Government of China is supporting rail development in the south of Sri Lanka. The 26.8-km section between Matara and Beliatta is under construction, and, in 2014, the China National Machinery Import and Export Corporation was granted a $590 million contract to build the 88-km extension from Beliatta to Kataragama.²⁸

The Government of Bangladesh has also embarked on an ambitious railway development agenda. Two projects will
improve east-west connectivity: (a) the construction of a new 190-km line from Dhaka to Jessore through the Padma River; and (b) construction of the 15-km Agartala (India) – Akhaura (Bangladesh) rail section. The latter project, consisting of 5 km of track in India and 10 km of track in Bangladesh, will cost an estimated $92 million and be financed by the Government of India. This link will significantly reduce the distance between Agartala and Kolkata from the current 1,700-km route (which goes through the so-called “‘chicken neck”) to only 350 km.

Two other important projects are: (a) the construction of a 65-km line from Kulna. The total cost of the project is $805 million, with an additional $175 million to be financed by the European Investment Bank (EIB) and $125 million by the Government of Bangladesh. This corridor could provide access to the Indian Ocean for Bhutan, Nepal and the north-eastern states of India as a critical link in the Trans-Asian Railway network.

Despite these initiatives, cross-border rail connectivity in South and South-West Asia still presents a very fragmented picture forcing the bulk of intraregional trade to use maritime shipping, as a result of which the benefits of geographical proximity remain unexploited. In an attempt to further demonstrate the impact that the efficient operationalization of cross-
Situated in the middle of the ASEAN region, the Lao People’s Democratic Republic has promoted the concept of turning landlocked countries into “land-linking” countries. The Government has outlined an ambitious plan to develop modern rail infrastructure and connect it with the networks of China, Thailand and Viet Nam. While financial considerations have delayed the start of construction of the $6.8-billion 417-km rail project between the Chinese border near Luang Namtha and Vientiane, the two governments have agreed to directly contribute 40 per cent of the total investment for the project with the Lao government responsible for 30 per cent, amounting to $840 million, and the Chinese government contributing 70 per cent. The remaining 60 per cent will come from private investors. The project seems more likely to come to fruition following a recent agreement between China and Thailand to build a 734-km rail link between Nong Khai in Thailand, which lies on the Mekong River opposite Vientiane, and Map Ta Phut, a deep-sea port in the country’s southern seaboard industrial zone. A second phase will run to Bangkok, linking the Thai capital directly with Kunming via Vientiane. This could lead to the realization of a long-discussed Singapore-Kunming rail link, via the Lao People’s Democratic Republic, Thailand and Malaysia.

Furthermore, from Bangkok, the line would follow the westbound alignment that currently stops at Namtok. From Namtok, a new line will be constructed to cross into Myanmar and extend to the industrial and logistics zone being developed in Dawei, Myanmar.

Sources: Janssen (2015); Ngamsangchikit (2015).
from moving beyond feasibility studies, but recent interest from the Governments of China, Japan and the Republic of Korea in infrastructure development in South-East Asia has spurred governments to revisit several major rail projects.

In 2014, the National Development and Reform Commission of China approved the construction of the country’s first rail links to the Lao People’s Democratic Republic and Myanmar. The former will consist of a 507-km electrified link from Yuxi, south of Kunming, to Mohan on the border with the Lao People’s Democratic Republic. It will cost an estimated $8.2 billion and is expected to take six years to complete. The latter will consist of a 330-km electrified link from Dali to Ruili, at an estimated cost of about $4.1 billion. China Railway Corporation will reportedly cover 85 per cent of the project costs, with the rest coming from the Yunnan provincial government. Railway development in the Lao People’s Democratic Republic received a further boost in the form of the 417-km rail project between Vientiane and Boten, which may be funded with the support of China (see Box 3.2). The Government of Myanmar is pursuing a policy to upgrade and modernize the existing railway network, with priority being given to the Yangon – Mandalay, Mandalay – Myitkyina, Bago – Mottama – Yay, and Yangon – Pyay routes, and to the Yangon circular line. In 2014, it was reported that the Japan International Cooperation Agency had offered to provide a $202 million loan for the Yangon – Mandalay line. The Government has also been discussing financial assistance with the Republic of Korea and OECD for the 550-km Mandalay – Myitkyina section.

In Cambodia, where the thirty-year concession granted to Toll of Australia came to a close in 2014, the Government has developed a new Railway Network.
BOX 3.3. HIGH-SPEED RAIL IN ASIA

Over the past two decades, several governments in the ESCAP region have announced plans for high-speed railways, but few have been able to follow through on them because of the high costs involved. High-speed railways require their own dedicated tracks, and the technology used for these systems requires a high degree of technical competence and experience. However, steady economic growth and the need to find an alternative to congested roads is reigniting prospects for high-speed rail in Asia.

In a reporting period that marked the fiftieth anniversary of the opening of Tokaido Shinkansen linking Tokyo and Osaka, the construction of high-speed lines — or in some countries the aspiration to join the high-speed club — remained upbeat.

In March 2015, Japan inaugurated the 228-km extension of the Hokuriku Shinkansen between Nagano and Kanazawa, which has reduced the travel time between Tokyo and Kanazawa by almost two hours to two hours and twenty-eight minutes from four hours and twenty minutes. In April 2015, Japan also confirmed its growing interest in developing magnetically levitated trains when it pushed its MAGLEV unit to a speed of 603 km/h. This is seen as a critical step in the future construction of the Chuo line that passes through Tokyo, Nagoya and Osaka. In late 2014, the Government of Japan approved construction of the 286-km section between Tokyo and Nagoya at an expected cost of $36.13 billion. When the line opens in 2027, travel time between the two cities will be forty minutes compared with one hour and thirty-five minutes on the existing Tokaido Shinkansen.

Overall, however, China has continued to set the pace in the area of high-speed development in the region. By early 2014, China had already operated 10,000 km of high-speed lines with an additional 12,000 km being planned or under construction. These figures do not include a number of new passengers or mixed traffic lines with a design speed of 200 km/h. Most metropolitan regions in China are either connected or about to be connected to lines with a speed of 200 km or above. A significant feature of these high-speed projects is the construction of stations, which have a dual role of serving as transport hubs while supporting urban expansion. Such stations are often built on three to five levels and offer interchange between rail, road and underground networks.

In the Republic of Korea, 2015 saw the opening of the 182-km Honam high-speed line from Osong, on the existing Seoul to Busan line, to Gwangju. From Gwangju, trains continue another 76 km to Mokpo on the conventional infrastructure, which the Government plans to upgrade for 200 km/h operation in the near future. The Honam line serves cities on a north-south axis along the country’s western region and is part of the Government’s agenda to bring all of its major cities within half a day’s travel of one another. Meanwhile, in the Russian Federation where Russian Railways already operates services at up to 250 km/h on the conventional 1,520 mm gauge main line between Moscow and St Petersburg, the Government has budgeted for the development of the country’s first dedicated high-speed corridor between Moscow and Kazan. The project includes the development of 15 stations serving a population of about 25 million people. The 770-km line is expected to cut some journey times by as much as 75 per cent compared with current timings.

In other countries, despite the high construction costs involved and the high level of technical competence required, projects are also being considered. One of the most high-profile projects in this regard is the planned high-speed line between Singapore and Kuala Lumpur. In 2014, the prime ministers of Singapore and Malaysia signed an agreement to construct a double-track electrified 330-km line with an operating speed of 300 km/h. This line will cut travel time between the two cities to ninety minutes compared to the current time of more than five hours. The project will be implemented using a PPP modality for which construction and land acquisition costs could reach $8 billion. It is expected to enhance socioeconomic development along the entire corridor, as well as be a catalyst for other local transport schemes, such as urban rail projects in and around Kuala Lumpur.

India is also considering high-speed development to link its heavily populated economic centres, and is turning to both China and Japan to acquire the necessary expertise. In 2015, acting under the memorandum of understanding signed in 2014 between the Governments of China and India, China Railway Survey and Design Group started work on a preliminary study of a planned 1,754-km high-speed line linking Delhi, Bhopal, Nagpur, Hyderabad and Chennai. Meanwhile, in December 2015, the Governments of India and Japan signed a memorandum of understanding for the development of a 508-km high-speed line between Mumbai and Ahmedabad using Japanese technology. Early estimates put the construction cost at $14.6 billion.

High-speed rail projects have also been discussed in other countries of the region, most notably in Thailand for the Bangkok – Chiang Mai route. However, governments are also weighing the costs of “high speed” construction against the more affordable costs of upgrading existing infrastructure to speeds of 160 km/h to 180 km/h. The often-prohibitive cost of high-speed line was one reason why the Government of Viet Nam decided to upgrade the existing North-South Rail route between Hanoi and Ho Chi Minh before building a new line.

Master Plan. This plan comprises: a) a short-term phase (2014-2020) prioritizing the rehabilitation of the Northern line from Phnom Penh to Poipet, and the construction of the 257-km Bat Deng – Snuol line to connect with the railways of Viet Nam; b) a medium-term phase (2012-2030), targeting the rehabilitation of the 260-km line between Phnom Penh and Sihanoukville, and construction of a 326-km line from Sisophon to Cheung Prey to develop the east-central area of the country; and c) a long-term phase (post 2030), targeting the construction of a 249-km line from Snuol to Sung Treng, to eventually connect with the Lao People’s Democratic Republic.33

Thailand has linked up with several other countries that have plans for the construction of high-speed rail lines for passenger transport, though previous plans to complete the proposed high-speed rail projects in the Asia and Pacific region have often stumbled on the financing side (box 3.3).

4. DRY PORT DEVELOPMENT

a. Status of dry port development

In many countries of the Asia-Pacific region, dry ports and their associated transport links function as conduits for international trade between inland trade origins and destinations, and with seaports. For some countries, the distance between the two can be vast. This is particularly true for the landlocked countries of Central Asia and for Mongolia, where goods being transported overseas have to travel distances of 1,000 km to more than 7,000 km to reach an outlet to the sea. In China and India, many inland industrial centres are at least 1,500 km from the nearest seaport.

By contrast, in other countries, such as those of South-East Asia, distances between trade origins or destinations and seaports are comparatively short. For example, in Thailand containers are carried by road and rail between Laem Chabang Port and Lard Krabang, a distance of only 118 km. Australia is a special case, as some 85-87 per cent of international trade, in terms of volume, does not move outside of the metropolitan areas of state capital cities, all of which have seaports, meaning that the throughputs of established inland intermodal freight terminals tend to be dominated by domestic freight. However, in recent years, road traffic congestion around seaports in Sydney and Melbourne has forced transport planning agencies to consider the consolidation of container handling facilities in the suburbs and the diversion of port-related container traffic from road to rail, despite the relatively short rail hauls involved.

To enable the emergence of a truly intermodal network, the interface between the different transport modes, whether road, rail or port, needs to be improved. With this in mind, governments in the region collaborated, under the auspices of ESCAP to develop the Intergovernmental Agreement on Dry Ports.34 The aims of the agreement are to: a) promote the international recognition of dry ports; b) facilitate infrastructure investment by attracting strong commitment from member countries and increased financing from international banks and bilateral donors; c) define operational services for a more harmonized approach to the development and operation of dry ports in the region through enhanced collaboration with the private sector; and d) contribute to the development of an efficient logistics industry in member countries.

During the second session of the Forum of Asian Ministers of Transport, which was held in Bangkok in 2013, 14 member States signed the Agreement, including Thailand, which deposited an instrument of ratification.35 Subsequently, four more countries became Parties to the Agreement – the Republic of Korea through ratification (April 2014), Viet Nam through approval (October 2014), Tajikistan through approval (November 2015), India through accession (December 2015) and Russian Federation
through approval (December 2015) — and three more countries became signatories — Bangladesh (September 2014), Sri Lanka (May 2014) and Turkey (December 2014). The Agreement will come into force after eight countries have become Parties to it.

b. Selected dry port projects
The benefits of dry ports are already recognized by governments in the region. In the context of regional infrastructure networks, dry ports and inland logistics centres give shippers the option of using rail transport or inland water transport over long or medium distances, while limiting road transport to the last miles of their planned trips. Both China and the Russian Federation have established dry ports in their territories, which are also serving as terminals for Asia – Europe container traffic along the Trans-Asian Railway (see part II).

In September 2014, construction began on the Khorgos – East Gate Free Economic Zone (FEZ) on the Chinese border. In December of the same year, the State-owned Kazakhstan Temir Zholy (Kazakhstan Railways) reported that the first part of the complex was ready for operation and that trains had begun carrying containers along the new railway tracks. The area includes the Khorgos International Centre for Cross-Border Cooperation, centres for trade activities, multimodal facilities, and warehouses for the storage, sorting and secondary packaging of goods in transit. It is expected that within the next two years, the facility will process more than 200,000 containers. Meanwhile, the Government of Kazakhstan is actively courting investors for FEZ by offering exemptions from tax and custom duties and rent-free land for up to ten years.

The Government of Uzbekistan has progressed in its development of dry ports in the country, in particular at Angren in the Tashkent region, and Navoi, 350 kilometres south-west of Tashkent. The Navoi dry port has been developed in connection with the Navoi Free Industrial Zone (FIZ), close to the international intermodal hub at Navoi airport, which became operational in 2009 under the management of Korean Air. The facilities are located along major subregional road and rail routes, which serve the traffic coming through the ILC Navoi, a major international intermodal logistics centre based at Navoi Airport.

In China, the Government’s transport policy remains focused on the development of major intermodal rail hub terminals at 18 inland locations, connected both to seaports and other inland industrial centres. The first of those was established at Kunming in 2006, and, to date, nine are in operation. It is expected that, in the longer term, all intermodal hubs will be connected by double stack rail container services, thereby substantially expanding their use and reducing their unit operating costs. The use of alternative transport modes (road and inland waterway transport) for the line-haul movement of containers is now generally restricted to corridors that are not connected to the railway network, of which the corridor for international trade between China (Kunming) and the Lao People’s Democratic Republic is an example.

The Government of Australia is supporting the development of the Moorebank project, which is estimated to cost 1.83 billion
Australian dollars ($A) (1.32 billion), with the majority of funding coming from the private sector. The primary function of the project will be to handle export and import containers, which will be transported by rail to and from Port Botany, a distance of only 31 km. Warehousing will be a major income earner for the new terminal, which will ultimately have a warehousing area of 85 hectares. The project will be developed through a PPP between the Government and a joint venture of two major private sector logistics operators (QUBE and Aurizon).

In South East Asia, several plans for the development of special economic zones are in the works. For example, in May 2015, the Governments of Thailand and Cambodia expressed their commitment to move ahead with a plan to set up joint special economic zones (SEZs) in Sa Kaeo-Banteay Meanchey and Trat-Koh Kong. The projects would be supported by new transport infrastructure and services by rail and road to serve rising demand in freight and passenger movements as well as the establishment of new border checkpoints.37

Plans are also under way in the Lao People’s Democratic Republic to develop a logistics park in at the country’s Savan-Seno Special Economic Zone (SASEZ), located in Savannakhet near the Second Thai-Lao Friendship Bridge across the Mekong River. Situated in Uthumphon near the Lao People’s Democratic Republic -Thailand border, the site covers 20 hectares. According to one report, two Thai companies, Double A logistics and Nann Logistics, along with the Japanese firm Logitem are already investing in the zone.38

In India, the dry port development policy of the Container Corporation of India Limited (CONCOR) is taking new relevance under the Government’s Delhi-Mumbai Industrial Corridor project. This project includes the construction of a dedicated freight corridor between Delhi and Mumbai, with a number of logistics parks along the route.

c. Prospects for future dry port development

As countries in the region embark on dry port development projects, the experiences related to the successful operation of dry ports helps to promote further development of dry ports:

Location: The viability of dry ports depends on whether they are suitably located for serving international trade customers and minimizing total transport costs. Regardless of whether the distances between dry ports and seaports or other trade origins or destinations are short or long, dry port sites must be accessible by high-quality railways and highways with direct connections to seaports. Furthermore, they should be located within or close to industry, manufacturing or logistics precincts or zones, to lower the cost of last-mile delivery by road transport. In the case of China and the Republic of Korea, very large rail-served terminals have been constructed in zoned areas some 30-40 km from city centres. In Australia, large interstate rail hub terminals have been established in the middle of industry and distribution zones, while smaller rail- and road-served terminals are being established within industrial estates in major inland centres.39 In India, CONCOR operates an extensive network of 62 inland container depots (ICDs); most of them are linked by rail to the Indian Railway network, with the rest linked by road.

Private sector involvement: While private sector ownership and operation of dry ports is not necessarily a condition for their sustainability, there appears be a widespread acceptance that the operation of these facilities can benefit from participation in their management (if not ownership) by companies with logistics expertise. In the Republic of Korea, for example, ICDs currently operate at five locations as part of inland logistics depots, with broader functions for the handling of domestic as well as international cargo. All of them operate under PPP contracts with public and private shareholdings of 25 per cent and 75 per cent, respectively. The public sector
partner is responsible for investing in the road and rail accesses to the terminals, while investment in infrastructure and handling equipment within the boundaries of the terminals is the responsibility of the private partners.

In Australia, the development, ownership and operation of inland intermodal freight terminals are in private sector hands, with the exception of Moorebank, the country’s largest intermodal terminal, with an annual throughput capacity of 1.7 million TEU, which is located on the outskirts of Sydney and the development of terminals in suburban Melbourne connected by rail shuttle services to the Port of Melbourne.

In the case of the Lard Krabang Inland Container Depot, the land and infrastructure is provided by the State Railway of Thailand (the owner) and the handling equipment is furnished by six logistics companies. Those companies lease and operate the six modules comprising the inland container depot.

Financial incentives: Financial incentives provided by governments often determine the viability of an operator’s investment in the construction of a terminal. The most popular type of incentive in the region is the provision of low-cost land, or low land rent. In China, for example, all terminal land is owned by the Government and payment for its use is recovered in the form of land taxes, payable by terminal operators. By keeping land valuations low relative to prevailing market rates, the Government can provide land use incentives to terminal operators. In addition, if the area occupied by an operator exceeds 60,000 square metres, that operator receives a 50 per cent reduction in the rate of land tax applied. Other forms of financial incentive which provided by governments are tax (especially business or corporate tax) waivers or holidays, whereby taxes are waived for an agreed period of time, usually to allow operators some time to establish their businesses and generate income.

Other government policies: It is important that, once established, dry ports generate a reasonable level of profit for their operators, while at the same time result in lower transport and cargo handling costs between cargo origins/destinations and ports. One way to reduce transport costs is to design dry ports as logistics hubs, allowing for the consolidation of LCL (less than container load) shipments. Other policies that accelerate the turnaround of containers in terminals can also help to reduce logistics costs. For example, the speed with which customs and other border control processes are completed is reflected in the terminal handling and storage costs, which are an important component of total logistics costs. The transport components of the total cost are related to local delivery and line-haul transport, and are therefore influenced by modal choice decisions (part II).

B. Transport facilitation and logistics

1. INTRODUCTION
International trade and transport have expanded at a remarkable rate in the Asia-Pacific region, contributing to the economic growth of countries and allowing for the diversification of their economies. The spread of global and regional supply chains has played an important role in boosting
trade integration, particularly in North-East Asia and South-East Asia. While economic and financial considerations are the main drivers behind this integration, government policies have had a significant influence on the trading environment and the inflow of foreign direct investment. In particular, governments’ efforts to facilitate trade and transport, particularly at borders, has reduced transport and trade costs substantially. Nonetheless, there is tremendous potential for further simplifying and harmonizing the processes that handle the movement of goods and passengers between countries. Border crossings, for example, are still a source of unnecessary delays and costs due to complicated and non-standardized procedures at borders, and the lack of institutional coordination across them. Improving transport facilitation would also help to bring down logistics costs, which, in turn, would enhance the competitiveness of the region’s developing countries.

This chapter provides a review of recent developments in transport facilitation and logistics in the Asia-Pacific region. Specifically, progress in the development of international conventions and multilateral agreements governing transport facilitation is described, followed by a discussion of the status of logistics in the region. In the chapter, new technologies that are helping border agencies and the private sector to better perform their respective roles in the transport chain are highlighted. Also included is a discussion on the roles of transport facilitation and logistics in enhancing the competitiveness of landlocked developing countries.

2. PROGRESS IN THE DEVELOPMENT OF LEGAL INSTRUMENTS FOR FACILITATING INTERNATIONAL TRANSPORT

Given the regional situation, the formulation and implementation of legal instruments are essential for countries to enhance operational connectivity. Subregional facilitation agreements are a valuable stepping stone towards harmonization at regional and international levels. Bilateral agreements on transport also play an important role in opening of border crossings and domestic routes for international transport.

a. Subregional and multilateral agreements

The Inter-Governmental Agreement of the Shanghai Cooperation Organization Member States on the Facilitation of International Road Transport, formulated with technical and financial assistance of ESCAP, was signed at the annual Meeting of the Council of Heads of States of the Shanghai Cooperation Organization, which was held in Dushanbe in 2014. All of the member States of the Shanghai Cooperation Organization — China, Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan and Uzbekistan — are covered by the Agreement. This Agreement is expected to open up more than 15,000 km of Asian Highway routes for transport operations and services, with the longest route stretching around 9,000 km from Saint Petersburg in the Russian Federation to Lianyungang, China. It will also facilitate access to the sea for landlocked Central Asia through China and the Russian Federation, revitalizing the ancient Silk, which connected China, the Russian Federation and the Central Asian countries to the Mediterranean Sea and Europe.

In 2014, the Governments of China, Mongolia and the Russian Federation began to negotiate an agreement on international road transport along the Asian Highways with support from ESCAP. The third consultation meeting among the member States, which was held in Ulaanbaatar from 15 to 18 September 2015, reached an agreement on both interstate and transit transport along the Asian Highway Routes Nos. 3 and 4.

Under the agreement, the Asian Highway route No.4 (AH4) will be opened to border of China with Pakistan. This route would then
be connected by bilateral and quadrilateral agreements with China and some Central Asian countries along the China-Pakistan Economic Corridor for connectivity, a western corridor of the Silk Road Economic Belt.

With the ASEAN Economic Community due to become operational in December 2015, member States of the Association of Southeast Asian Nations, or ASEAN, have worked steadily to remove non-physical barriers at borders and to modernize their trading environments. In that regard, substantive progress was made towards the entering into force of Protocol 7 of the ASEAN Framework Agreement on the Facilitation of Goods in Transit (AFAGIT), entitled the “Customs Transit System”. The Protocol provides for the full end-to-end computerization of transit operations; a single electronic customs transit declaration; and free movement for trucks and drivers without the transshipment of transit goods. The Protocol was signed in 2013 by Brunei Darussalam, Cambodia, Indonesia, the Lao People’s Democratic Republic, Malaysia, Myanmar, the Philippines, Singapore and Viet Nam, and by Thailand in 2015, and will enter into force upon the deposit of instruments of ratification or acceptance by all contracting parties with the Secretary-General of ASEAN.

Meanwhile, work has intensified on the ASEAN Customs Transit System in three pilot countries, Malaysia, Singapore and Thailand, with plans to start testing the system by mid-2016. ASEAN member States also continued to work towards the ASEAN Framework Agreement on Cross Border Transport of Passenger (CBTP), which is expected to facilitate the cross-border road transport of people within the ASEAN region through the simplification and harmonization of transport procedures and requirements.

At the national level, the National Multimodal Transport Law was enacted in Myanmar in January 2014, with the corresponding rules and regulations issued on 30 December 2014. This marks a significant step towards the practical application of the ASEAN Framework Agreement on Multimodal Transport (AFAMT) and the Greater Mekong Subregion Agreement for Facilitation of Cross-border Transport of Goods and People, of 1999 (GMS CBTA).

In North and Central Asia, the Treaty on the Eurasian Economic Union entered into force on 1 January 2015. Signed by the presidents of Belarus, Kazakhstan and the Russian Federation, and subsequently acceded to by Armenia and Kyrgyzstan. The Treaty includes measures to coordinate transport policy among member States, unify transport control procedures for the exterior border of the Union, and introduce a permit-free system for traffic moving between the countries of the Union (gradually with a ten-year transition period). Future measures being planned include the harmonization of transport infrastructure tariffs and the simplification of transport documentation, including abolishing permits for all road transport operations among the Eurasian Economic Union member States.
Several countries in South Asia are entering into a multilateral transport agreement to facilitate cross-border and transit transport. The member countries of the South Asian Association for Regional Cooperation finalized the SAARC Motor Vehicles Agreement. Pending signature to the agreement by all SAARC members, Bangladesh, Bhutan, India and Nepal signed the Motor Vehicles Agreement for the Regulation of Passenger, Personal and Cargo Vehicular Traffic on 15 June 2015. The arrangement for the implementation of the agreement will be laid down through the protocols, to be negotiated separately. It is expected that once the agreement is implemented, the transshipment of goods at border crossings in South Asia could be a thing of the past.

In April 2015, India and Bangladesh ratified a coastal shipping agreement to facilitate the movement of goods between the two countries via sea routes. The agreement allows merchant ships to ply directly between the two countries, which will help to reduce transport costs and create more employment opportunities. In addition, the two countries have also decided to constitute a joint task force for negotiating a multimodal transport agreement.

3. INNOVATIVE APPROACHES AND NEW TECHNOLOGIES TO FACILITATE INTERNATIONAL TRANSPORT

Around the world, governments are embracing innovative approaches and new technologies for managing and monitoring trade and transport flows. For example, the World Bank estimates that 73 economies have implemented single-window systems, and 88 per cent allow traders to submit at least some of their export and import documents to customs authorities electronically. Many of these initiatives are implemented in conjunction with measures to harmonize and simplify procedures.

b. Bilateral agreements

China and Mongolia signed several bilateral agreements in August 2014, with the aim to enhance mineral trade and transportation links for Mongolia. Those relevant to transport include:

• Inter-Governmental Agreement on Transit and Freight Transportation to Sea and Back through Mongolian and Chinese Territories;
• Inter-Governmental General Agreement on Development of Railway Transit Transport;
• Inter-Governmental Memorandum of Understanding on Development of Railway Cooperation; Memorandum of Understanding between Ministry of Road and Transportation of Mongolia and Railway Authority of People’s Republic of China on the renewal of the “Mongolia and China Border Railway Agreement.”

In South Asia, the Motor Vehicle Agreement between Nepal and India was signed in Kathmandu on 25 November, 2014 to facilitate the movement of vehicular traffic between the two countries. Separately, India, Myanmar and Thailand are also working on a motor vehicle agreement to facilitate cross border transport.
The impact of those efforts is becoming evident at border crossings. In recent years, border agencies have faced the challenges of facilitating increasing volumes of trade and transport, while also monitoring those movements to enforce control measures. To help border agencies optimize their methodologies for dealing with these conflicting requirements, many countries in the region are developing innovative approaches and new technologies.

a. Integrated check posts
Several countries in the region have introduced integrated check posts (ICPs) at their border crossings. ICPs provide facilities for the clearance of passengers and cargo under one roof in the form of customs and immigration facilities, weigh bridges, security and scanning equipment, cargo inspection sheds, warehouses and cold storage, and health and quarantine facilities. To facilitate border crossings, some also provide space for banks and money changers, hotels, parking and other public utilities.

In South Asia, India has established 13 ICPs along its international borders. The first ICP was established along the India–Pakistan border at Attari near Amritsar in April 2012, followed by the Akhaurah ICP near Agartala along the India–Bangladesh border in November 2013. With support from India, Nepal is also constructing ICPs at four important border crossings: Birgunj, Bhairahawa, Biratnagar, and Nepalgunj. Similarly, Pakistan is in the process of establishing a land port authority to manage its land ports.

b. Automation of customs processes
The completion of customs formalities is a major cause of delays at border crossings, so it stands to reason that the automation of customs processes is the most effective way to reduce such delays. To that end, the Russia Federation is implementing an electronic system for submitting export and import documents and reducing the number of physical inspections on cargo in the Russian Federation. Uzbekistan also allows the electronic submission of these documents.

Also in Central Asia, Azerbaijan streamlined its internal customs procedures in 2014 while in Kyrgyzstan, the customs services completed the roll out of a unified automated information system in December 2013, and since January 2014 all goods have been declared only electronically; Meanwhile, Tajikistan has introduced a unified automated information system for customs, which connects 72 customs posts in the country. The system processes customs declarations, allows the close monitoring of cargo, and generally improves the quality of customs control, clearance procedures, and the collection of customs duties.

In South-East Asia, Cambodia has introduced automated border clearance processes, risk management and coordinated inspections, and a single administrative document. These measures helped Cambodia move up in the Logistics Performance Index from 129 in 2010 to 83 in 2014. In February 2015, Cambodia and Viet Nam also opened a “one-stop-shop” customs model at the Lao Bao – Densavan International Border Gate, which is part of the Asian Highway.

In South and South-West Asia, the Islamic Republic of Iran introduced a new system of customs clearances in October 2014. This system, which facilitates the electronic acceptance of declarations, is expected to shorten the customs clearance time from 21 to 4 days. Pakistan has introduced a fully automated, web-based one customs system for the submission of export and import documents in Lahore and Karachi.

Meanwhile, Bangladesh is using the computerized Automated System for Customs Data (ASYCUDA) in Chittagong and Dhaka. It joins other countries in the Asian and Pacific region – including, among others, Afghanistan, Fiji, the Lao People’s Democratic Republic, the Philippines, Samoa, the Solomon Islands, Sri Lanka, Timor-Leste and Vanuatu – in
using ASYCUDA to facilitate customs data management.

**c. Trends in new technologies to facilitate international transport**

The objective of border agencies is to identify, isolate and interdict goods and people from entering their respective countries that are in contravention of rules and regulations. Though the aims of border agencies are simple, the necessary processes are complex. In the light of the increasing volume of intra- and interregional trade and transport, the application of new information and communication technologies is supporting border agencies in carrying out their duties.

The main technologies used are satellite positioning systems, cellular communication systems, radio frequency identification (RFID) and electronic seals. Coupled with the Internet and customized application software, these technologies are being used to track containers and vehicles. Radio frequency identification technologies are also being used in container asset management at ports and logistics terminals to identify and locate containers for the smooth operation of the supply chain. In addition, electronic seals embedded with RFID chips allow agencies to determine in real time whether a container has been subject to tampering. They can also help to detect changes in pressure, humidity, temperature, and carbon dioxide levels.

Vehicle/container tracking is particularly useful for securing the movement of goods and vehicles that are in transit. Control authorities in many countries are concerned about the potential diversion of goods and the associated loss of revenue, as well as the smuggling of prohibited goods. With container and vehicle tracking systems, control authorities can feel more confident about the movement of foreign vehicles in their territories.

A growing number of economies are using these technologies, including: China; Hong Kong, China and Republic of Korea in North-East Asia; and Malaysia, Singapore and Thailand in South-East Asia. Their use is also being considered in South and South-West Asia. Some bilateral and subregional agreements contain explicit provisions for the tracking of foreign vehicles across their territories. For example, the Afghanistan-Pakistan Transit Trade Agreement contains a provision for it, while a proposed motor vehicle agreement among the countries of SAARC also has a similar provision.

In Central Asia, Kazakhstan has gone a step further by implementing a comprehensive approach to coordinating border agency controls and tracking. A centre of operational management has been established by the state revenue committee of the Ministry of Finance to serve as a single point for the remote control and monitoring of the movement of goods and vehicles by customs authorities and other government agencies — dealing in areas, such as health, agriculture, transport and communications — that exercise control at the border.

To promote the application of these technologies, ESCAP and ADB jointly conducted a feasibility study on the pilot implementation of ESCAP’s Secure Cross Border Information System (SBCIS).
Border Transport Model along the Bhutan-India transit corridor in 2014 (figure 3.3). The recommendations of the study are currently being considered by the Governments of both countries.

The use of ITS for freight transport is expected to expand in many directions. Tremendous scope exists for the use of ITS in other elements of freight management, including transport asset management systems, port and terminal management systems, and border crossing management systems. Those technologies can give control authorities greater confidence and security in managing cross-border flows of freight and vehicles. However, further work is required to establish global technical standards, such as for electronic seals and application software, in order to be able to use these technologies across borders.
4. LOGISTICS DEVELOPMENT

Logistics is defined as “the part of the supply chain process that plans, implements, and controls their efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption in order to meet consumers’ requirements”, and as such is an integral part of all trade movements. Country-level data on logistics costs are very limited in the Asia-Pacific region. Nevertheless, some studies have provided estimates of logistics costs in emerging economies. Estimates for China in 2008 and Thailand in 2009 were 18 and 19 per cent of their national GDP, respectively, while a 2010 estimate for Republic of Korea was 13 per cent of GDP.

In the absence of comparable data, the World Bank created the perception-based Logistics Performance Index (LPI), which assesses countries’ performances in six main areas, namely efficiency of customs and border management clearance, quality of trade and transport infrastructure, ease of arranging competitively priced shipments, competence and quality of logistics services — trucking, forwarding and customs brokerage; ability to track and trace consignments; and the frequency with which shipments reach consignees within scheduled or expected delivery times. Based on LPI, the logistics performance of the Asia-Pacific region as a whole was almost on par with the world average in 2014, scoring 2.9 points out of 5 (figure 3.4).
However, the average LPI score for Asia and the Pacific is still considerably lower than for North America (3.9) and the European Union (3.6). Furthermore, as figure 3.5 illustrates, there are substantial differences between subregions. East and North-East Asia scored 3.5 points in logistics performance, which is comparable to the European Union, while the worst performing logistics sector was found in North and Central Asia with a LPI score of 2.5.

Many different factors affect logistics costs, including, among them, geographical situation, logistics infrastructure, political and economic stability, regulatory frameworks, interest rates and energy prices, that affect logistics costs. Based on this, LPI results should be interpreted with caution. Some factors, such as geography, or political and economic stability, are perhaps beyond the influence of public policy. However, governments have tremendous leverage over other factors, such as the regulatory frameworks governing trade and transport across borders, infrastructure development and the promotion of relevant technologies to facilitate transport and logistics.

As the growth rates of many countries in the region continue to slow, governments must seek new ways to enhance their competitiveness. Without reliable logistics infrastructure, companies need to adopt more costly shipments or higher inventories and abandon lower cost just-in-time production. In some Asia-Pacific countries, delays and unexpected costs, such as informal payments, contribute to poor logistics performances.

One way in which the logistics industry can become more efficient is to diversity services. A recent study by the ESCAP secretariat found that some logistics service providers were increasingly involved in a range of more sophisticated services within the supply chains, offering services beyond their traditional boundaries of moving goods and customs brokerage. Examples include:
• Assembly: some providers offer assembly activities for both low-end assembly (such as kitting) and high-end assembly (such as assembly of final product based on store requirements). These activities can take place at client premises or at the warehouses of logistics service providers;
• Supply chain: Logistics service providers increasingly offer services from the perspective of the supply chain rather than transport. This includes supply chain design, management and operations, operating as a lead logistics provider with procurement responsibilities and inventory management;
• Quality control: Logistics service providers may provide technical testing, localization, and quality inspection services, either as in-plant services or at the warehouse;
• Financial services: Some providers can supply collateral management services and act as insurance brokers for their clients upon request;
• Customer services: Logistics service providers may assume responsibility of such back-end customer service activities as returns and repairs, operation of call centres (particularly relating to warranty and technical support), and provide reverse logistics services.

The increased complexity of supply chains and distribution systems requires logistics service providers to have the appropriate types of skills and competencies to manage them. Some governments are working closely with the private sector to raise the quality of their logistics industries. In an effort to improve quality and competence, the Government in Malaysia is providing training programmes to increase the human resource capacity of the logistics sector. In the Republic of Korea, logistics service providers who meet certain industrial criteria can apply for the “Logistics Company Certification”, a symbol of quality that assures customers of a certain standard of service.

In addition to the human resource aspects of successful logistics sectors, technology plays an important role in integrating supply chains and distribution systems. For many countries, the ultimate goal is to realize one comprehensive logistics information system. Also known as “e-logistics” systems, they serve as interfaces for fast, accurate and reliable data exchange and associated manipulation. Ideally, national e-logistics systems should be able to communicate with each other, thereby helping to integrate cross-border supply chains.

Having already made significant advances in logistics information systems in their respective countries, China, Japan and the Republic of Korea recognized that trade between among could be better managed if they had a common platform which allowed their logistics systems to communicate with each other. This led to the establishment of NEAL-NET, or the Northeast Asia Logistics Information Service, which provides a standardized query interface for supply chain partners in all three countries to obtain logistics status data through their national logistics systems (box 3.4).
The Northeast Asia Logistics Information Service Network (NEAL-NET) was established at the third China-Japan-Korea Ministerial Conference on Transport and Logistics in 2010, as a mechanism to improve trade facilitation through seamless supply chains and high-quality logistics. NEAL-NET members include a wide range of stakeholders: ports, logistics service providers, transporters of all modes, government agencies, and other institutions. NEAL-NET connects the information systems LOGINK, COLINS and SPI-DC from China, Japan and the Republic of Korea, respectively.

LOGINK (China)
The national transportation logistics public information platform (LOGINK) for China comprises a national interchange hub linked to thirty-two provincial interchange nodes to form a network across China. Users include both public and private stakeholders, such as transport authorities, customs and quarantine authorities, logistics companies and other information service providers.

The platform’s core functions are a data interchange service and a “service call” service. The data interchange service allows registered supply chain partners to share business data and transmit electronic documents through a secure platform. The “service call” service enables registered logistics service users and providers to find each other through LOGINK. Users can request logistics information or services and receive responses through the server.

This open information channel enables the better utilization of logistics service resources and increases overall efficiency. Third-party stakeholders within the supply chain can also provide other value-added services through the LOGINK interchange network, such as shipment tracking, vehicle access and departure management, and the resolution of inquiries for vessel schedules and customs inspection information.

COLINS (Japan)
The Container Logistics Information Service (COLINS) was set up in 2009 to enhance ports’ services and provide an efficient logistics network in Japan. Users of COLINS include, among others, container terminal operators, shippers, freight forwarders and land transport service providers.

The programme combines information from three databases — vessel schedules, export container status, and import container and cargo availability status — and can be accessed via the Internet from computers and cellular phones. Vessel schedule data are updated every 60 minutes while the other data are updated every 10 minutes. In addition, live traffic camera streams are broadcast from more than fifty port districts to facilitate logistics management planning.

Data are also transmitted to NEAL-NET through Electronic Product Code Information Services (EPCIS) to enable information sharing and traceability with China and the Republic of Korea (see figure).

Port-MIS and SP-IDC (Republic of Korea)
Port-MIS is an integrated information system designed to support and facilitate seamless port logistics activities. The system, which is accessible from any location through the Internet, currently covers 31 international ports in the Republic of Korea.

As it is connected with customs, immigration and quarantine offices, Port-MIS supports e-document submission and processes applications instantly. The system also allows ports to better manage vessel and container traffic by streamlining berth management, organizing cargo/container movement and allowing for more transparent handling of hazardous goods. The system enables the automated calculation of facility usage and handling fees, including berthing, anchorage and discharge handling fees.

Meanwhile, the Shipping and Port Integrated Data Center (SHDC) offers easy public access to information generated on Port-MIS, allowing stakeholders to obtain maritime logistics information and statistics, such as cargo volume, container throughput and vessel schedules. Port authorities in four main ports, namely Busan, Incheon, Ulsan and Yeosu/Gwangyang, participate in the system, while users include logistics service providers, shipping companies and agencies, terminals, members of academia and the general public. Since 2011, the system has been sharing logistics information through NEAL-NET with China and Japan.
The NEAL-NET website allows all users, including small and medium-sized enterprises, to easily request data online — such as container vessel arrival and departure times and container movements — to help with operational planning. Some larger companies have developed their own interfaces to connect their internal systems to NEAL-NET. While at present, NEAL-NET mainly focuses on maritime transport, it is expected that it will be extended to other modes in the near future.

5. TRANSPORT FACILITATION AND LOGISTICS FOR LANDLOCKED DEVELOPING COUNTRIES

The simplification and harmonization of border crossing processes will help to bring down logistics costs and shorten transit times, which, in turn, will help improve the competitiveness of landlocked developing countries disadvantaged by their geographical situation dictating that trade must take place across multiple borders. This is why transit policy issues remain central to the Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014-2024.

In recent years, the special characteristics of landlocked developing countries have been recognized by the international community as a potential barrier to their economic and social development. According to a recent United Nations document, the share of landlocked developing countries in global exports was estimated at only 1.2 per cent in 2014, compared with 33 per cent for all developing economies (excluding China), while the 2014 World Bank Logistics Performance Index found landlocked developing countries to have an overall performance score of 2.49, compared with 2.69 for transit developing countries.

To help landlocked developing countries overcome some of the development challenges they face, the second United Nations Conference on Landlocked Developing Countries, which was held in Vienna from 3 to 5 November 2014, adopted the Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014-2024. More holistic and results-oriented than the Almaty Programme of Action, which preceded it, the Vienna Programme of Action identifies the following six areas as priorities for action:

**Priority 1. Fundamental transit policy:** The Vienna Programme of Action urges landlocked developing countries and transit countries to work together to harmonize, simplify and standardize rules and documentation, drawing on the relevant international conventions, regional/subregional and bilateral agreements on transit transport facilitation. Three specific objectives have been identified: first, to reduce transit time along transit corridors, with the aim of attaining a speed of 300-400 kilometres per 24 hours; secondly, to reduce time spent at border crossings; and thirdly, to enhance the efficiency of intermodal transfers from port to rail/road, and vice versa.

**Priority 2. Infrastructure maintenance and development:** The Vienna Programme of Action reiterates the importance of infrastructure to support the development of landlocked developing countries. In that regard, it calls on landlocked developing countries and transit countries to develop comprehensive national policies for infrastructure development and maintenance for all modes of transport, particularly railways, as well as for intermodal facilities such as dry ports, ICDs, transshipment facilities, and international logistics hubs. It also underscores the need to involve the private sector in infrastructure development. Unlike the Almaty Programme of Action, the Vienna Programme of Action also calls for the development of energy and information and communication technology infrastructure (ICT), including the use of ICT for transit transport, customs and border facilities.
**Priority 3. International trade and trade facilitation:** To help landlocked developing countries participate more in global value chains, those countries are urged to streamline and harmonize their customs and border procedures. This would help enhance the competitiveness of exports from landlocked develop countries. The Vienna Programme of Action also encourages landlocked developing countries to diversify their export markets to reduce their vulnerability to global economic shocks, including by expanding their services sectors.

**Priority 4. Regional integration and cooperation:** The implementation of the 10-year Almaty Programme of Action showed that in addition to transit transport, trade and trade facilitation, there is a need for cooperation on a wider range of issues, such as foreign direct investment, research and development, common policies for rapid industrial development and regional connectivity. This priority area, therefore, covers other issues that can contribute to regional integration, such as regional trade agreements and customs guarantee systems, to help landlocked developing countries deal with the barriers to their sustainable economic growth.

**Priority 5. Structural economic transformation:** This also is a new priority, which is aimed at helping landlocked developing countries diversify their economies, as well raise productivity levels. Specifically, the Vienna Programme of Action calls on landlocked developing countries to increase their manufacturing base and thereby contribute to regional and global value chains. Promoting science, technology, innovation as well as the private sector in those countries is imperative for the structural transformation of their economies.

**Priority 6. Means of implementation:** This priority reiterates the fact that ultimately development is the primary responsibility of a country itself. At the same time, it calls upon development partners to support the efforts of landlocked developing countries to establish and maintain an effective transit system, enhance their productive capacities and work towards the structural transformation of their economies. Official development assistance, aid for trade, and South - South cooperation are all important for supplementing and complementing the efforts of landlocked developing countries.

### C. Inter-island shipping in the Pacific subregion

#### 1. INTRODUCTION

The maritime sector plays an important role in many countries of the ESCAP region, but it is fundamental to the maritime countries and territories in the Pacific, as this subregion is heavily dependent on shipping services for the domestic and international transport of cargo and passengers. Inter-island shipping is also central to the lives of Pacific islanders, often providing the only means of access to and from the smaller outer islands. The sector is also a major source of employment for Pacific islanders, contributing significantly to their economies and supporting families and communities. Most government administrations and business activities are directly or indirectly linked to the sector, a telling sign of its importance.

The maritime sector is accorded prominent political status in the subregion, reflected in the periodic meetings of ministers of transport, which set strategic directions for the development of the sector and guide national and regional efforts and development partners’ involvement. Most recently, the Denarau Communiqué, which was issued by the Second Pacific Regional Energy and Transport Ministers’ meeting, held from 21 March to 4 April in Nadi, Fiji, reaffirmed the Framework for Action on Transport Services for the further development of transport in the Pacific (box 3.5). Governments have also put other important sectoral communications in place, such as the Forum Principles on Regional Transport Services, the Framework for Pacific Regionalism and the Waiheke Declaration.
The Framework for Action on Transport Services acknowledges that national transport policies and plans are the principal means for achieving improved transport services. The Framework outlines seven themes for action to improve regional transport services, namely:

1. Leadership, governance, coordination and partnerships;
2. Capacity development, policy, planning and regulatory frameworks;
3. Transport safety and security;
4. Improved access;
5. Environmental impact, technology and energy;
6. Transport data, information and knowledge; and
7. Sustainability, monitoring and evaluation.

Despite its pre-eminence and recent progress in improving the sector’s efficiency, limited awareness on the development-facilitating role beyond maritime sector professionals exists. National sector development plans have been prepared. They are now pending until they are translated, which will not be completed until adequate resources are allocated for the process. Fresh, proactive approaches are needed to address the sector’s requirements, so that the Pacific island developing economies can reach their true potential in trade, fisheries and cruise tourism, and improve the sustainability of their maritime environment.

2. KEY DEVELOPMENTS AND TRENDS

The maritime sector of the Pacific island developing economies is very dynamic and has evolved in response to local and international industry trends and emerging issues. Some key developments and trends are elaborated below.

a. International shipping

Reflecting worldwide trends, the maritime sector of the Pacific island developing economies has had some success in transitioning to containerized shipping. Services are being consolidated as a consequence of the merger of shipping lines, the emergence of hub ports and slot-sharing arrangements. As a result, there are relatively good north-south and east-west international shipping connections with major trading partners for all categories of cargo.

Improvements in international and intraregional shipping services have been achieved in part through regional approaches, such as the formation of shipping commissions, including the Micronesian Shipping Commission and more recently, the Central Pacific Shipping Commission (box 3.6). These cooperative efforts have made progress in addressing the perennial challenge of irregular, uncertain and very costly shipping services, especially for the smaller island developing States.
The Central Pacific Shipping commission is an intergovernmental organization, which regulates shipping in Kiribati, Marshall Islands, Nauru and Tuvalu, whereby shipping lines are granted entry assurance certificates to serve particular shipping routes at predetermined freight rates for five years. Although only a limited time has passed since the formation of the Commission in 2014, its member countries are already beginning to see positive results. The membership of Kiribati and Tuvalu in the Commission has resulted in more reliable international shipping services via Fiji. Service is now reliable; freight rates have stabilized, but they are still very high due in part to long and thin routes, the high operating costs of a ship, small markets and limited exports.

The efficiency of services has also been enhanced with the emergence of several hub ports as major transhipment points. Some of them are well-established hub ports, while others are building a reputation as hub ports as they increase their transhipment activities. These include Auckland, New Zealand (for the South Pacific), and Guam (for Micronesia). In addition, a number of location have emerged as subregional hub ports, namely Fiji, New Caledonia, French Polynesia, and more recently Solomon Islands and the Marshall Islands. As a result, most trade from Tuvalu, Samoa and Tonga now depends on transhipment through Fiji, and commodities from Tonga are transhipped through Samoa.

**b. Domestic inter-island shipping**

Most Pacific island developing economies are archipelagic States comprising widely scattered islands. Outer islands are often far from the main islands, with voyages to most outer islands involving thin passenger and cargo traffic, coupled with limited maritime infrastructure, poor domestic shipping safety and dangerous channels. Unprofitable routes remain largely underserviced, as commercially minded private sector providers naturally gravitate towards profitable routes. This does not only has an impact on food security and access to social services, it also adversely affects income-generation prospects for outer island residents, who rely on regular access to local and global markets to realize such opportunities.

Amid such challenges, most Pacific island developing economies support domestic services through public service obligations (PSO), particularly for uneconomical routes to their small outer islands. This takes the form of franchise or subsidy schemes for shipping services along routes that are otherwise not commercially viable. The provision of domestic shipping services are in the form of public provision in Tuvalu and the Federated States of Micronesia, fully privatized services in Vanuatu and Fiji and State-owned enterprises (SOEs) in Marshall Islands, Tonga and Samoa, with limited private sector involvement in most countries. In Tonga, church and community associations also operate domestic vessels.

The franchising of domestic shipping routes involves private shipping companies competitively bidding for subsidies to provide shipping services on uneconomical routes. Operators are required to provide a specified number of voyages on those routes during the contract period, in addition to fulfilling safety and quality requirements. The level of subsidy to bidders is based on a cost model developed for each route, and is typically the difference between the passenger and cargo revenues and the operating cost per voyage. Examples of such schemes implemented in the region include the Domestic Maritime Support Project in Solomon Islands, the shipping service to the Niutas, the most remote islands of Tonga, the Inter-island Shipping Support Project in Vanuatu, and the Fiji Franchise Scheme (box 3.7).
The Fiji Franchise Scheme is recognized as a subregional model that other countries facing similar challenges could replicate and tailor to their local context. In the case of Fiji, some of the scheme’s success factors are the following: the high level of national political commitment; cost modelling and a consultative approach for tender assessment; annual contract reviews; the placement of observers on tendered vessels to monitor compliance with and report on safety and shipping conditions during voyages; the enforcement of penalties; feedback on performance obtained through customer satisfaction surveys; and periodic reviews of the scheme to improve its effectiveness. These have promoted accountability and transparency.

Other countries, including Vanuatu, are in the early stages of introducing a shipping support scheme (SSS) similar to the shipping franchise scheme in Fiji and in addition to a shipping coordinator schemes (SCSs). SSS provides subsidies for servicing uneconomical routes based on a least-cost tender process. Vessels are required to meet safety standards and provide facilities to reduce barriers for women to use. SCS involves appointing people on each island and tasking them with promoting and aggregating demand and communicating the need for voyages to private-sector vessel operators. The SSS improves the transparency of subsidy arrangements, while SCS empowers residents of outer islands. Although they have been implemented with varying levels of success, these schemes have been largely effective in improving access to, and the affordability of, shipping services to outer islands, with evidence of positive impacts on trade development. They also offer valuable experiences and lessons for other countries in the subregion.

However, there is still a tremendous “shipping safety culture deficit” in the Pacific island developing economies. Countries still largely rely on unsafe, poorly designed and second-hand ships, which are poorly maintained. Most countries lack adequate maintenance and shipyard facilities to accommodate the majority of domestic vessels, and have limited search and rescue capabilities. Furthermore, overcrowding of vessels and the lack of updated ship surveys and crew certification further jeopardize the safety of ships.

A lot of effort has been placed on ensuring that vessels comply with basic safety standards, and today, national authorities do not hesitate to order the detention of vessels pending compliance with regulations. A concrete example of such efforts is the Pacific Islands Domestic Ship Safety Programme, piloted initially in Tonga and Kiribati in 2010 and now extended to several other Pacific island developing economies (see box 3.8 and below). This is part of a holistic approach towards creating a sustainable maritime safety culture in the Pacific enshrined in the Pacific Forum on Domestic Ferry Safety, 2012 Action Plan.

Funded by the Australian Department of Foreign Affairs and Trade (DFAT) and managed by SPC, the Pacific Islands Domestic Ship Safety programme was introduced in 2010, triggered by two tragic marine accidents, in Tonga and in Kiribati, which occurred almost simultaneously in 2009. The programme aims to improve domestic shipping safety through the strengthening of safety management systems and the implementation of SOPs by domestic shipping companies on board their domestic fleet, along with the development of a safety programme that could be exported to other Pacific island developing economies on request.

The Secretariat of the Pacific Community implemented a 12-month pilot project in Kiribati and Tonga in 2010. As of June 2015, a total of 17 domestic ships in both countries were considered under this programme, eight have successfully developed and implemented approved SOPs. This programme was extended to the Marshall Islands and Vanuatu in 2013 and to Solomon Islands in 2014. Four domestic ships in the Marshall Islands were considered to have commenced development of their SOPs and more ships from Vanuatu and Solomon Islands are expected to have their SOPs developed in 2015. A total of seven SOP initial audits and three follow-up audits have been conducted in these countries between 2010 and 2015.
c. Declining seafaring
Seafaring remains a vital industry for Pacific island developing economies, providing employment and contributing to national income. In Kiribati, for instance, seafaring is by far the most important source of private-sector employment, with remittances contributing to about 6 per cent of GDP. However, the recent global trend in the industry has been an oversupply of ratings (the highest level certified by maritime training institutions in most Pacific island developing economies) and an undersupply of certified officers (higher industry qualifications are not offered by most maritime training institutions in the Pacific island developing economies), as well as growing competition in the industry around labour costs, discipline, and adaptability. These have contributed to the decline in demand for seafarers from several Pacific island developing economies.

For example, the number of Kiribati and Tuvaluan seafarers employed on merchant vessels has fallen in the last decade, with both seafarer wages and remittances declining quite significantly. This has implications for the seafarer competitiveness and quality standards of Pacific island developing economies, requiring changes in the maritime training institutions to allow for greater responsiveness to emerging issues/trends. The Pacific island developing economies are evaluating options for revive seafaring; these should be coordinated across countries, and include greater private-sector involvement and regional approaches.

d. Improvements in port infrastructure
The main international ports in the Pacific are compliant with the International Ship and Port Facility Security Code, and have benefited from major infrastructure improvements within the last decade. For instance, Cook Islands, the Federated States of Micronesia, Fiji, Kiribati, Tonga, Solomon Islands, Samoa and Vanuatu, have embarked major infrastructure developments to amongst others, increase the port capacity to allow for berthing of larger vessels and multiple vessels at a time, raise efficiency of port services and improve safety standards.

Investment related to ports has tended to favour wharves, pavement expansions and equipment replacement, with little or no investment in ancillary infrastructure, such as roads and passenger and cargo facilities. Infrastructure improvements have not been accompanied by preventive maintenance programmes, scheduled dredging, or plans for future equipment replacement. This has resulted in a backlog of dredging, ageing pilot boats, poor maintenance of facilities and assets, and poor access roads. These ongoing maintenance concerns undermine the impact and sustainability of recent infrastructure investments, an issue that is further discussed below.

Recognizing the importance of the maritime sector to the overall development of Pacific island developing economies, donors and development partners continue to support the development of this sector. The support ranges from helping to fund the acquisition of port infrastructure to the procurement of vessels for domestic shipping services. A notable development in 2008 was the establishment of the Pacific Regional Infrastructure Facility, which is a multi-partner investment coordination mechanism to improve coordination and delivery of official development assistance to the infrastructure sector in the subregion.
3. TOWARDS DEVELOPING SUSTAINABLE MARITIME TRANSPORT IN THE PACIFIC THAT IS SAFE, AFFORDABLE AND EFFICIENT

The maritime sector’s vital role in the region necessitates the promotion maritime transport systems that are safe, affordable, efficient and sustainable. These systems should be central to national development objectives and strategies and comply with international conventions and standards, including ensuring the safety of passengers and cargo while transiting port facilities and on vessels. They should also facilitate the timely movement of ships at least cost and enable reliable service delivery. Achieving those goals depends on directing greater attention to several key areas.

a. Consolidating legal frameworks

International maritime conventions regulate the maritime industry and facilitate trade among countries. It is, therefore, essential that Pacific island developing economies develop a global approach towards international organization memberships, and ratification and implementation of key maritime instruments. Most Pacific island developing economies are party to the United Nations Convention on the Law of the Sea and are members of the International Maritime Organization (IMO) but many still experience challenges in translating international conventions into domestic legislation. They also lack implementation and enforcement capacity.

Pacific Islands Maritime Laws (PIMLaws) have been developed to address this challenge (box 3.9). They particularly have assisted the small island States, including Kiribati and Tuvalu, to adapt national legislation in a timely manner. Countries, such as Samoa and Tonga, have used sections of the PIMLaws to supplement their national legislation where gaps existed. Sectoral laws and regulations are also now available online in most Pacific island developing economies.

BOX 3.9 PACIFIC ISLANDS MARITIME LAWS

Pacific Islands Maritime Laws (PIMLaws) are a set of up-to-date generic instruments that are consistent with international maritime conventions and customary laws and can easily be incorporated into the national legal systems of Pacific island developing economies. Several sections can be updated as maritime conventions are amended or as practices change. PIMLaws have been developed to cover non-convention vessels less than 500 GT, and small vessels under 15 metres — areas not covered by international maritime conventions.

These laws are generally seen as a very efficient mechanism for allowing Pacific island developing economies to update their legislation and regulations. Continuous and ongoing review of PIMLaws helps these economies remain current with international standards.
Maritime policy formulation is a prerequisite for achieving the effective implementation of international instruments and the enacting national regulations, including for domestic shipping. The Governments of Pacific island developing economies, therefore, need to adopt coherent maritime transport policies to support planning and decision-making, from which relevant legislative actions can be developed and promulgated. This would support a sustainable maritime safety culture and environmental stewardship in the Pacific island developing economies and allow States to meet their obligations and responsibilities as flag, port and coastal States under the relevant international maritime instruments.

**b. Strengthening sector development planning**

Pacific island developing economies have made progress in preparing national development plans or strategies and associated transport sector investment plans, which were mostly formulated with the assistance of development partners, following generally consultative approaches. Those plans outline clear development objectives for the transport sector.

One such plan belongs to the Government of Samoa. The country’s vision in its Transport Sector Plan 2014-2019 (TSP 2014-2019) is to ensure a “sustainable, safe, secure and environmentally responsible transport network that supports Samoa’s economic and social development and contributes to improving the quality of life for all Samoans” (Government of Samoa, Transport Sector Plan 2014-2019). The National Sustainable Development Strategy (Te Kakeega II), 2005 of Tuvalu, has a clear focus on the infrastructure sector and how it relates to achieving the vision and objectives for sustainable growth in the country. Having a clear maritime sector plan helps governments to mainstream other sustainable development goals, including social and environmental targets (box 3.10).

National governments and their development partners are also trying to improve the coordination of donor aid and make it more effective. For example, most Pacific island developing economies have successfully completed public expenditure and financial accountability assessments, which have enabled national plans to be used as a basis for budget support programmes, using national financial and procurement systems. In some instances, such as in Samoa and Vanuatu, extra capacity has been accorded to coordination responsibilities, often with dedicated staff appointed in ministries of finance.

Despite recent progress, however, subsector (maritime) policies and plans still remain absent or outdated in several Pacific island developing economies, and in practice, the sector still receives relatively low levels of attention in national agendas and budgetary allocations. This has led to an ad hoc approach towards maritime development in those countries, and undermines the sector’s ability to effectively lobby for greater national attention and funding. Governments must move forward in finding ways to finance maintenance programmes, equipment replacement and the retrofitting of ports to withstand climate change impacts. Ageing ports need to be expanded to include modern port facilities, such as biosecurity and waste reception, and to cater to larger cargo and cruise ships calling due to the consolidation of services.
To minimize the negative impact of the maritime sector on the environment and to reduce the dependence of Pacific island developing economies on fossil fuels, their maritime policies should aim to avoid inefficient transport and operations, shift towards cleaner modes of transport that are more energy efficient, and improve infrastructure and operations for energy efficiency and the reduction of fuel consumption and emissions. Concerted actions should target data collection and research into fuel supply chains upon which Pacific island developing economies are completely reliant, in order to improve chain management and reduce duplication. These economies could also work together to create opportunities for shared infrastructure and dedicated terminals, and to facilitate negotiations on a regional scale. At the same time, Pacific island developing economies are at the forefront of the battle against climate change. Baseline studies on port energy efficiency and resilience to damage due to rising sea levels and cyclones need to be undertaken to protect these key national assets. Given the global nature of these issues, however, the strengthening of development partnerships for supporting means of implementation, as captured in the Framework for Pacific Regionalism and Outcomes of the Third International Conference on Small Island Developing State (SAMOA Pathway), is important for more targeted climate adaptation and sustainable development in the Pacific.

**c. Private sector involvement**

The private sector could be an important ally in governments’ efforts to direct more resources into the maritime sector. Already, an integral component of structural reforms being implemented in Pacific island developing economies is the facilitation of private-sector involvement in employment creation, small business development, tourism, and trade. Budgetary and fiscal limitations give a further rationale for increasing levels of private-sector involvement in those countries.

In that regard, several Pacific Governments have articulated the need for supportive strategies and action plans for incorporating private-sector investments in the maritime sector, and a number of them have improved their procurement systems by transferring functions traditionally undertaken by the central government or SOEs to the private sector. Yet, despite those changes, most Pacific island developing countries have not formulated dedicated policies to promote greater private sector participation in the sector, and governments still dominate the sector, through SOEs, and even in direct competition in some instances. SOEs themselves are dependent on governments for financial guarantees and approval of tariffs, which influences their decision-making, and, in turn, their performance.

Opportunities exist for deeper private-sector participation in maritime sector service delivery in areas, such as infrastructure construction and maintenance, and ship operation and maintenance. Service needs, such as port dredging, could be provided by the private sector at the regional level, offering economies of scale. The formulation of specific plans inclusive of fiscal incentives and improving access to financing is crucial for Pacific island developing economies to maximize the potential of the private sector and should be accorded high priority.

Given their financial and regulatory constraints, it is likely that private-sector participation will take different forms in different countries. For instance, in Tuvalu, private-sector participation may continue to be limited because of poor access to financing, which is the result of lack of adequate collateral. On the other hand, in Pacific island developing economies in the North Pacific, such as Samoa, Tonga and Vanuatu, where the private sector has been involved in stevedoring, port efficiency has improved. Governments of Pacific island developing States should consider a mix of models that cater to their particular local contexts, including PPPs and outsourcing.

**d. Breaking the “build-neglect-rebuild” paradigm**

A persistent challenge in Pacific island developing economies, as in many other developing countries, is the issue of inadequate maintenance, which results in the premature deterioration of assets and increased wear and tear of equipment, often with major financial implications. The maintenance gap in Pacific island developing economies is due to a combination of
issues, ranging from limited fiscal space to institutional factors related to ownership of assets and arrangements for carrying out maintenance. In addition, there is a lingering preference among governments and development partners to build new infrastructure, as opposed to conducting maintenance.

In some instances in which SOEs, such as port authorities, carry the responsibility of managing infrastructure, approved tariffs are kept low due to political expediency. Furthermore, there are requirements for the transfer of SOE revenues to the national treasury. This diverts funds away from maintenance and operations.

For Pacific island developing economies, the Pacific Regional Infrastructure Facility estimates that an average of 6 per cent of GDP is required for the maintenance of existing infrastructure, against an estimated average of 5.1 per cent in middle-income countries to 6.9 per cent of GDP in low-income countries. In terms of budget impacts, the Facility-estimated liabilities due to planned infrastructure investment in Samoa and Tuvalu were equivalent to 6.7 per cent and 43.02 per cent of government revenue, respectively. This is a significant liability for those countries as their budgets are dependent on support from development partners and should give development partners leverage with influencing changes in the maintenance culture.

Pacific island developing economies have a long way to go before they have optimal maintenance expenditure. Several of them, however, have already made substantial progress in certain areas of infrastructure maintenance. Some of the lessons learned, to date, include the following:

- **Life-cycle costing:** Future operations and maintenance liabilities associated with infrastructure acquisition should be estimated over the whole life-cycle of the assets to determine the affordability of planned investments. These should be aligned with national budgets and budget support programmes, thus promoting national ownership and improving coordination. Maintenance expenditure should be disaggregated according to economic sectors, and targets should be set and monitored.

- **Independence of maintenance funds:** Where Infrastructure Maintenance Funds are established with earmarked revenue sources, such as the fuel tax in Solomon Islands and Papua New Guinea, income should be spent as intended to assure public support. This minimizes perceived political risks. These funds should be audited and regular performance reports need to be prepared to promote fiscal discipline, transparency and accountability.

- **Cost-effectiveness:** Expenditure from the funds should be based on proper maintenance plans and budgets which demonstrate cost effectiveness, such as successful road maintenance in Papua New Guinea and Palau. This would also provide predictability in maintenance plans which should promote private sector interest and confidence in tendering to carry outsourced maintenance works, such as what is done in Samoa and Tonga.

- **Clear designation of authority:** Responsibilities for maintenance at institutional and staff levels should be clarified with dedicated agencies and staff assigned to these functions (this was the case in Samoa and Solomon Islands). This resolves uncertainty concerning management responsibility for asset maintenance, and promotes accountability. Capacity-building programmes should be instituted for public sector and private contractors, for example, in Tonga with Government of Australia and World Bank support.

- **Conforming to international norms:** International obligations, such as adherence to the International Shipping and Port Facility Security Code can be a catalyst for improving the maintenance culture, as countries would want to avert sanctions, such as being blacklisted.
Due to the wide range of causal factors, improving sustainability in Pacific island developing economies will be a complex matter, which will take place over time, requiring ongoing commitment from national ("strong political will" and stakeholder consultations) and international stakeholders.

**e. Strategic hub ports development**

As noted in the introduction, the efficiency of shipping services in the Pacific subregion has improved in part due to the emergence of subregional hub and transhipment ports. In a hub and spoke system, shipping lines call into a major port within a country or region (selected transhipment centre), “a hub”, rather than at several ports in the same vicinity; feeder shipping services then tranship cargo to and from smaller ports in neighbouring countries.

Understandably, many ports desire to become subregional hubs for the Pacific. However, the efficiency gains of such systems arise from the fact that there are only a few hubs, with several secondary (smaller) ports linked to these hubs. In that regard, not every port can become a hub, and so collectively, Pacific island developing economies need to strategically identify and develop existing and/or potential regional hub ports, including by investing in appropriate infrastructure to support/handle major transshipment operations, efficient port clearance and information technology systems, the procurement of sophisticated stevedoring equipment, and the more advanced training of stevedores. Meanwhile, ports lacking the inherent advantages or do not meet specific minimal requirements to assume the role of hub ports should concentrate on maximizing the efficiency of their feeder services.  

**f. Improving domestic shipping safety and arrangements**

Maritime safety has become a serious issue because of the increase in the number of ships traversing the seas of the Pacific. Several major ferry accidents, including some with significant loss of life, have been recorded in the Pacific within the last decade, while an even greater number of smaller-scale ferry accidents and vessels lost at sea go unreported annually. Several of the accidents involved situations that could very well have been avoided, such as vessel overloading, the absence of life-saving equipment on board, erroneous cargo and passenger manifests, and poorly maintained vessels.
Recent efforts, such as the Pacific Forum on Domestic Ferry Safety and the 2012 Suva Action Plan, have brought the issue of maritime safety to the forefront of national and regional maritime agendas. These regional efforts have managed to influence the global agenda on domestic ferry safety, including by informing the “Manila Statement”, which was adopted by IMO in April 2015. The statement provides guidelines on the safe operation of coastal and inter-island passenger ships not engaged in international voyages. Regional initiatives, such as the Pacific Island Domestic Ship Safety Programme provides trainings on the development and enforcement of safety management systems, standard operating procedures (SOPs), risk assessment and management, and enforcement to vessel operators, regulators and maritime administrators.

Regional ship to shore projects also provide supporting infrastructure, such as aids to navigation to improve vessel safety, and also passenger transfer from the ship to the shore. In partnership with the Secretariat of the Pacific Community (SPC), IMO has been further assisting Pacific island developing economies in making their domestic vessels safer through legislative and enforcement enhancements.

The need to engender a safety culture in this subregion cannot be overemphasized. Addressing domestic shipping safety requires concerted efforts of governments, maritime administrators and associated actors, ship inspectors, surveyors, vessel owners, operators, and crew, maritime education and training institutions, and passengers, the public and civil society. These efforts, however, should be complemented with citizen’s empowerment to help people better understand their entitlement to safe transport and the safety standards required of operators, and in turn, demand greater accountability from private and public sector providers.

The subregion has made great strides recently in improving maritime data collection and analysis, through the creation of a regional transport data repository. National governments have also made progress in developing and incorporating maritime statistics into national statistics systems. These efforts are laudable and need to be consolidated.

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Endnotes

1 ESCAP (2012a), chap. 3.
2 ESCAP (2014b).
3 China is an exception, as the Government has a large-scale development plan for a comprehensive intermodal rail network. This involves the development of major intermodal rail hub terminals at 18 inland locations, connected to seaports and to other inland industrial centres. For a map and further details, see ESCAP (2013), chap.1.
4 General Assembly resolution 69/137.
5 E/ESCAP/68/9.
6 ESCAP (2015d).
7 According to the 2015 updates to the Asian Highway Database, 1,928 km in Myanmar, 1,461 km in Afghanistan, 1,138 km in Pakistan and 914 km of roads in Tajikistan did not meet the minimum desirable standards. For more details see ESCAP (2015d).
9 This initiative is being co-financed by ADB, the Neighbourhood Investment Facility, the European Investment Bank, the Eurasian Development Bank, and the European Bank for Reconstruction and Development (for the Bagratashen Border-Crossing Bridge). Additional information is available from http://northsouth.am/en
10 EIB (2013).
14 The Economic Times (2014).
15 See http://www.bba.gov.bd/category/ongoing-projects/.
18 ADB (2014a).
19 Country paper for Cambodia presented at 17th meeting of the Special Working Group on the Singapore-Kunming Rail Link project, Medan, Indonesia, 24-25 August 2015.
20 Country papers for Thailand presented at 17th meeting of the Special Working Group on the Singapore-Kunming Rail Link project, Medan, Indonesia, 24-25 August 2015.
21 Country papers for China presented at 17th meeting of the Special Working Group on the Singapore-Kunming Rail Link project, Medan, Indonesia, 24-25 August 2015.
23 Asbarez (2014).

See also the China Pakistan Economic Corridor in part I.
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ESCAP resolution 69/7, annex.
Armenia, Cambodia, China, Indonesia, Islamic Republic of Iran, Lao People’s Democratic Republic, Mongolia, Myanmar, Nepal, Republic of Korea, Russian Federation, Tajikistan, Thailand (also became Party), Viet Nam.
Kalymov (2014).
Therparat (2013).
Examples from Australia are Albury/Wondonga on the New South Wales/Victoria border; Griffith in southern New South Wales; and Toowoomba in southern Queensland.
The ASEAN Framework Agreement on the Facilitation of Goods in Transit, which was signed on 16 December 1998, provides an arrangement for facilitating transit transport among ASEAN countries.
67  Some of the relevant factors that need to be considered for a hub port include: direct location or proximity to a major sea lane/shipping route; an established network of neighbouring feeder ports; ability to accommodate large vessels (deep water, advanced equipment) and/or availability of space for port infrastructure and facility expansion; efficient cargo handling, such as quick vessel turnaround time, and other port and customs services; intermodal transport infrastructure (good access to air and road distribution networks); and availability of ancillary and transhipment facilities; and reasonable port tariffs.
1. INTRODUCTION

The Asia-Pacific region is home to more than two billion urban residents, representing 55 per cent of the world’s urban population — a figure set to rise to 64 per cent by 2050.1 Unprecedented population growth and the expansion of Asian cities are putting tremendous pressure on urban transport systems, while the rapid growth of private vehicle ownership has led to worsening traffic congestion, increasing fossil fuel consumption, and greater road traffic crashes, car emissions and air pollution.

The negative externalities associated with urban road traffic are a burden on economies, which result in a lower quality of life for residents. The municipal authorities of many Asian cities are finding it difficult to counter these trends, a situation made more difficult by the proportion of urban residents living in slums, estimated to be 28 per cent in East Asia, 31 per cent in South-East Asia and 35 per cent in South Asia in 2012.2 With such large numbers of poor people, governments must strive to provide not only environmentally sustainable transport, but also socially inclusive transport systems that meet the mobility needs of the people.

Much attention is given worldwide to addressing urban mobility in larger cities, including in Asia, which, in 2014, was the location of 17 of the world’s 28 megacities. However, the majority of the Asia and Pacific region’s urban population lives in rapidly growing small and medium-sized cities and towns, while more than half of the region’s urban residents (54.4 per cent) live in smaller cities with fewer than 500,000 people.3 These secondary and medium-sized cities are destined to follow the same unsustainable patterns of growth if more effective strategies for integrated and sustainable land use and transportation planning are not developed.4 Given that they are in early stages of development, these cities offer the best opportunities to plan and implement innovative urban transport policies and strategies.

There are many feasible options to consider towards achieving a sustainable future. It is up to the governments of the region to harness their potential. Non-motorized transport is key, with the channelling of more resources into cycle lanes, pedestrian pathways and the enforcement of safety gear usage among cyclists remaining an absolute priority. These measures represent the profundity of just how easy it is to achieve sustainable mobility in urban environments.

Electric-powered transport solutions are prevalent throughout the transport spectrum. Currently, the implementation of them is often costly, but policymakers must plan for their imminent reduction in price and eventual implementation. In the meantime, rail services and metro and bus rapid transit systems represent the cutting edge of sustainable transport options available in urban environments. While these systems take a long time to design and implement, their long-run feasibility far outstrips that of other less sustainable options. There are many ways in which such projects can reach fruition.
2. THE STATE OF URBAN TRANSPORTATION SYSTEMS IN ASIA

Asian cities feature a wide array of urban transport modes and systems, such as para-transit, public transport, taxi services, private vehicles, and walking and cycling (box 3.11). Public transport systems include public bus services, BRT systems, subways, urban rails, monorails, elevated rails (skytrains), and cable cars. Para-transit takes various forms, including vans, tricycles, motorcycle taxis, and boats (water transport). While the agglomeration of those services may seem to be promising, the biggest challenge facing many cities is the increasing popularity of private vehicles. Private motor vehicles support personal mobility, but the rapid growth in the number of vehicles is further aggravating already congested urban roads and inhibiting the smooth operation of road-based public transportation systems, such as public buses.

a. Motorization

While vehicle ownership has risen across the Asia-Pacific region, a closer look at available data for 2013, depicted as in figure 3.6, shows that it ranges from below 200 vehicles per 1,000 of population for many developing countries to between 600 and 725 per 1,000 in more developed economies, such as Australia, Japan and New Zealand. The main growth countries in the region in vehicle ownership are Azerbaijan, Brunei Darussalam, China, Georgia, Indonesia, the Islamic Republic of Iran, Kazakhstan, the Russian Federation and Thailand. Meanwhile, Afghanistan, Bangladesh, India, Pakistan and the Philippines have a markedly lower per capita vehicle ownership, but the car ownership levels in their cities are significantly higher than the region’s national averages, a product of the wide income disparity in Asia and the Pacific.
These trends have resulted in greater traffic congestion and increased air pollution, greenhouse gas emissions and energy wastage. Figure 3.7 shows the average vehicle speed compiled from various sources in selected Asian cities. They vary from between 7 km/hr (Manila, Philippines) to 17 km/hr (Guangzhou, China). These speeds give a clear picture of the road traffic efficiency in cities, with policy measures to improve traffic management, including those aimed at reducing the number of motor vehicles on the roads, becoming all the more necessary.

While there has been steady growth in motorization on the roads of many countries in the region (figure 3.8), in recent years, growth of vehicle ownership has slowed in some countries, including, among them, Japan, Kazakhstan, Pakistan, the Russian Federation, Singapore and Sri Lanka. Notably, growth in motorized vehicle ownership remains very much prevalent in China, India and Indonesia.

A characteristic of motorization unique to many Asian countries is the prevalence of
motorcycles. As indicated in figure 3.9, there is a high level of motorcycle ownership in South-East Asian countries, such as Indonesia, Malaysia, Thailand and, Viet Nam. In some countries, it is common for people to use motorcycles for intercity trips of distances more than 200 km, potentially a sign of public transport services lacking in both efficacy and options. For many urban residents for whom cars may still be unaffordable, motorcycle ownership is seen as a step up the ladder of private personal mobility.

b. Public transport services

Many of the major cities of the Asia and Pacific Region – Hong Kong, China; Seoul; Tokyo; and Singapore successfully operate urban public transport systems that are exemplary to most other cities that are in the process of designing and developing their own systems. Figure 3.10 shows the modal share of public transport in selected cities. Some examples are 81 per cent in Hong Kong, China; 65 per cent in Seoul, Republic of Korea; 53 per cent in Mumbai, India; 34 per cent in Bangalore, India and 30 per cent in Ahmedabad, India.
WALKING AND CYCLING:
Walking and cycling can be done at a relatively low cost and do not consume any fuels or emit pollution. Collectively known as non-motorized transport or NMT, they are a popular mode of transport in Asia, with a modal share estimated to be between 21 to 63 per cent across various cities. To promote NMT, more attention must be placed on integrating these forms of transport into public transport systems, including the planning and construction of safe non-motorized transport infrastructure.

PRIVATE VEHICLES:
As economies have grown in the region, the number of private vehicles and two-wheelers on the roads, particularly motor scooters and motorcycles, has increased accordingly. Private motorized vehicles are becoming the preferred form of urban transport in Asian cities. Transport by private vehicles is not a sustainable mode of urban mobility when their numbers outpace the capacity of roads. Even though new IT applications are emerging that facilitate shared car driving and carpooling, private vehicles still take up space that could be used by public transport vehicles.

MASS RAPID TRANSIT SYSTEMS:
The most common urban public transportation systems used in Asia are public buses and metro systems, urban rails, elevated rails and monorails. The type of public transportation system in use depends on the size and wealth of the city. In 2014, some 157 cities around the world had a metro system in operation and 54 of those were in Asia. In recent years, BRT have gained popularity in Asia. Such systems are currently in operation in 39 Asian cities, with a number of other cities planning their implementation.

PARA-TRANSIT (INFORMAL TRANSPORT):
Para-transit is a popular form of urban transport in many Asian cities, in some cases accounting for more than half of all motorized trips. Many forms of para-transit extend to inner-city areas, where narrow lanes and low population densities put their services beyond the reach of the main public transport systems. Examples include motorcycle taxis in Bangkok; auto-rickshaws and tuk-tuks in Bangladesh, Cambodia, India, Thailand, Pakistan, and the Lao People’s Democratic Republic; rickshaws in Dhaka, New Delhi and Mumbai; pick-ups in Myanmar; ejeepneys in the Philippines; and minibuses and electric tempos in Kathmandu. Min buses and microbuses are the mode of transport for 5-10 per cent of all trips in Indonesia and Thailand. Notably, the informal transport sector provides many employment opportunities to migrant people, making up close to 15 per cent of total employment in developing countries.

TAXI SERVICES:
Automobile taxis are ubiquitous in major Asian cities. If poorly regulated, however, taxis can exacerbate traffic congestion and add to air pollution. Taxi services, therefore, need to be better integrated into overall urban transportation planning. One way of doing this is by planning and building appropriate infrastructure, such as designated taxi stands and taxi stops.

WATER TRANSPORT:
In some cities, water transport along canals and rivers forms part of the overall transportation system. In Bangkok, for example, canal boats provide a relatively cheap and reliable service into the central part of the city and there are both regular and express boat services along the Chao Praya River, which is integrated with the Bangkok rapid transit system (the skytrain).

ROPEWAYS AND CABLE CARS:
Ropeways and cable cars are gaining popularity in several major South American cities, such as Rio de Janeiro, Brazil, and Bogota. In the Asian context, ropeways and cable-cars operate mainly in tourist areas and public parks in China, Hong Kong, China; Japan; Georgia; Malaysia; Nepal; Singapore and Viet Nam. The use of ropeways and cable cars as a public transport option should be further explored, especially in Asian cities with mountainous terrains.

Source: UN-HABITAT (2013), pp.16-17, 25-26, and 29; UITP (2014)
The relatively high share of public transport users in many of these cities reflects, in part, the fact that many urban dwellers depend on public transport because they cannot afford private vehicle ownership. The following cities: Shanghai, China; Osaka, Japan; and New Delhi, India retain a high share of non-motorized transport.

Despite efforts, municipal authorities face an uphill struggle to maintain public transport’s modal share, with it declining in some cities. Consequently, the upgrading of existing public transport systems and the introduction of newer, more efficient systems are urgently needed to compete with increased private vehicle use. It appears that a major barrier to this are the high capital costs that modern mass transit systems incur, which, in turn, act as hindrances to the conception of such systems (table 3.1).

<table>
<thead>
<tr>
<th>CITY</th>
<th>TYPE OF SYSTEM</th>
<th>LENGTH, KM</th>
<th>COST PER KM ( MIL $ / KM )</th>
</tr>
</thead>
<tbody>
<tr>
<td>JANAMARG, AHMEDABAD</td>
<td>BRT</td>
<td>82</td>
<td>2.4</td>
</tr>
<tr>
<td>KUALA LUMPER (PUTRA)</td>
<td>ELEVATED RAIL</td>
<td>29</td>
<td>50.0</td>
</tr>
<tr>
<td>KUALA LUMPER Monorail</td>
<td>MONORAIL</td>
<td>8.6</td>
<td>38.1</td>
</tr>
<tr>
<td>BANGKOK (BTS)</td>
<td>ELEVATED RAIL</td>
<td>23.7</td>
<td>72.5</td>
</tr>
<tr>
<td>BEIJING Metro</td>
<td>METRO RAIL</td>
<td>11.3</td>
<td>62.0</td>
</tr>
<tr>
<td>SHANGHAI Metro</td>
<td>METRO RAIL</td>
<td>87.2</td>
<td>62.0</td>
</tr>
<tr>
<td>BANGKOK MRTA</td>
<td>METRO RAIL</td>
<td>20</td>
<td>142.9</td>
</tr>
<tr>
<td>HONG KONG Subway</td>
<td>METRO RAIL</td>
<td>82</td>
<td>220</td>
</tr>
</tbody>
</table>
BRT are significantly cheaper than other mass transit options. As a result, such systems are now emerging as a popular mass urban transit mode in many Asian cities. Some 39 Asian cities are currently operating 1,375 km of BRT routes, carrying 8.5 million passengers per day. Box 3.12 provides details of the Janmarg, a BRT system which was successfully launched in Ahmedabad, India, in 2009.

**BOX 3.12 BUS RAPID TRANSIT SYSTEM IN AHMEDABAD, INDIA**

The Indian city of Ahmedabad launched the Janmarg, a BRT system with 12 km of network, in October 2009. The city authorities have subsequently expanded the network, taking it to its present length of 82 km. Today, the system carries more than 150,000 passengers per day on 150 buses, with average travel speeds of 26 km/h.

The system was implemented by the Municipal Corporation of Ahmedabad in partnership with CEPT University (Center for Environmental Planning and Technology) as its technical partner. The project was delivered through a network approach and with public consultations using participatory processes.

The “Janmarg”, meaning “People’s Way”, has provided a sustainable mobility option to the people of Ahmedabad and has successfully transformed the urban cityscape along the corridor. It has also expanded labour market opportunities to the urban poor and improved the quality of the city’s air, thereby becoming a sustainable urban transport model for other cities in the region to emulate.

c. Non-motorized transport

A significant proportion of the population in Asia still depends on walking and bicycling. This is reflected in figure 3.12, which shows a relatively high modal share for walking and cycling in many cities, such as Guangzhou, China (46 per cent) and Bangalore, India (42 per cent). In some cities, people choose NMT because of their low incomes. This is a common global trend among the urban poor. It is also a trend in many developed countries,
Rajshahi, a city in Bangladesh with a population of 950,000, has been laying down NMT infrastructure on its streets. Examples include pedestrian footpaths, such as the one shown below, and cycle tracks, as well as initiatives to green the city to improve the environment.

An improved footpath along a city road. Source: Rajashahi city

BOX 3.13 IMPROVEMENT OF NON-MOTORIZED TRANSPORT IN RAJSHAHI, BANGLADESH

with many of them recently hailing its health benefits. Governments are increasingly promoting the use of NMT as a policy strategy to reduce traffic congestion, boosting the viability of NMT for wider swaths of population.

While the cost of NMT is relatively low for travellers, safe and efficient NMT systems still require investment in the necessary infrastructure, especially if such modes are to offer an attractive alternative to motorized modes. Non-motorized transport infrastructure, such as walkways, sidewalks, cycleways and pedestrian zones need to be carefully designed with the safety of users in mind. One way to boost road safety is through the provision of segregated infrastructure for bicyclists and pedestrians, such as bicycle lanes, sidewalks, and bicycle and pedestrian bridges. Box 3.13 furnishes the example of Rajshahi, Bangladesh, where the mayor was instrumental in constructing new pathways and cycle lanes across the city.

According to one report, some 19 countries in the region have initiated either national or subnational policies to promote the use of non-motorized modes of transport, namely walking and cycling.\(^7\) Chennai, a city in southern India, has recently adopted a progressive policy that makes walking and cycling a policy priority. To support this policy, 60 per cent of the transport budget of the Chennai City Corporation is to be allocated to the construction and maintenance of NMT infrastructure.\(^8\) Other examples include the construction of skywalks to link several stations along the Bangkok mass transit system (the Skytrain), and the Walk2Ride initiative in Singapore, which aims to make transport modes more accessible.\(^9\) Bike-share systems, car-free zones and car-free days have also been introduced in several Asian cities to encourage the use of NMT.

3. POLICY OPTIONS FOR MOVING TOWARDS SUSTAINABLE URBAN MOBILITY

Despite increasing evidence that current urban transport systems require a major overhaul, many Asian cities are still following the conventional unimodal approach to transport planning. If these cities are to become sustainable, all levels of government should evaluate existing policies and strategies, identify policy gaps and adopt innovative strategies and polices to improve mobility and accessibility. The region already holds a wealth of knowledge and best practices in these areas from which governments can draw. The most essential parts are outlined below.

a. Integrated urban transport and land use planning

A comprehensive sustainable and inclusive urban transport policy should be a part of each country’s overall national sustainable transport programme. Many countries in Asia and the Pacific lack the strategic urban transport policies that ensure the mobility of people rather than just vehicles. It is advisable, that authorities adopt and implement comprehensive urban transport policies at the municipal and national levels rather than revert to the ad hoc approaches so commonly used for solving urban transportation issues.

Integrated transport master plans should be developed with future urban growth and expansion in mind. In that regard, short, medium and long-term transportation plans need to be developed and implemented.
The Ministry of Transport of Sri Lanka has developed a comprehensive urban transportation plan for Colombo and its suburbs, which aims to promote public transport modes, alleviate traffic congestion and reduce traffic pollution and accidents. The plan, named "CoMTrans", includes a city road development plan, modernization of the railway system, monorail development, the introduction of a BRT system, improvements to the public bus system, traffic management and the development of transport interchange facilities, pedestrian paths and bicycle paths. CoMTrans is planned for implementation over the period 2015 to 2035. It is divided into short, intermediate and long-term development plans. The estimated cost for the plan’s implementation is Sri Lankan Rs. 2,780 billion (circa $20 billion).

Source: Perera (2014)

b. Improved transport demand management

Transport demand management measures can improve the operational efficiency of transport systems, limit traffic congestion and improve traffic flows in urban areas. In order to reduce dependency on private transport modes, policies to promote public transport modes are essential. Public transport is especially important for the urban poor, as they tend to experience reduced mobility and reside far distances from their places of work.10

At the same time, policies are also needed to discourage the use of private vehicles. Such policies include: the elimination of subsidies for private cars and taxis; parking restrictions and pricing; congestion charging; area licensing schemes; electronic road pricing; car sharing; and the designation of high-occupancy lanes. While the existence of such schemes is critical to the sustainability plans of many countries, it is only the fostering and policing of such plans that can really make a difference. In Singapore, for example, the introduction of electronic road pricing reduced total traffic within a cordon area by 14 per cent and increased travel speed by 22 per cent.11

One regional trend that is gaining momentum is the promotion of “compact cities”, or cities that are designed with a focus on living and working and have self-contained recreational and shopping facilities nearby, thereby reducing the need to travel. Tianjin Eco-city in China, for example, is being planned as one such compact city. It is comprised of land uses and physical infrastructure for the promotion of public transport, walking and cycling.12

c. Promoting the use of old – and new – vehicle technologies

In recent years, hybrid and electric vehicles have appeared in many transport markets in the region as an alternative to gasoline-only cars. However, as exciting these technologies may be, their sustainability depends on the sources of electricity used for charging. If the electricity is generated from coal burning, electric vehicles can be more polluting than petroleum-fuelled vehicles. Furthermore, the use of such vehicles does not lessen the number of vehicles clogging congested urban roads.
A modern, popular trend in mitigating urban congestion has been a move towards electric buses and para-transit modes, which are beneficial as they can reduce congestion as well as curb fossil fuel combustion and emissions. The Lao People’s Democratic Republic is experimenting with electric public buses in Luang Prabang; Nepal is using battery-operated para-transit tempos (three wheelers); Bhutan has recently begun to promote electric cars in Thimphu. In this vein, the Philippines has launched the electric eJeepney, public electric minibuses that not only provide mobility but also raise awareness of the importance of sustainability.13

In this regard, it was noted that the Urban Electric Mobility Initiative, discussed during the United Nations Climate Summit, held in New York on 23 September 2014, aimed to boost the share of electric vehicles to 30 per cent of urban travel by 2030.14 This would require substantial investment in appropriate electric-charging infrastructure. As it is the private sector that usually drives technological innovation, governments should consider supporting their efforts through incentives, such as tax allowances that provide innovators with business environments more hospitable to the development of cleaner, more fuel-efficient engines.

Alternative fuels, such as the biofuels, namely compressed natural gas (CNG) and liquefied petroleum gas (LNG) are also increasingly being used throughout the region, though their attractiveness has fallen in recent years due to the decline in global oil prices. In the region, Thailand is promoting the use of gasohol by reducing the price of the fuel and increasing its availability at fuel pumps in Bangkok. Further expansion of these fuels requires policies to safely retrofit vehicles to run on such fuels, as well as substantial investment in distribution systems and pumps.

d. Intelligent Transport Systems
The use of intelligent transport systems, or ITS, are nothing new — they have been around for the best part of a decade. Their influence is now widespread, having become increasingly common to urban transport systems around the
world. ITS have helped to improve safety on highways by communicating vehicle information and highway conditions and connecting drivers. In Asia, the three most common ITS applications are: electronic toll payments and pricing (which can be varied, according to the time of day and congestion levels); coordinated linked traffic signals; and the provision of real-time information to drivers and travellers. Countries, including China, Malaysia, Japan, the Republic of Korea, the Russian Federation, Singapore and Thailand, use such technologies to enhance traffic operations and safety. In particular, the application of an automatic traffic enforcement system in the Republic of Korea on its entire highway network has resulted in a reduction in road traffic crashes from 1,405 to 999, in only a six-month period.

Intelligent transport systems also assist travellers in making informed choices about public transport, telecommuting or driving outside peak hours. They enable commuters to plan their trips and avoid unnecessary journeys and congested routes. They also allow for the better coordination of public transport modes and online timetables, thereby enhancing the efficiency of the operations and services.

Common ticketing systems and prepaid cards can make travelling more convenient as well as reduce travel time by facilitating transferring between modes. Many cities are using integrated ticketing on public transport. In Beijing, one card is used for the metro, light rail and all buses. In Tokyo, rechargeable smart cards called “Suica” and “Pasmo” can be used on the overland trains, urban subways and buses. In the Republic of Korea, the new “One Card All Pass” can be used for all public transport modes, including buses, the metro, the railway and the expressway, across the nation, while in Seoul, the “T-money” and “Cash Bee” cards provide commuters with similar freedoms. With the advantages of these systems already proven, Thailand is also formulating a common ticketing system for public transport in Bangkok.
Endnotes

1 ESCAP (2014c).
2 UN HABITAT (2012).
3 ESCAP (2014c).
5 Acharya (2013).
7 WHO (2013).
8 Dilip (2014).
10 UN-HABITAT and ESCAP (2010).
11 GIZ and Beijing Transportation Research Center (2012).
12 See www.tianjinecocity.gov.sg/bg_masterplan.htm
15 Ito (2013).
PART III
INTEGRATED INTERMODAL TRANSPORT SYSTEM

CHAPTER 3
RURAL TRANSPORT

1. INTRODUCTION

Most of the region’s poor do not have access to safe and affordable means of transport. This deficit is particularly acute in rural areas, where a large proportion of the inhabitants have to travel a long distance to reach a road or railway. Transport infrastructure and services play a critical role in reducing rural poverty, in addition to facilitating access to schools, medical clinics, hospitals, cultural and religious institutions, and other facilities. There are many ways in which transport has enabled, or hindered, the drive to reduce poverty.¹

As the urban centres in the Asia-Pacific region become increasingly well connected, the conspicuous intraregional disparity in citizens’ mobility has spurred a campaign to provide rural residents with all-season roads. For agrarian producers, improved market access can result in increased surpluses because of higher producer prices, lower production and transport costs, reduced spoilage in the marketing chain, higher value crop substitution and better market information. Thus, transport infrastructure and services in rural areas have a major impact on food prices and on food security.² They also provide physical access to markets and employment while opening up previously closed markets to competition.

The Sustainable Development Goals point directly to a number of ways in which transport is pivotal in the quality of life of the world’s residents, and as populations grow, investment in development initiatives is becoming more important. Many rural infrastructure projects backed by governments and international financial institutions have been implemented in the region. The resulting rural roads have stimulated socioeconomic development and the projects themselves have provided essential information on the types of measurements and criteria needed to evaluate, plan, streamline and prioritize future rural projects. In addition, valuable insights have emerged, such as the need to engage with local residents in every project phase in order to ensure the sustainability of construction work, ease monetary obligations on local municipalities and provide extra income for residents in the long run.
2. THE CRITICAL ROLE OF TRANSPORT IN SUPPORTING RURAL DEVELOPMENT AND POVERTY REDUCTION

An estimated 700 million people in the Asia-Pacific Region, or about 40 per cent of the rural population, lack direct access to an all-season road. The level of rural connectivity varies greatly among countries. ADB reported that in 2013, 22 per cent of the 24 million people living in Nepal had to walk least two hours from the nearest all-season road to their home, while in 2014, approximately one quarter of rural habitants in India were reportedly not connected to all-season roads. In comparison, rural populations in most East and South-East Asian countries appear to have better rural connectivity, with the exception of some of the least developed countries, such as the Lao People’s Democratic Republic and Myanmar.

An increasing body of research shows that having access to all-season roads can contribute to poverty reduction. In India, the World Bank found that expenditure on roads had the largest impact on rural poverty compared with other types of public expenditure. Another study, which was conducted in the Lao People’s Democratic Republic, indicated that having access to all-season roads reduced the incidence of rural poverty significantly. This was supported by the finding that about 13 per cent of the decline in rural poverty incidence during certain periods can be attributed to improved road access alone. The results of the research confirmed that access to roads does reduce poverty with the level of the impact depending on the areas in which the road is located and the quality of road.

In Indonesia, another study indicated that the contribution of provincial economic growth to poverty reduction differed depending on the quality of roads: every 1 per cent increase in provincial GDP was found to correlate with a decline in poverty incidence of 0.33 per cent in “good-road” provinces and 0.09 per cent in “bad-road” provinces. The study also found that provincial roads improved wage and employment prospects for the poor. This points to the issue of road quality, and the importance of having effective maintenance regimes to ensure the benefits of rural access are realized beyond the lifetime of road construction projects.

Rural road projects are likely to have both direct and indirect effects, many of which are not captured in academic studies. A project’s direct effects are usually gauged by measuring changes in travel time, fuel and maintenance costs, vehicle-load capacity and seasonality and delivery delays. It is more difficult to adequately measure the indirect effects, which result from such changes as the reorganization of production, land use and market areas, usually in response to the direct effects. For example, one of the unexpected indirect effects of a road project in rural Philippines was the collapse of the local fishing oligopoly, which enabled more people to partake in fishing (box 3.15).

BOX 3.15 DIRECT AND INDIRECT EFFECTS OF IMPROVED ACCESSIBILITY

A study on the influence of a 63-km road project connecting Dinahican fishing village in the Philippines concluded that a significant array of benefits can be achieved by providing road access. The area has a long history of being peripheral due to poor transport conditions and low accessibility. It is far from its major market, Manila (155 km). As part of the same project, the improvement of the Famy – Infanta road, which involved the road being paved with asphalt and its condition improving from bad/very bad to good, was found to have had distinctive direct and indirect effects, including:

**Direct effects**
- Fuel consumption declined, on average, by 35 per cent;
- Maintenance costs were reduced by 44 per cent;
- Travel time was reduced by 40 per cent, and delays almost disappeared;
- The road became passable for all vehicle types throughout the year.

**Indirect effects**
- Uncompetitive production system of a fishing oligopoly collapsed;
- Fishing sector-related groups experienced a considerable increase in income;
- Work opportunities rose sharply.

Source: Olsson (2009).
Having access to rural roads may not, in itself, lead to sustainable development results. In that regard, the success of China in reducing rural poverty can serve as an example of how public policies need to be comprehensive and multisectoral to make a sustainable impact (box 3.16). This experience suggests that additional inputs and policies that focus less on the catalytic and more on the complementary role of rural roads in supporting socioeconomic development may be required.

This is particularly true in locations where rural road development is expected to support agricultural development. It is generally accepted that inferior transport access hinders the ability of poor farmers to move beyond subsistence farming. However, it is not only the availability of roads which open up opportunities for market development. The ability of farmers to respond to market opportunities depends on non-price factors, including rural roads, and on institutions and support services, such as rural finance initiatives. Projects that are intended to generate economic growth and social welfare may therefore need to be linked to a range of additional cross-sectoral investments.

3. SELECTED RURAL ROAD DEVELOPMENT INITIATIVES

Over the past few years, a number of major rural road development projects have been launched. A notable trend has been the increase in the number of projects that focus on local community involvement, including through labour-based approaches for construction. A selection of those projects are described below.

Afghanistan: Following years of war, the Government of Afghanistan started the National Rural Access Programme (NRAP) to provide year-round access to basic services and facilities in rural areas. Under the programme, essential rural infrastructure is rehabilitated, reconstructed and maintained to ensure year-round access to marginalized districts and villages with greater employment opportunities available for the local inhabitants by using labour-based community methods for a private sector-led approach for all works in order to build the capacity to manage, deliver and maintain public transportation facilities through on-the-job capacity development. Part of NRAP, the Afghanistan Rural Access Project (ARAP) is being implemented over a five-year project life and is slated to be completed on 30 September 2017. With financing of about $400 million, this project aims to ensure that rural communities benefit from all-season road access to basic services and facilities.
In 2014, a collaboration of development partners initiated the second phase of the ADB-sponsored Rural Roads Improvement Project in Cambodia. Approved initially in 2010, the project aims to upgrade more than 1,031 km of rural roads from gravel roads to a paved condition in nine provinces. The next phase of the $118 million package is supported by a combination of loans and grants from the Governments of the Republic of Korea and Australia, and the Nordic Development Fund. The Government of Cambodia will finance $11.16 million of the project.

Unlike other rural road programmes, the Rural Roads Improvement Project II is comprised of a variety of components to ensure that the project is sustainable in all senses of the word, including:

• Improvement of about 1,200 km of rural roads to a climate-resilient paved condition, including green planning/planting in the nine provinces;
• Strengthening of rural road asset management through a strong capacity-building programme;
• Extending the community-based rural road safety programmes of the earlier project, as well as an axle-loading control programme to address the problem of overloading, as the improved roads may increase average speeds;
• Project management support to strengthen the capacity of the Ministry of Rural Development
• Connectivity improvements for Mekong river islands, including the rehabilitation of roads and jetties within a five-island cluster in the Mekong River.

It is hoped that by improving access to markets, jobs and social services, this project will help raise the living standards of the rural poor who live in these provinces.

Source: ADB (2014d); See www.ndf.fi/project/rural-roads-improvement-project-ii-rip-ii-ndf-c63

Cambodia: With many donors funding various rural road projects over many years, the Government of Cambodia developed a strategic plan for rural roads in 2007 with the support of the South-East Asia Community Access Project (SEACAP) (box 3.17). To implement this strategy, the Government of Cambodia developed the Rural Roads Improvement project. This project has recently embarked on its second phase, which aims to rehabilitate roughly 1,000 km of rural roads in nine provinces with the objective to provide year-round access to markets. This phase also includes other components designed to make the project both socially and environmentally more sustainable (box 3.18).
China: As noted in box 3.16, the Government of China has a long history of implementing poverty-reduction programmes that have concentrated on rural roads and other basic infrastructure development. The country is expected to extend its road network in rural areas to 3.95 million km by the end of 2015, reaching 99 per cent of the country’s towns and 93 per cent of its villages. During its twelfth Five-Year-Plan period (2011-2015), China will complete or renovate about 1 million km of roads in rural areas and connect 5,000 villages. The country is investing 326.5 billion Chinese yuan (RMB) ($51 billion) on rural road construction. Notably, this project has provided more than 2.9 million jobs for rural migrant workers and helped the poorest 60 per cent of the population in the project areas. Examples of some of the projects include the Gansu Rural-Urban Integration Project, which involves the construction and repair of rural roads and bridges, connecting 48 villages. It is estimated that this project will benefit some 168,000 people. Another project is the Guiyang Rural Roads Project, which entails upgrading or rehabilitating about 940 km of rural roads that pass through villages where more than 703,000 people live. An example of the work is in Yunnan province where high-quality rural roads have been constructed using local rocksets by local people trained in constructing and maintaining low volume roads. Information and experiences associated with these projects have provided input for the thirteenth Five-Year Plan.13 14

India: To provide rural accessibility for the 300 million people in the country who lacked access to paved roads, the Government of India launched in 2000 the national Pradhan Mantri Gram Sadak Yojana (PMGSY), which is intended to secure all-season road connectivity (with necessary culverts and cross-drainage structures operable throughout the year) to habitats in rural areas. Currently, about 91 per cent of the 167,000 previously unconnected habitants now have road access, and of the 740,000 km of road to be constructed or upgraded,
415,000 km has been completed. Overall, 190,976 inhabitants are expected to benefit from the programme. The programme has allocated significant resources for technical assistance to help build the capacity of the rural roads agencies, especially in the ongoing management of assets and the sustainable maintenance of roads.

**Nepal:** Recognizing that the mountainous and remote areas of the country were in need of practical measures to overcome barriers to road access, the Government of Nepal launched the Rural Access Programme (RAP) in 1999. The main feature of RAP has been the construction of tracks, trails and roads using labour-intensive, environmentally sound and climate resilient methods. This approach has ensured that the programme has also generated employment for people, particularly women, living in local communities, thereby providing an additional source of income. RAP3, which was launched in 2014, involves building rural roads in the poorest districts in western Nepal and developing road project management and engineering expertise in both the public and private sectors.

**Pakistan:** The Multi-Donor Trust Fund is financing the Emergency Roads Recovery Projects in Khyber – Pakhtunkhwa Province and the Emergency Rural Roads Project in the Federally Administered Tribal Areas. These projects aim to improve access and mobility through the construction of rural roads for the people living near existing road corridors.

**Sri Lanka:** The “Maga Neguma” Rural Road Development Programme was initiated in 2004 to upgrade roads to an operable level for motor vehicles. The Government designed the programme in cooperation with local community-based organizations. In 2010, the Rural Development Authority began to promote the use of pre-cast concrete block paving in order to maintain the quality of the roads as well as to provide easy access even after the laying of a utility service. The “Maga Neguma” programme was still running in 2014, along with the Connecting Village Project and a number of other smaller projects that specifically target rural areas.
While there seems to be a growing consensus that roads need to be taken into consideration when designing rural development projects, infrastructure in rural areas is still underfunded by multilateral and bilateral donors as well as by governments. Part of the challenge is that current systems of assessing the feasibility of rural transport projects, in which a minimum monetary rate of return is required, sometimes overlook the other potentially important benefits to which monetary values cannot be assigned. Research has also found that it also takes time for the benefits of new rural road projects to be realized.  

Another critical obstacle to raising the profile of rural transport in the development agenda has been the challenges posed by measurement. For example, recognizing that physical isolation may be contributing to poverty in the rural areas of developing countries, the World Bank developed the Rural Access Index (RAI) in 2003, which calculates the percentage of the rural population that lives within 2 km (typically equivalent to a walk of 20-25 minutes) of an all-season road.
For a more detailed discussion on the contribution of transport to the Millennium Development Goals, see E/ESCAP/MCT.2/9.

E/ESCAP/CTR/2.

World Bank (2014b).


The most recent Rural Access Index data from the World Bank can be found at: www.worldbank.org/transport/transportresults/headline/rural-access/rai-updated-modelbasedscores5-20070305.pdf

The study found that for every 1 million Indian rupees ($22,000) invested in rural roads, 163 people were lifted out of poverty (World Bank, 2009b).

The paper used a general equilibrium modelling approach in which road improvement was modelled as a reduction in transport costs, and simulates the effects of the changes to transport costs on real GDP, rural poverty incidence and total poverty incidence (Warr, 2005).


For a discussion on the importance of road maintenance, see (ESCAP 2013a).

For a more detailed discussion on the direct and indirect effects of improved accessibility, see United Nations Centre for Regional Development (2014).

Kingombe (2012).


Xinhua (2015).

ADB (2014c).

See www.rapnepal.com/home


Van de Walle (2008).

Roberts and others (2006).
1. INTRODUCTION

The provision of high-quality roads has been shown time and again to improve people’s lives. As we move into an era of more sustainable transport, policymakers are placing increasing emphasis on the mitigation of transport’s negative social and environmental impacts when planning for a cleaner, more productive and efficient future. However, there are externalities more immediate in nature that require rigorous attention and planning.

Many governments in the Asia-Pacific region are grappling with the challenge of ensuring that their transport programmes result in safe mobility. Transport safety, and road safety in particular, has moved to the forefront of the international development agenda because of the growing epidemic of road crashes. Road traffic injuries have become the leading cause of death globally, and the major cause of death among young people (15-29 year olds). 1 90 per cent of road traffic deaths occur in low-and middle-income countries, yet these countries have just 54 per cent of the world’s vehicles. 2

According to the Global Status Report on Road Safety 2015, more than half of the world’s 1.25 million road crash fatalities in 2013 occurred in the ESCAP region. 3 With motorization rates expected to continue to grow in many of the region’s emerging economies, one of the targets of Goal 3 of the Sustainable Development Goals is to halve global deaths and injuries from road traffic crashes by the year 2020. In addition to that target, the importance of improving road safety in achieving inclusive, safe, resilient and sustainable cities and human settlements is emphasized in Goal 11. Many options are available to make this happen. Whether through road quality assurance or strict law enforcement, public education schemes or the use of ITS, it is vital that policymakers exhaust all routes available to them while addressing this exigency.
2. ROAD SAFETY IN THE ASIA-PACIFIC REGION

a. Current status of road safety in Asia and the Pacific

In recent years, there has been mixed progress in tackling road safety issues in Asia and the Pacific. Figure 3.11 show progress in reducing the number of death from road crashes in ESCAP subregions between 2010 and 2013 based on estimates from the Global Status Report on Road Safety 2015. According to the report, in the Asia-Pacific region, road facilities have declined in 23 countries: Afghanistan; Armenia; Australia; Azerbaijan; China; Fiji; Georgia; India, Indonesia; Iran (Islamic Republic of); Japan; Kiribati; Lao People’s Democratic Republic; Marshall Islands; Nepal; New Zealand; Pakistan; Palau; Republic of Korea; Singapore; Thailand; Timor-Leste; and Turkey. This indicates that road safety improvement is possible.
In addition to the human toll, road crashes result in tangible economic losses to the victims, their families and their respective sources. The ESCAP secretariat estimated the cost of road crashes as a percentage of GDP when converted into monetary terms, the economic cost of road crashes in the Asia-Pacific region is estimated at between $245 billion and $378 billion. According to the Road Safety Action Plan published by the ADB, road crashes are costing the Bank’s developing member countries more than the total development aid received annually in the region, a clearly unsustainable scenario.

Meanwhile, figure 3.12 reveals that the overall performance of the ESCAP region in reducing road fatalities is also improving. The number of estimated fatalities in the region declined from more than 777,000 in 2010 to approximately 733,000 in 2013, a 5.6 per cent reduction. A closer look at figure 3.6 shows that in the South and South-West Asia, East and North East Asia and South-East Asia subregions, the overall reduction of fatalities declined by 8.24 per cent, 6.37 per cent and 0.1 per cent, respectively.

In addition to the human toll, road crashes result in tangible economic losses to the victims, their families and their respective countries as a whole. Drawing on a range of sources, the ESCAP secretariat estimated the cost of road crashes as a percentage of GDP (table 3.8), with the results ranging from between 0.02 and 3.5 per cent. Cambodia, India, Indonesia and Thailand are among the countries experiencing the highest percentage loss of GDP from road crashes, while New Zealand has the lowest at only 0.02 per cent.

Figure 3.13 provides a summary of the estimated fatality rate per 100,000 population in 2013. The region’s average rate was at 18.99 with Thailand, the Islamic Republic of Iran, Vietnam, Kazakhstan and Malaysia topping the list at 36.2, 32.1, 24.5, 24.2, and 24.0 respectively.
FIGURE 3.13 ESTIMATED FATALITY RATE PER 100,000 POPULATION IN 2013.

Source: Data from WHO(2015a) For ESCAP average, data from WHO(2015a) and ESCAP calculations.
b. Addressing the causes of road traffic crashes
The Global Plan for the Decade of Action for Road Safety 2011-2020 developed by the UN Road Safety Collaboration have identified five key pillars improving road safety. These five pillars include road safety management, safer roads and mobility, safer vehicles, safer road users, post-crash response. The following section highlights some of the key main issues.

i. Infrastructure design
The quality of roads plays a significant role in crash incidence. Studies show a strong correlation between infrastructure design and both the number and severity of road crashes. Based on data covering roughly 40,000 km of the Asian Highway, the Asian Highway Database (AHDB) shows that average fatality rates fell on Class I, II and III roads between 2010 and 2014 (figure 3.14).

However, it also indicates that the primary-class Asian Highway roads have the best safety record, at 3.57 fatalities per billion vehicle-km, with roads below Class III having the worst, at 168.48 fatalities per billion vehicle-km. This suggests that the upgrading of roads across all classes, especially to meet the minimum required standards for Class III, is likely to result in a reduction in fatalities on the Asian Highway network.

In many developing countries, pedestrians and non-motorized transport users are at a
significant risk of road crashes due to the poor quality of infrastructure. According to WHO, more than 30 per cent of road traffic fatalities in low- and medium-income countries involve pedestrians and cyclists. To reduce this risk, governments must make a greater effort to incorporate pedestrians and cyclists into infrastructure design and land-use planning. Another proven way of improving road safety is to incorporate ITS into countries’ national road systems, particularly on expressways and highways. Tools, such as variable message signs, can warn drivers of incidents or bad weather up ahead to help them reduce speeds and avoid crashes, while automatic traffic enforcement has been proven (see the usage of it by the Republic of Korea, Part III, Chapter 2) to induce a significant drop in road crashes in a short period of time.

Intelligent Transport Systems can also be useful inside vehicles, providing drivers with road-specific real-time traffic announcements relayed to their radios from local infrastructure transmitters, along with an ever-increasing array of in-vehicle safety features.

ii. Human risk factors
The World Health Organization has identified five key risk factors in road safety: speeding; drink-driving; and not wearing or using helmets, seat-belts and child restraints. For the ESCAP region, speeding, reckless driving and drink-driving have been identified as the top causes of traffic crashes (table 3.4). For Bhutan, Brunei Darussalam, Georgia, Tajikistan and Thailand, speeding was identified as the top cause of road crashes. Drink-driving was identified as major causes of road crashes in Bhutan, the Lao People’s Democratic Republic and the Russian Federation.
### Table 3.4 Top cause(s) of road crashes in the ESCAP region countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Top cause(s) of road crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armenia</td>
<td>Violation by drivers</td>
</tr>
<tr>
<td>Bhutan</td>
<td>Speeding, drink - driving and reckless/inexperienced driving</td>
</tr>
<tr>
<td>Brunei Darussalam</td>
<td>Speeding</td>
</tr>
<tr>
<td>Georgia</td>
<td>Speeding</td>
</tr>
<tr>
<td>India</td>
<td>Driver’s fault</td>
</tr>
<tr>
<td>Lao People’s Democratic Republic</td>
<td>No driving license, drink - driving</td>
</tr>
<tr>
<td></td>
<td>Inexperienced driving</td>
</tr>
<tr>
<td>Nepal</td>
<td>Negligence by drivers</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Careless driving, dozing at wheel</td>
</tr>
<tr>
<td>Republic of Korea</td>
<td>Lack of drivers (pedestrians) awareness of road safety rules</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>Drink - driving</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>Overtaking, speeding (fatal accidents)</td>
</tr>
<tr>
<td>Tajikistan</td>
<td>Speeding</td>
</tr>
<tr>
<td>Thailand</td>
<td>Speeding</td>
</tr>
</tbody>
</table>

Source: multiple sources.

Most countries have adopted national legislation to tackle the issues of speeding, drink-driving, and the wearing of helmets and seat belts, while there are still very few specific laws regarding child restraints. These issues are described below in more detail.

**Speed limit:** Most countries in the region have enacted national speed limits, but compliance levels vary significantly. For example, a spot-speed study conducted in Brunei Darussalam found that 100 per cent of vehicles on the Jln Kebangsaan Highway were exceeding the speed limit of 50 km/h, with the highest speed detected registering 188 km/h. On average, speed limits in the region were found to be 90-130 km/h for higher speed roads; 70-100 km/h for rural roads; and 50 km/h for urban roads. Measures for limiting speed can contribute significantly to reducing crashes: a recent WHO study showed that a 5-per cent cut in average speed can reduce the number of fatal crashes by as much as 30 per cent.

**Drink-driving:** According to WHO, the crash risk of a person driving with a blood alcohol concentration (BAC) of 0.1 g/dl is approximately five times higher than that of someone with a BAC level of zero. Furthermore, inexperienced young adults driving with a BAC level of 0.05 g/dl are more than twice as likely to have a road traffic crash than more experienced drivers. As a result, the drunk-driving laws of Afghanistan, Azerbaijan, the Democratic People’s Republic of Korea, the Russian Federation and Uzbekistan all limit BAC to zero, that is no blood alcohol concentration while driving. Other countries are also strengthening their efforts to enforce driving under the influence (DUI) laws. For example, the Land Transport Office of the Philippines announced that from March 2015,
some 150 breathalyser units would be in place for enforcing its Anti-Drunk and Drugged Driving Act (Republic Act 10586) of 2013.13

Helmets: Based on information available from the Global Status Report on Road Safety 2015, motorcycle helmet usage rates for different countries vary from 6 to 100 per cent. In Asia and the Pacific, Australia, Malaysia, the Marshall Islands, Tonga and Viet Nam have the highest usage rates of nearly 100 per cent. Helmet usage in urban areas is typically higher than in rural areas, most likely due to differing levels of enforcement. The helmet wearing rate of motorcycle drivers is also much higher than that of passengers. In Thailand, for example, studies have found that only 12 per cent of rural motorcycle passengers wear helmets, as compared to 83 per cent of urban motorcycle drivers.14 Another serious problem is that only 25 countries in the ESCAP region have requirements for minimum helmet standards. According to WHO, wearing a good-quality helmet can reduce the risk of death from a road crash by 40 per cent and the risk of severe injury by more than 70 per cent.15 These issues are particularly pressing in South Asia and South-East Asia, where two and three-wheelers account for 30 to 50 per cent of total road traffic fatalities.16

iii. Enforcement and awareness-raising
One of the main challenges facing all countries is the enforcement of laws. While most countries have adopted national legislation to tackle the key human risk factors, such as speeding, drunk-driving, helmet wearing, and seat belt usage, the level of enforcement varies significantly between them. Figure 3.15 shows the divergence in the levels of enforcement for helmet wearing, speed limits and drunk-driving based on a perception-based survey on a scale of zero (not effective) to 10 (highly effective).17 Strict enforcement generally requires resources, both financial and human. However, it doesn’t always change the perception of road users. While it may lead to the fear of being arrested and punished, strict enforcement does not necessarily lead to the fear of road injuries and fatalities.

The Government of the United States of America annually publishes statistics on the number of lives saved due to various road safety measures (table 3.5). The data show, for example, that in 2013, the use of seat belts in passenger vehicles saved more than 12,500 lives, while the use of child restraints saved more than 260 lives.18 Factual data, such as these, can help persuade drivers to “self-enforce” the legislation put in place by governments.
FIGURE 3.15 LEVEL OF ENFORCEMENT FOR HELMET WEARING, SPEED LIMITS AND DRUNK-DRIVING

Another example of an effective self-enforcement campaign is currently being implemented in Singapore. The country’s demerit-free driver car decal has raised awareness among motorists, and the system of recognition it has put in place has motivated drivers to maintain a demerit free record (box 3.19).

3. MOVING TOWARDS ZERO ROAD CRASHES IN THE ASIA-PACIFIC REGION

Many ESCAP member countries have developed comprehensive national road safety plans, with measurable goals in line with the Decade of Action for Road Safety and the ESCAP Goals, Targets and Indicators for Inclusive and Sustainable Development. These goals, targets and indicators were adopted as a follow-up to the Ministerial Declaration on Improving Road Safety in Asia and the Pacific, which aimed to save 600,000 lives and prevent a commensurate number of serious injuries in the region over the period 2007 to 2015 (box 3.20). While progress has been witnessed in many countries, most countries in the region have yet to achieve the eight targets in the
Declaration. As 2015 marks the end of the mandate for the Ministerial Declaration on Improving Road Safety in Asia and the Pacific, governments may wish to consider renewing their commitment to the various goals, targets and indicators deemed important for the region. But as noted above, these goals will not be achievable without identifying innovative ways to enforce road safety legislation.

Education is paramount, and in this regard, governments could win public support by strengthening their statistical capacities in collecting and monitoring road safety data, and using this information to educate people at all stages of life, especially schoolchildren and the young, about the importance of road safety and the effects that it can have on their lives and the lives of others.

**BOX 3.20 EIGHT TARGET AREAS IN THE ESCAP REGIONAL ROAD SAFETY GOALS, TARGETS AND INDICATORS**

- a. Making road safety a policy priority;
- b. Making roads safer for vulnerable road users, including children, senior citizens, pedestrians, non-motorized vehicle users, motorcyclists, and persons with disabilities;
- c. Making roads safer and reducing the severity of crashes (building “forgiving roads”);
- d. Making vehicles safer and encouraging responsible vehicle advertising;
- e. Improving national and regional road safety systems, management and enforcement;
- f. Improving cooperation and fostering partnerships;
- g. Developing the Asian Highway as a model for road safety;
- h. Providing effective education on road safety awareness to the public, young people and drivers.
Endnotes

1 WHO (2015a).
2 ibid
3 ibid
4 The sum of estimated GDP lost in per cent in 2010, multiplied by 2010 GDP.
5 ADB (2012a).
6 For further information see E/ESCAP/AHWG(6)/1.
7 For 2014 data, the fatality rates in the figure are based on reported fatalities on 32.18 per cent of the length of the Asian Highway network (41,580 km in 24 countries), for which the required data were available as of June 2015. For 2010 data, the fatality rates are based on reported fatalities on 24.1 per cent of the length of the Asian Highway network (34,370 km in 23 countries).
8 WHO (2013).
9 ibid
12 Blood alcohol concentration, or BAC, limit refers to the maximum level of alcohol legally acceptable in the blood of a driver on the road. WHO (2013).
14 Poon and others (2010).
16 WHO (2013).
17 As part of the WHO Global Status Report on Road Safety 2015, respondents to a survey were asked to rate, as individuals, the effectiveness of enforcement of the road safety legislation covering these issues based on their professional opinion or perception. The group of respondents then reached consensus on an enforcement score, ranging from 0 (not effective) to 10 (highly effective). It is, therefore, a subjective perception-based indicator.
18 United States (2015).
19 See E/ESCAP/MCT
In determining whether to invest in transport infrastructure, governments have to take into account the three pillars of sustainable development — economic, social and environment. Selection criteria for infrastructure investment cannot focus exclusively on economic benefits and have to consider social and environmental impacts.

The preceding chapters highlighted that the provision of high-quality infrastructure can foster economic integration, improve people’s lives and contribute to alleviate poverty. However, enhancing transport infrastructure requires significant investments and governments need to decide how best to allocate limited resources while ensuring public finance sustainability.

Transport financing is challenging as Asia and the Pacific is facing soaring demand for transport infrastructure to support its burgeoning population and economic development. As the region continues to grow, the need to find viable solutions to ensure the freedom of movement of the people and goods necessary for an economic zone of its size become all the more pressing.

With car ownership levels rising and the region’s urban population expected to grow by 0.7 million every week until 2050, the existing level of congestion already very costly to the economies will only worsen.¹ This rapid urbanization is creating a demand for sustainable, integrated public transport systems well beyond the capacities of those currently in operation.

The region’s transport hubs, its seaports, airports and its networks of roads, railways and waterways, are also under pressure because of growing intra- and interregional trade.

The flow of containers has tripled since 2000, creating a need for significant investment in port and auxiliary infrastructures.² Regional land transport networks are also facing considerable strain, with more investment needed to build missing links of Trans-Asian Railway network. There are currently an estimated 10,900 km of missing links³ in the Trans-Asian Railway network, which equates to 9 per cent of the identified network. These missing links prevent countries from reaping the full benefits of a transport mode rapidly emerging as the most sustainable for freight movement in the region. Filling the gaps will be costly, with ESCAP estimating the total for their completion to be approximately $59 billion.

At the region’s airports, the number of air passengers carried has more than doubled since 2005, while in some countries traffic has quadrupled over the same period.⁴ This trend is expected to continue as more people join the middle classes, with airlines
anticipating a yearly increase of 5.7 per cent in passenger numbers over the next few years. To keep pace with this growing demand, required capital expenditure for airports has been estimated to be around $6 billion/year for the decade 2010 - 2020.

Such high demand for transport necessitates massive investment in new infrastructure projects and for the adequate maintenance of those already in place. This is difficult to find in the public expenditure budgets of many of the region’s countries, yet essential to the region’s continued growth. One of the solutions to this problem would be to form of public private partnerships (PPPs).

To explore these critical issues, the chapter first outlines the recent trends in transport infrastructure investments before introducing different financing options. The chapter then presents the factors to consider for using successfully the PPP mechanism in the transport sector and lays out the intricacies, opportunities and pitfalls of a mechanism many believe to be the future of infrastructure investment. The chapter concludes by examining the specificities of financing each transport mode.

2. RECENT TRENDS

Many of the governments in Asia and the Pacific recognize that investing in transport infrastructure is a certain way to improve socioeconomic development, and it can be noted from figure 3.16 that some countries, including, for example, Australia and Turkey, have significantly raised their levels of investment over the past decade (despite some downward movements in their investment share of GDP in certain years). It is also interesting to note that while countries, such as Japan and the Republic of Korea, have progressively reduced the share of their respective GDPs devoted to transport infrastructure (see figure 3.16), these countries already had strong transport networks and continue to invest more than the average of most developed countries (spending on road and rail infrastructure is about 1 per cent of GDP in developed countries). These countries have also stabilized or slightly increased their levels of investment since 2010.

Some of the countries in the region have been investing at even higher levels, with China, for instance, allocating the equivalent of 4 per cent of its GDP each year to transport over the last ten years, representing an expenditure of about $400 billion in 2014 (box 3.21).

Source: OECD-ITF data estimates (*data do not include private spending for India and Japan)
Transport investment in China reached a record level in 2014 with about $400 billion invested in roads, railways, airports and waterways. As a result of those investments, the road network was lengthened by about 90,000 km — some 7,450 km of which were expressways — and 230,000 km of rural roads were renovated. About 8,000 km were also added to the rail network and eight new airports were built. In the port sector, 631 new berths came about in this fresh wave of investment.

Source: Xinhua (2014)

Overall, there is no rule regarding an ideal level of investment in transport as it depends heavily on the existing stock of infrastructure. The observed levels, nevertheless, demonstrate the high priority assigned to transport in the region.

The quality of transport infrastructure in much of the region is still perceived to be relatively low (figure 3.17) and greater investment will be required to meet future demand for transport services and to address the needs of their citizens and businesses. A report from McKinsey estimates that countries in South-East Asia will have to increase by a factor of 2
to 6 the annual amount they have historically spent on infrastructure. This is not only required to accommodate expected economic growth but also to raise the infrastructure stock to a level that will make these countries more competitive.\(^8\)

In terms of investment priorities, a shift towards railways is noticeable. Figure 3.18 illustrates this gradual shift in selected countries. While most of these countries in the early 2000s were earmarking only a limited share of their investments to rail, they have since modified the balance. Among the selected countries in the figure below, only those with a previously high share of rail investment, namely India and the Russian Federation, have not increased the amount allocated to rail. However, those two countries have maintained their rail expenditure on a par with their budgets for roads.

This growing allocation means that rail investment, in real terms, has risen exponentially in many countries (figure 3.19). This trend is set to continue, with some large railway projects already in the pipeline. A $6.8 billion project in the Lao People’s Democratic Republic, which will connect the Lao-Chinese border to Vientiane, is one such example.

**FIGURE 3.18 ROAD AND RAILWAY INVESTMENT SPLIT IN SELECTED COUNTRIES**

(LIGHT COLOURS REPRESENT RAIL INVESTMENT SHARE AND DARK COLOURS ROAD EXPENDITURE)

- **2003**
  - Australia: 80%
  - Japan: 50%
  - Republic of Korea: 50%
  - Turkey: 30%
  - China: 20%
- **2013**
  - Australia: 70%
  - Japan: 40%
  - Republic of Korea: 40%
  - Turkey: 30%
  - China: 20%

**FIGURE 3.19 GROWTH IN RAILWAY INVESTMENT IN SELECTED COUNTRIES SINCE 2005**

- **Turkey (2013)**: 766%
- **China (2014)**: 345%
- **Australia (2013)**: 136%
- **India (2013)**: 56%
- **Russian Federation (2013)**: 40%
- **Japan (2011)**: 37%
- **Republic of Korea (2013)**: 8%

Source: ESCAP calculation based on OECD-ITF data estimates and data from the Transport Ministry of China website (data at constant prices have been used).
3. FINANCE OPTIONS
Countries have several options when seeking to finance transport development (figure 3.20). In the light of the extensive needs that such projects present, mobilizing both public and private resources often seems to be the best course of action.

To decide whether projects should be financed with public or private money, governments need to consider their fiscal space as well as the benefits that they can expect from each financing mechanism. In that respect, “value-for-money” assessments have been developed to evaluate whether a project is likely to bring more value if implemented with private resources rather than through a traditional procurement process. For example in the Republic of Korea, the Public and Private Infrastructure Investment Management Center (PIMAC) possesses considerable experience in using VfM tests in order to assess potential PPP projects. The ESCAP secretariat has also recently developed guidance and toolkit materials for supporting countries in conducting this type of assessment. For instance, VfM can be realized in a PPP project only under certain conditions, including (but not limited to) when:
• The private sector is given space to innovate and incentivize to improve service delivery (for instance by linking payments to Key Performance Indicators);
• The risks are properly allocated between the public and private partners; and
• The private partner is selected through market competition.

Governments should, however, continue to publicly finance transport infrastructure projects if these projects are unlikely to achieve VfM through the PPP mechanism. This could, for example, be the case if the project delivered as a PPP project does not create sufficient additional value to offset the higher financing and transaction costs associated with the private sector’s infrastructure delivery.

FIGURE 3.20
FINANCE OPTIONS

TRANSPORT INFRASTRUCTURE

PUBLIC FINANCE

PRIVATE FINANCE

- Govt. Bonds
- Loans (e.g. multilateral, bilateral loans)

GOVT REVENUES & EXPENDITURES

PROJECT FINANCE

CORPORATE FINANCE

- Equity
- Direct Investments
- Listed and Unlisted Infrastructure Funds

- Debt
- Project Loans
- Project Bonds
- Commercial Loans
- Corporate Bonds
- Stocks

Source: ESCAP / Remark: To obtain funds through project financing, a party wishing to realize an infrastructure project establishes a dedicated project company known as a special purpose vehicle — or SPV — to acquire financing and implement project activities. This legally isolates the parent organization from direct exposure to the financial risks associated with a project. With corporate finance, the same party will finance the project directly from its balance sheet.
Countries also need to decide who should be paying for the infrastructure. In this respect, efforts could be made to further link user charges, fees and levies to infrastructure construction and maintenance. For example, this can be done through the establishment of dedicated road funds that governments in many countries have set up as a sustainable mechanism for financing the needs of their road sectors.

**a. Public Finance**

It is expected that transport infrastructure development should usually remain financed from the public purse. While discussion of public finance management goes beyond the scope of a transport review publication, consideration of the following options is nonetheless invaluable.

**Mobilizing domestic resources:** Governments can raise more resources by strengthening tax revenues. There is significant potential for this in the Asia-Pacific region as the collection of tax revenues remains low compared to other developing regions. Governments could also create fiscal space by making existing investments more efficient and by reprioritizing their current expenditures. For example, removing or reducing fuel subsidies could free up significant resources for capital investment, even though such a measure would face strong opposition in many countries.9

**Accessing external resources:** In some countries, demand for infrastructure simply exceeds financing resources available domestically, meaning that foreign borrowing is required. These countries could benefit from the existing MDBs and initiatives recently launched with the aim to boost the financing available for infrastructure, such as the AIIB. For regional projects, intraregional cooperation through bilateral loans and grants should also continue to be a key source of financing.

**Improving public expenditure management:** Addressing the infrastructure gaps is not only about investing more; it is also about investing better. Large savings can be made by improving the planning, delivery and operation of infrastructure projects. In a study from McKinsey, it is estimated that the productivity of infrastructure investment could be increased to achieve savings of 40 per cent if proven best practices were to be adopted.10 This could be achieved, for example, by improving project selection, streamlining delivery, optimizing maintenance and managing demand. These productivity gains are often associated with private involvement in infrastructure development, which is discussed below.

**b. Private Finance**

Public private partnerships have become a key mechanism for channelling private resources for infrastructure development; there seems
At the Asia-Pacific Forum on Public-Private Partnerships for Transport Infrastructure Development, which was held in Bangkok on 21 and 22 January 2015, the ESCAP secretariat conducted a survey of more than 50 PPP experts from government agencies and the private sector in attendance from more than 20 countries.

The results of the survey revealed a number of interesting views. Almost unanimously, respondents said that PPPs can have an added value compared to the traditional procurement of public infrastructure (98 per cent). A substantial number said that their main reason for considering PPPs was to access additional funding resources. Based on this, it appears that less priority had been placed on other benefits, such as efficiency gains and risk allocation.

The majority of respondents viewed PPPs as a complicated procurement mechanism that should be considered carefully (63 per cent). Among some of the problems identified for road PPPs, in particular, respondents highlighted land acquisition issues and demand risk, namely inaccuracy of traffic forecasts, as being the most troublesome.
FIGURE 3.21 MODAL SPLIT OF PRIVATE INVESTMENTS IN TRANSPORT INFRASTRUCTURE PROJECTS IN THE ASIA-PACIFIC REGION (2000-2014)


There is a long history of PPP involvement in the region’s transport sector. More than $210 billion were mobilized in the period 2000-2013 through this procurement mechanism, representing an average of $15 billion per year. The major share of investment during this period was allocated to the road sector, followed by railways, seaports and then airports (figure 3.21).

The private sector has to secure financing to contribute to infrastructure development, which can be done through either the banking sector or through financial markets.

**Banking sector**

Most PPP projects are financed by banks through loans from corporate and project finance activities. However, commercial banks have short-term liabilities, such as customer
Financial markets and infrastructure funds

While banks have traditionally been the main source of financing for PPP projects, long-term local currency loans are not always available and banks may have constrained lending capacities. In that case, it is possible that financial markets can complement the banking sector and increase the availability of funds for infrastructure development.

In particular, institutional investors could be an alternative source of financing. The long-term nature of infrastructure projects matches the long-term liabilities of institutional investors, such as pension funds, insurance companies and sovereign wealth funds. Despite this natural match, the potential of institutional investors remain largely untapped and allocations from those investors towards infrastructure debt and equity continue to be limited.

However, some countries have managed to mobilize these resources efficiently. Malaysia has been successful in financing its infrastructure development through the issuance of sukuk (Islamic bonds, structured to generate returns for investors without contravening Islamic law). For example, the largest national highway concessionaire, PLUS Berhad, issued sukuk worth several billion dollars in 2012, notably for acquiring the rights for five toll concessions.

Besides sukuk, project bonds are another solution for financing and refinancing infrastructure projects through capital markets. They have, for instance, been used to refinance the Mersin International Port project in Turkey, for which a seven-year bond was issued for $450 million in 2013.

There might, however, be need to develop credit enhancement mechanisms to effectively mobilize institutional investors’ resources. These investors are often restricted by regulation to purchasing only securities that carry an investment-grade rating. By providing guarantees, credit enhancement mechanisms can increase the ratings of project bonds, thereby making those bonds more acceptable. An example of a credit enhancement mechanism is the Credit Guarantee and Investment Facility, which was established...
in 2010 to boost long-term investment in the ASEAN+3 region.15

Financial markets have also been used to finance infrastructure development in the Republic of Korea. For example, the listed Macquarie Korea Infrastructure Fund, which was set up in 2002, has contributed to one port and 11 road projects through equity, subordinated debt and senior debts.16 Following the same model, approximately $625 million for equity investments in infrastructure projects and businesses in the Philippines have been mobilized through the unlisted Philippine Investment Alliance for Infrastructure fund created in 2012.17

At the regional level, the ASEAN Infrastructure Fund was launched in 2012 to address the region’s infrastructure needs. While the fund was initially set up to provide loans from its own resources, it is expected that it will issue debt in the coming years to increase the resources available for infrastructure financing. Central banks will be able to purchase those debts, thereby offering a new avenue for investing foreign exchange reserves.18 In a similar vein, the $40-billion Silk Road Fund, which was launched by China in 2014, should expand resources for infrastructure projects that aim to strengthen connectivity across Asia.

4. FACTORS FOR A SUCCESSFUL TRANSPORT PUBLIC-PRIVATE PARTNERSHIP PROGRAMME

To leverage private resources, financing makes up only one part of the equation, the other being the availability of a pipeline of well-prepared infrastructure projects that require financing. This pipeline can only emerge if an enabling environment for PPP projects exists, and if those projects are properly structured and prepared. Based on the past experiences of the PPP experts surveyed by ESCAP, the following issues have been identified as being critical to the success of transport PPP projects.

**BOX 3.23 OVERCOMING LAND ACQUISITION ISSUES IN INDONESIA**

Land acquisition has been a major obstacle for PPPs in Indonesia. To address this issue, a law on land procurement for public infrastructure was enacted in 2012 to shorten the time required for acquiring land to a maximum of two years. Three amendments have already been made to this regulation to further facilitate the land acquisition process. Among the main changes, the following objectives have been pursued:

- To provide for the compulsory purchase of property for both existing and new public infrastructure projects;
- To allow the private sector to finance land acquisition to speed-up the process (removing the need to wait for state budget disbursements).

Despite some progress, issues remain because of the lack of proper land registration in many sparsely populated areas. People willing to claim unregistered land for infrastructure projects have to compensate those that have cultivated or occupied it for a number of years. While the principle is fair, it creates practical difficulties. For instance, it might be difficult to determine who has to be compensated in the absence of clear evidence. People might also be tempted to take advantage of upcoming infrastructure projects by claiming property rights they might not have. Defining the appropriate compensation package could also be difficult in the absence of well-developed land markets.


**a. Tackling land acquisition issues**

When asked about PPPs for road development in their respective countries, the experts identified land acquisition as the single greatest challenge to the success of road PPP projects. This is an issue for all infrastructure projects, not only PPPs. According to an industry survey, 80 to 90 per cent of road projects in India are delayed because of land acquisition and related environment and forest clearance issues, with such delays often constituting 15 to 20 per cent of the total project time.19

Those problems often arise because land acquisition is typically not fully secured prior to bidding.

Within the PPP process, public authorities are normally in a better position to handle the risk of land acquisition, as legal procedures are usually required. To facilitate land acquisition, the use of public land should be prioritized whenever available. Some countries, such as Indonesia, are also revising their regulations to facilitate the land acquisition process. This is illustrated in box 3.23.
b. Allocating demand risk adequately

Demand risk refers to the risk that the number of users may be lower than anticipated, resulting in lower revenues for the private operators and eventually financial distress. Unfortunately, the forecasting of traffic demand has proven to be largely inaccurate, in particular for new infrastructure, or “greenfield”, projects. This has, for instance, been experienced in Australia (box 3.24). Such inaccurate forecasting can lead to the financial ruin of companies and a loss of confidence among investors.

Availability payments

In some countries, the availability payment model has been used to overcome demand risk. In this model, the State sets and retains all tolls and pays the concessionaire a predefined sum at regular time intervals over the life of the project contract provided that the road is available for users and meets predefined quality standards. In other words, while the private partner designs, constructs, finances, operates and maintains the road, its revenue stream does not depend upon the amount of tolls collected. This is becoming the new standard for greenfield road PPP projects in many countries. For example, the recently awarded 1.6-billion Australian dollar (SA)($1.2 billion) Toowoomba Second Range Crossing project in Queensland, Australia, follows this approach.20

In Kazakhstan, the Almaty Ring Road Concession project, also known as BAKAD, is structured on an availability payment scheme. If successful, this 66-km road project could become a reference for PPP projects, not only in the country but also in Central Asia.21 The availability payment model can also be useful when the revenue flow expected from tolls is insufficient to repay the investment made by the private partner. India has developed the BOT-Annuity model for that reason.

In the urban rail sector, estimating passenger numbers for new mass rapid transit projects has also been difficult. For example in Thailand, both the BTS Skytrain (opened in 1999) and the Blue Line (opened in 2004) initially recorded roughly 25 per cent of the estimated passenger numbers. As a result, the government is using the availability payment model to finance the construction of the new MRT Purple line in Bangkok.22 The same model is being used for the Sydney Light Rail PPP project, for which construction started in 2015.23 With this model, the operator’s revenues are no longer linked to the actual ridership level. With less of an incentive to increase the number of users, the operator has a reduced incentive to offer high-quality services. To address this issue, hybrid models can be considered in which the concessionaire’s remuneration is linked to patronage, such as a bonus payment for target ridership levels.

Although the availability model does not solve the funding issue of transport infrastructure projects, the project stands to benefit from other advantages brought by the PPP structure, such as protection against cost overruns, efficiency gains in design, construction and operation, and better life-cycle cost management.

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**BOX 3.24 THE DANGERS OF OVERESTIMATING TRAFFIC DEMAND**

Similar to many transport infrastructure projects, PPPs are susceptible to inaccurate traffic projections (or too-aggressive bidding), which leads to the collection of tolls insufficient to cover the cost of the private operator. In Australia, several high-profile road projects, such as the Lane Cove and Cross City tunnels in Sydney or the Airport link and CLEM7 tunnel in Brisbane have gone into administration in recent past. A 2010 study found that traffic on 5 of the 14 Australian toll roads to be 45 per cent below forecasts. This triggered lawsuits against traffic forecasters for poor performance. While these projects failed from the perspective of the private investors, the cost for the government was limited, and much less than what it would have been if financed through traditional procurement. In that respect, PPP structures can be seen to have played their expected role by protecting the public purse from the demand risk.

Source: Allen and Overy (2015).
Public guarantees
To assuage private sector fears about traffic demand, public guarantees can also be provided to ensure a minimum revenue stream to the private partner, independently of the number of users. An extension of the concession period can also be granted to compensate for lower demand. The Republic of Korea, for example, applied a “minimum revenue guarantee” extensively in the early days of its PPP programme before phasing it out progressively because of the significant burden it placed on government finances (box 3.25).24

Public construction/private operation
Another option for governments is to finance the construction of a greenfield asset and sell the project to a private operator once traffic is established. In Australia, this approach is expected to be used with the New South Wales government’s key infrastructure project, WestConnex, the largest motorway project in the country, for an estimated cost of A$11.5 billion. The same logic applies to transfer-operate-transfer (TOT) structures, which have been used for road development in China. In TOT projects, the rights to operate the asset and to collect tolls are transferred to a third party for a certain period of time before being transferred back to the initial owner.25 A potential issue with this approach is that the private partner might be reluctant to accept the operation and maintenance risks of an asset that it has not constructed, if attaining a comprehensive assessment of its condition is not immediately feasible.

BOX 3.25 LEARNING FROM EXPERIENCE: THE CASE OF THE REPUBLIC OF KOREA

The Republic of Korea is one of the region’s pioneers in using PPPs for transport infrastructure. In the early days of its PPP programme, it actively provided a minimum revenue guarantee, but decided to phase this approach out because of the growing financial burden associated with it. Although it was fully stopped in 2009, the system still costs around $0.5-$1.2 billion per year and is expected to weigh on the national budget until 2040.

Subsequently, a risk-sharing structure was introduced, through which the government ensures that the operational revenues of the PPP allow for a return at least equivalent to the government bond’s rate. Meanwhile, a mechanism for reimbursements to the government is in place if revenues for the private sector grow beyond a specified threshold in the subsequent years of operation. To ensure financial sustainability into the future, the Republic of Korea has also set a fiscal rule to limit annual government payments related to PPPs to less than 2 per cent of total government expenditure.

As its guarantees have no immediate cost to government, there is a risk that those guarantees are granted in order to simply get the project done, without due consideration for the long-term impact on public finance. There is need to carefully consider those guarantees at the upfront stage by recognizing and analysing their potential fiscal liabilities. The Republic of Korea has adopted accrual-basis accounting to reflect PPP commitments and incorporate future payment for PPPs into a medium-term expenditure framework to ensure the long-term budget affordability.

Sources: Kim (2015); ESCAP (2013).
c. Making public-private partnership projects financially viable

**Capital grants**
As a result of the high up-front capital costs involved in railway infrastructure, some governments have used public resources to finance civil works, limiting private investments to electrical and mechanical systems, such as rolling stock, signaling systems and fare collection mechanisms, which typically represent approximately 15 to 30 per cent of total project costs. This is a popular model that has been used for the development of metro lines in Beijing (Lines 4, 14 and 16) and for the MRT Blue Line in Bangkok.26

**Land capture mechanisms**
To improve the financial viability of transport infrastructure projects, it is critical to exploit every possible source of revenue that can arise from the development of the infrastructure. In particular, land capture mechanisms present a highly viable means of financing the infrastructure of mass transit systems. These mechanisms recoup part of the infrastructure costs by “capturing” the value added to real estate, which usually follows the development of mass transit systems.

The most well-known example exists in Hong Kong, China, where land capture mechanisms have contributed to the development of a world-class mass transit system, with only limited public financial input. Over a fifteen-year period (1998 to 2013), revenues generated from co-developing and selling properties above railway stations and depots, as well as land adjacent to the railway tracks, have amounted to twice the money spent on railway line construction.27

Cities in India and other parts of China have started to implement land capture mechanisms for their infrastructure projects. For example, the state government in Hyderabad is developing a 71-km elevated rail system through a PPP arrangement, which is expected to be operational in 2017. In this project, the private operator expects to generate 45 per cent of its revenues through real estate development at depots and stations.28 Another type of land-value capture mechanism is to charge a levy on properties that are benefiting directly from the transport infrastructure project. This is currently being done in the light rail Gold Coast project in Australia.29

**d. Building capacity for public-private partnership project development**
There is a growing consensus that the lack of bankable projects is holding back the expansion of PPPs in the region and not the lack of financing. This was reaffirmed by the ESCAP PPP Survey, in which limited knowledge and capacity related to PPPs was identified as a major obstacle to PPP development in the respondents’ countries (see figure 3.22 and box 3.26).

While building capacity for government officials is essential, public authorities still need the support of consultants when preparing and tendering for PPP projects. Project preparation facilities that enable governments to access expertise they may lack internally have been established all around the world. A regional example is the Asia Pacific Project Preparation Facility, which was established in 2014 by ADB, and the ASEAN Infrastructure Centre of Excellence, based in Singapore. These facilities can help countries to develop “properly prepared projects” that are likely to be successful. A similar initiative is the Global Infrastructure Facility (GIF), which became operational in April 2015. With an initial capitalization of $100 million, this global open platform aims to facilitate the preparation and structuring of complex infrastructure PPPs.

Recognizing that PPP projects require specific expertise, many countries have also established dedicated institutions, often called PPP units, to drive the country’s PPP programme and support government contracting agencies with their PPP projects. For example, the Government of China established the China PPP Center under the Ministry of Finance in 2014. This Center is in charge of promoting an ambitious programme of pilot projects costing an estimated $29 billion.30
To assist governments in building PPP capacities, the ESCAP secretariat developed and launched a new E-Learning series on PPPs in 2015. Consisting of six modules that cover various major areas related to PPPs, the E-Learning series contains essential knowledge for policymakers considering the PPP route. The course can be accessed for free on the ESCAP website — www.unescap.org/our-work/transport/financing-and-private-sector-participation/public-private-partnership-course — and will include a certification programme in the near future.
e. Streamlining procedures

Lengthy administrative procedures discourage private sector investment in any area. In some countries, for example, infrastructure projects may require more than 40 permits involving in excess of 15 agencies at different levels of government (sometimes conflicting). Investors need to be reassured that their money won’t be locked in for years pending bureaucratic approvals or land acquisition. Recognizing this issue, Thailand revised its legislation on PPPs and passed the Private Participation in State Undertaking Act (the PPP Act), which became effective on 4 April 2013. The revised Act shortens the project review timeline to 7-12 months, compared to the two or three years previously, and also limits the number of Cabinet approvals needed. The Government of Viet Nam also recently passed a PPP decree, which simplifies and clarifies PPP procedures (box 3.27).

To assist countries with the design of related laws and regulations, the World Bank has developed the “Public-Private Partnership in Infrastructure Resource Center (PPPIRC)”, which provides easy access to an array of sample legal materials.

During the implementation of projects, measures can also be put in place to eliminate unnecessary red tape. For example, it is possible to include a tariff formula in the contract to avoid relying on administrative approvals for implementing agreed tariff revisions. This also reduces the regulatory risk, which is often a concern to private investors.

f. Applying good governance principles

To get the best out of a PPP mechanism, governments should follow international PPP standards, practices and norms as closely as possible and encourage healthy competition among private sector bidders. This ensures that the bidding process attracts the best potential companies (box 3.28). At the minimum, governments must ensure fair treatment in the procurement process and open up the process to all potential partners, not just to incumbent operators or national companies. It is also important to consider how to deal with State-owned-enterprises (SOEs) in order to avoid the crowding-out of private bidders.

5. SUBSECTOR SPECIFICITIES

Each transport subsector has its own particular characteristics. Therefore, mobilizing private investment requires a thorough understanding of the specificities of each mode. Project risks need to be allocated in a manner that makes deals attractive without compromising the principle of risk transfer that incentivizes the private sector to innovate and perform efficiently.

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**BOX 3.27 THE PPP DECREE OF VIET NAM**

To facilitate the development of PPP projects, Viet Nam has promulgated a new PPP Decree that entered into force in April 2015. This new Decree:

- Provides greater guidance for project preparation and implementation;
- Removes the limit on State support for individual projects (previously capped at 30 per cent);
- Gives projects greater flexibility for viability gap funding (including through capital expenditure (capex) grants and availability payments);
- Allows funding for project preparation, including through a project development facility.

The Decree permits the use of foreign governing law and foreign arbitration, and recognizes unsolicited proposals. It also clarifies the process regarding step-in rights for lenders, defined by the World Bank as “rights given to lenders to take control of the infrastructure project where the project company is not performing”. This is an important issue for securing the financing of projects by banks.

Sources: Hogan Lovells (2015); Frontier Law and Advisory (2015); PPPIRC (2013).
a. Roads

The road sector has the largest track record of PPPs, with more than five hundred projects having been undertaken in the Asia-Pacific region since 1990. The ESCAP PPP Survey showed that 44 per cent of the respondents believed that PPPs were needed the most in this sector, followed by the rail sector, which was specified by 26 per cent of the respondents. However, recent trends in the region reveal a mixed picture regarding the use of PPP schemes for road development.

In 2013-2014, there was a slowdown in the number of new PPP projects in the region. This was particularly noticeable in India, which has been the largest market in Asia and the Pacific for road projects. Likewise, Australia, another major PPP market, is revising its approach in the light of difficulties encountered with past projects.

However, new PPP markets are securing their first major road deals. In 2014, the New Zealand Transport Agency signed a 25-year contract for the Transmission Gully project, a 27-km four-lane motorway. In the same year, the National Highway Authority of Pakistan signed its largest PPP contract to date, worth more than $400 million, for the Lahore-Islamabad Motorway (M-2) on Asian

To achieve ‘value-for-money’, a competitive tendering process is required to ensure that the government is paying the right price for its infrastructure. Attracting bidders, however, is not an easy task, as only a limited number of private companies have the technical and financial capacity to enter into long-term contracts for developing large-scale infrastructure projects.

As a result, several PPP projects in the region have received a limited number of bidders. In the Republic of Korea, historical data show that some 70 per cent of PPP projects were awarded to a sole bidder, with only 30 per cent involving more than one bidder. Another example is in the Philippines: the $1.4-billion Manila Light Rail Transit Line (LRT 1) Cavite Extension project had to undergo two rounds of tendering before receiving a single bid. The contract was eventually signed in 2014. The first bidding process failed due to uncertainties related to a real estate tax. In the second bidding, the government agreed to bear the cost of this real estate tax and to provide a two-year guarantee for the line’s existing structure that the concessionaire has to operate in addition to the planned expansion.

This illustrates the importance of confirming the interest of the market prior to the launch of the tendering process, and of carefully drafting tender documents to limit uncertainties that might scare investors away.

Highway route AH1. In the Philippines, the $1.2 billion Cavite–Laguna Expressway (CALAX) project, which was signed in 2015, constitutes another milestone in the growing PPP pipeline being implemented in the country.

Public-private partnership mechanisms are also being considered for road development projects in other countries in the region. For example, in Mongolia, a concession agreement was signed in 2014 for the construction of the 1,000-km Altanbulag-Ulaanbaatar-Zamiin-Uud highway project, which is also part of Asian Highway route AH3. On a pilot basis, the Lao People’s Democratic Republic is considering the upgrading of its National Highway 13 (NR13) through PPP arrangements.

### b. Railways

Compared to road projects, the number of PPPs in the rail sector is relatively limited, with less than fifty projects having reached financial close in the Asia-Pacific region since 2000 (figure 3.26). Those projects, on average, exceed $700 million, with most of them contributing to the development of urban rail systems.

### Urban rail projects

Given their high capacity and relatively low land requirements, urban rail transit systems are particularly suitable options for tackling the region’s urban mobility challenges. Unfortunately, rail projects suffer from a limited financial viability, as illustrated in figure 3.27. Capital investment costs are extensive and can rarely be recouped solely by charging users. Direct public support, often in the form of subsidies or the generation of revenue from other indirect sources, such as land value capture, are required to make these projects financially attractive to investors.

### Rail freight

Freight carriage is usually more profitable than passenger transport, and therefore more likely to attract private interest. Rail is particularly cost competitive over medium distances (300+ km) and well-suited for transporting heavy goods, such as mining products. On that basis, several countries have used PPPs to expand their rail networks for the purposes of freight.
In India, Pipavav Railway Corporation Ltd. was set up in 2000 as a joint venture of Indian Railways and the Gujarat Pipavav Port to construct, maintain and operate a 271-km broad-gauge railway line connecting the port to the main network. In Australia, the Adelaide-Darwin rail link project included the construction of a 1,420-km stretch of standard-gauge line between Alice Springs and Darwin, and the lease and maintenance of the existing 830-km line between Adelaide and Alice Springs by a private partner. Although the project failed to achieve the revenue forecast and the original operator went into receivership, the railway continued to operate after the operating lease was purchased by another company in 2010.

To encourage private investment in rolling stock, some railways have also introduced track access charges, which allow private companies to operate on public infrastructure. In 2006, for example, the Indian Ministry of Railways introduced a policy to permit private entities to undertake the movement of freight in privately owned container trains. Sixteen container operators were granted the right to provide container services through a long-term agreement.

**FIGURE 3.25 GEOGRAPHICAL DISTRIBUTION OF RAIL PUBLIC-PRIVATE PARTNERSHIP PROJECTS (1990-2014)**

**FIGURE 3.26 RAIL PUBLIC-PRIVATE PARTNERSHIP PROJECTS IN THE ESCAP REGION (2000-2014)**

**FIGURE 3.27 LIMITED FINANCIAL VIABILITY FOR RAIL PROJECTS**


Source: Adapted from IFC (2012)
**c. Ports**

Public-private partnerships have a solid track record for port infrastructure development, with the implementation of around 250 PPP port projects in 18 ESCAP countries since 1990. However, port development activities have decreased in intensity following the global financial crisis.

![Figure 3.28 Port Public-Private-Partnership Projects in the Asia-Pacific Region (2000-2014)](image)

![Figure 3.29 Geographical Distribution of Port Public-Private Partnership Projects (1990-2014)](image)

Different models of private participation in port operations have been tested around the world. The most common one is the Landlord Port Model in which the private partner leases a port terminal and is responsible for both operations and related investments (examples are wharf expansion, cranes and office buildings). However, the public authority remains in charge of common facilities, such as breakwaters, entrance channels, utilities and road and rail access to the port.46

A key characteristic of the maritime sector is that demand for services is volatile and highly sensitive to market conditions, such as world economic growth, free trade agreements and exchange rates.

The need for a cautionary approach is illustrated by the experience of the Republic of Korea, where 17 PPP port projects with a value of approximately $5.4 billion have been developed since 1994. These projects have suffered from overcapacity because of optimistic forecasts and low landing charges.46

To address those issues, the terms of port concession agreements need to be flexible to allow for changes in the timing and scale of project implementation, and to take into account possible changes in cargo throughput.47 Demand risk can also be mitigated by having shipping lines invest in the operating companies, thereby giving assurance of a minimum volume of traffic.
To avoid under- or oversupply of port infrastructures, consistent planning at the national level is required. Private sector operators might also request exclusivity rights to ensure that no competing ports will be developed within the same area during a certain period of time.

Price setting is another issue that must be considered with regard to port development. Some countries have regulated tariffs set by private port operators to avoid abuses from monopolistic positions, while others have relied on market forces. Competition may not always be the optimal price mechanism as the number of possible terminal operators within the same port area is limited by nature. For example, cargo volumes might not be enough for two or more stevedores to run a profitable business. However, in monopolies, private operators might be tempted to use their situation to overcharge users (particularly for captive cargoes that have no viable transport alternative other than the port). In Malaysia, for example, tariffs are capped in Port Klang, the largest port in the country, by the Port Klang Authority.

d. Airports

About 90 airport projects have been developed as PPPs in the Asia-Pacific region since 1990, mobilizing $21 billion, with a few deals accounting for a large proportion of these funds (the top 10 projects account for more than 60 per cent of resources mobilized). Turkey, which has been particularly active in using PPP for airport development, recently closed a deal for the third Istanbul-based airport at a total cost of $9 billion, which includes a state guarantee regarding the number of passengers and tariff levels. Another milestone in the region is the concession agreement signed in 2010 for the expansion of the Pulkovo Airport in St Petersburg, Russian Federation, with an estimated cost of $1.2 billion.

FIGURE 3.30 GEOGRAPHICAL DISTRIBUTION OF AIRPORT PUBLIC-PRIVATE PARTNERSHIP PROJECTS (1990-2014)
Other countries have also attracted private financing for their airport development. In Myanmar, a concession agreement was signed in 2014 for the operation, rehabilitation and maintenance of airport facilities at the Mandalay International airport, while a separate 30-year PPP contract was awarded for the construction a new airport to be located approximately 70 km north-east of Yangon for an estimated $1.4 billion.\(^{51}\)

New deals have also emerged in developed economies. In Japan, recent policy initiatives have aimed to expand the usage of PPPs. The Private Finance Initiative law was amended in 2011 to introduce “operating rights”, namely the right to operate “user pays” infrastructure assets that can be transferred to the private sector for a fee, while retaining public ownership of the underlying infrastructure.\(^{52}\) Airports are one of the first sectors to benefit from this approach.\(^{53}\) In 2014, the first bidding process was launched for the rights to operate and improve facilities at Sendai Airport in North-East Japan. As with the case of maritime ports, airports are well suited to the PPP model, especially as the business of operating an airport terminal matches the private sector’s strengths. For example, the private sector is able to identify and develop other sources of revenue, such as shops, hotels and car parks, which can partly fund the infrastructure investment. Foreign exchange risks are also low for this type of asset as airports generate substantial revenues in hard currency, which increases their attractiveness for international investors.
Endnotes

3. “Missing links” are defined as the absence of continuous rail infrastructure between the railway networks of neighbouring countries or the absence of continuous railway infrastructure within one country, often due to local geography.
5. IATA (2013).
8. Woetzel and others (2014).
15. See www.cgif-abmi.org/about/overview.
17. See www.mirafunds.com/our-funds/pinai#.
18. ADB (2012b).
22. For this project, the Government retains the revenues collected and pays the concessionaire an amount to cover its costs, provided that the agreed standards are met, such as the services to the timetable, cleanliness and maintenance of rolling stock and maintenance of the infrastructure. See Verougstraete and Enders (2014).
24. Although it was fully stopped in 2009, the system still costs around $0.5 - $1.2 billion per year and is expected to weigh on the national budget till 2040 (Kim, Kang-Soo (2015)).
26. A 30-year concession agreement was signed in February 2015 for Line 16, which is expected to be open by the end of 2016. See railway-technology.com (2015).
29. See http://gcrresultslearned-executive-4f9f68c6a1d84.pdf.
32. A report from McKinsey estimated that streamlined procedure – notably for land acquisition – could reduce by 15 per cent the cost of public infrastructure while accelerating public service delivery. For further details see Dobbs (2013).
34. These costs can be substantial: from 0.5 - 1.2 percent of project capital value in Australia (KPMG, 2010). Some countries have also introduced mechanisms to compensate losing bidders through a fee charged from the winning bidder thereby encouraging greater participation. See KMPG (2014).
35. ESCAP PPP Survey.
36. See http://nha.gov.pk
40. According to a recent survey from the Economist Intelligence Unit, 64 per cent of respondents in the Asia-Pacific region consider that greater use of PPPs is one of the top factors for improving urban infrastructure and services. This is the highest percentage in comparison with the world’s other regions (The Economist Intelligence Unit (2015)).
41. Adapted from IFC (2012).
42. Several other rail projects in India have followed the same approach. See www.pipavварailway.com/.
45. Kim and others (2011).
47. Verougstraete and others (2015).
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