Economic and Social Commission for Asia and the Pacific (ESCAP)

The Economic and Social Commission for Asia and the Pacific (ESCAP) is the regional development arm of the United Nations and serves as the main economic and social development centre for the United Nations in Asia and the Pacific. Its mandate is to foster cooperation between its 53 members and 9 associate members. ESCAP provides the strategic link between global and country-level programmes and issues. It supports Governments of the region in consolidating regional positions and advocates regional approaches to meeting the region’s unique socio-economic challenges in a globalizing world. The ESCAP office is located in Bangkok, Thailand.

Asian Institute of Transport Development (AITD)

The Asian Institute of Transport Development (AITD) is an independent, not-for-profit organisation devoted to non-partisan research, education and training in the area of infrastructure with special focus on the transport sector. Its principal purposes are to promote balanced, equitable and sustainable development for enhancing overall welfare of the people. Its well-defined mandate of promoting regional cooperation has been facilitated by a special consultative status with United Nations, an MoU signed with UNESCAP and a large membership from countries in south and south-east Asia. It provides substantive support to various regional initiatives – BIMSTEC, SAARC, Mekong-Ganga Cooperation, etc.
TOWARD
AN ASIAN INTEGRATED
TRANSPORT NETWORK

New York, 2007
ESCAP WORKS TOWARDS REDUCING POVERTY AND MANAGING GLOBALIZATION
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The term “ESCAP region” is used in the present document to include Afghanistan; American Samoa; Armenia; Australia; Azerbaijan; Bangladesh; Bhutan; Brunei Darussalam; Cambodia; China; Cook Islands; Democratic People’s Republic of Korea; Fiji; French Polynesia; Georgia; Guam; Hong Kong, China; India; Indonesia; Iran (Islamic Republic of); Japan; Kazakhstan; Kiribati; Kyrgyzstan; Lao People’s Democratic Republic; Macao, China; Malaysia; Maldives; Marshall Islands; Micronesia (Federated States of); Mongolia; Myanmar; Nauru; Nepal; New Caledonia; New Zealand; Niue; Northern Mariana Islands; Pakistan; Palau; Papua New Guinea; Philippines; Republic of Korea; Russian Federation; Samoa; Singapore; Solomon Islands; Sri Lanka; Tajikistan; Thailand; Timor-Leste; Tonga; Turkey; Turkmenistan; Tuvalu; Uzbekistan; Vanuatu; and Viet Nam. The term “developing ESCAP region” excludes Australia, Japan and New Zealand.

The term “Central Asia” in this publication refers to Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan. On 1 July 1997, Hong Kong became Hong Kong, China. Mention of “Hong Kong” in the text refers to a date prior to 1 July 1997. On 20 December 1999, Macao became Macao, China. Mention of “Macau” in the text refers to a date prior to 20 December 1999.

The term “billion” signifies a thousand million. Reference to “tons” indicates metric tons. Unless otherwise stated, current United States dollars have been used throughout.

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Contents

Foreword i
Preface iii

I. Introduction
1. Background and Objectives 1
2. Network Integration 8

II. Concepts and Issues
1. Globalization and Infrastructure Networks 23
2. Network Infrastructure, Development and Poverty 28
3. General Network Characteristics 33
4. Regionalization and related Issues in Developing Inter-Country Infrastructure Networks 42
5. Regionalism: Government-Level Regional Cooperation in Infrastructure 48
6. Systemic Risks Arising from Increased Regional Integration 63

III. International Experiences in Moving toward Integrated Transport Systems
1. International Experiences in Developing Intermodal Infrastructure and Services 67
2. Cross-border Facilitation and Transit for Landlocked Developing Countries 76

IV. Extending Production Systems to Inland Sites in Asia
1. International Production Systems and Connectivity of Hinterlands 87
2. Infrastructure Investment Needs and Financing 98

V. Policy Recommendations and Way Forward
1. Strategies, Programmes and Activities for Consideration 109
2. Selected Institutional Proposals for Consideration 125

Annexes
1. Review of Regional Cooperation in Transport Infrastructure Development in Asia and the Pacific 133
2. Membership of Regional and Subregional Organisations, Agreements and Programmes 156
Foreword

Globalization is essentially a ‘story’ of technological change coupled with the development and organization of interacting physical and non-physical networks designed to take advantage of the change. The economies of East and South-East Asia that have developed and used these networks have been able to participate in the fragmented international production networks that have emerged since the early 1980s and have consequently benefited much from globalization.

Such participation requires an efficient connection to an integrated, international transport network. Therefore, the ultimate objective of the development of a network that covers all of Asia and links it to the rest of the world is to spread the benefits of globalization with a view to reducing the widening income gap between coastal and inland areas, as well as between landlocked countries and those with access to the sea.

This publication assumes importance in that overall context. It defines the scope of the proposed network, lays out a broad vision for it, and brings together in one document information on the status of Asian transport networks. It is expected to form the basis for a common vision of the evolution of transport system in the Asia-Pacific region over the coming decades.

The manner in which it outlines and discusses the shape of future developments will be of particular interest to transport professionals and policy makers. Both will find the conceptual background against which the UNESCAP Secretariat identifies specific corridors, routes and intermodal facilities – with the overarching goal of developing an international integrated intermodal transport network – of special relevance.

The UNESCAP Secretariat is very grateful to the Asian Institute of Transport Development and its Chairman, Mr. K. L. Thapar for their support and professional
advice in bringing out the monograph. Without their support, a hard-copy version would not have been possible and the dissemination of its message would have been more limited. It is but the latest example of the many years of fruitful collaboration between UNESCAP and the Institute for the benefit of the countries of Asia and the Pacific.

Kim Hak-Su
Under-Secretary-General of United Nations
and Executive Secretary of UNESCAP

Bangkok, December 2006
Preface

It is now received wisdom that the current wave of globalization is not the first one. However, unlike on previous occasions, most notably in the 19th century when most of Asia was under colonial rule, managing globalization poses a bigger problem now than ever before. Democracy, popular aspirations and peoples’ needs have made the task very challenging, not the least because one of the positive externalities of globalization, namely, poverty alleviation, is also accompanied by a substantial displacement cost.

The issues are especially stark in Asia because of the large numbers of people living in poverty. One of the most important causes underpinning chronic poverty has been identified as poor access and connectivity. It is worth pointing out in this regard that while other forms of infrastructure are not taken for granted, access, connectivity, transport links, management and technology have not received the attention they deserve, especially given the importance of transport to economic activity and economic growth.

Globalization of international capital has, as we all have witnessed, accelerated economic growth rates in Asia. It has also, as a result, altered the transport geography of nations, as well as the region. The main feature of transport links during the colonial period was their orientation: they ran from the hinterland to ports as the colonies were used for feeding the factories of the colonial masters with raw materials and minerals.

But all this has now changed. The development of domestic markets arising from rapid economic growth has led to the need to develop internal transport links to support the increasing levels of economic activity. This is happening not only at the national level, but also at the regional level. Old divisions are now giving way to greater integration and we are witnessing the development of regional transport networks, which are bringing countries and peoples closer together through greater trade and tourism.
Therefore, it gives me great pleasure in bringing to the readers this highly useful volume. It brings home the central role of transport in the socio-economic development process. It also focuses on one of the most neglected aspects of transport, namely, that transport needs to be considered primarily as a network. In drawing these matters to the attention of the reader, the authors have done a yeoman service. I feel transport planners and policymakers will be better equipped for analysing the key issues after reading it.

K. L. Thapar
Chairman, AITD

New Delhi, January 2007
I.1

Background and Objectives

Background

The United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) is the regional arm of the United Nations in the Asia and the Pacific region. It is located in Bangkok, Thailand.

ESCAP activities in the field of transport are guided by global United Nations mandates, such as the Millennium Development Declaration, as well as ESCAP’s specific regional mandates, in particular, those contained in the Declaration of the Ministerial Conference on Infrastructure, held in Seoul from 16 to 17 November 2001.

The Ministerial Conference on Infrastructure adopted a Regional Action Programme for 2002-2006, that, inter alia, recommended the promotion of an Asian Integrated Transport Network. In particular, point 1.3 of the Programme (“Integrated transport network and intermodal linkages”) mandated the ESCAP Secretariat to produce two outputs in this regard:

(i) Conceptual plan for an integrated regional transport network for Asia covering all transport modes, including railway, roads, water transport, ports, freight terminals and airports.

(ii) Recommendations for the development of intermodal transport facilities at the country, subregional and regional levels.

In this regard, the ESCAP Secretariat has taken preliminary steps through a series of subregional studies, the first of which focused on North-East Asia with the second one on Central Asia currently under preparation. The studies are carried out to collect data, identify bottlenecks and pinpoint potential routes for an Asian integrated transport network.

2. This is known as the “Regional Action Programme (2002-2006) of the New Delhi Action Plan on Infrastructure Development in Asia and the Pacific” as it is a continuation of an earlier regional action programme that was adopted in the earlier Ministerial Conference on Infrastructure in New Delhi in 1996.
The current document is the first of a number of planned contributions to formulate a conceptual plan (“output 1”). The resulting choice of methodology, together with the route-specific information collected through the subregional studies will allow the definition of specific recommendations on the country, subregional and regional level (“output 2”) during the course of 2006.

The annual, legislative sessions of the Commission have elaborated these outputs further in the form of ESCAP’s biennial work programme 2004-2005. In particular, the current document was mandated to be entitled Toward an Asian Integrated Transport Network, and to be published under the Monograph Series on Managing Globalisation, due to the central role played by international integrated transport in the fragmented international production systems which are a main characteristic of the current wave of globalization of the past three decades, and especially so in Asia.

Finally, it should be noted that there are a number of related inter-continental activities that are going in parallel and in which the ESCAP Secretariat also plays a role. For example, the various activities that are promoting Euro-Asian Linkages are a case in point. In fact, the recent declaration of the Euro-Asian Conference on Transport held in St. Petersburg specifies elements of a strategy to develop an integrated Euro-Asian Transport network (the details of which are also described in this study).

Objective, Approach and Scope of the Study

Objective

The objective of this document is to carry out a comprehensive fact-finding and to lay out a broad vision of the Asian integrated transport network for consideration by the national policy-makers in Asia and the Pacific. It aims to:

(a) define the scope of the integrated transport network and the possible paths towards its realization;
(b) bring together in one document relevant information on the status of the Asian transport networks, relevant regional cooperation initiatives, policy environment, and related tools and guidelines;
(c) provide preliminary guidance on necessary strategies, policies, programs and activities, including the role of governments in the process, investment needs and financing mechanisms.

Consequently, this monograph is designed to complement and provide the necessary broad background information for route-specific studies that are carried out in parallel on a subregional basis by the ESCAP Secretariat.
Introduction

Approach

This study follows a pragmatic approach. In fact, it draws on policy-relevant work from various disciplines, including economics, social sciences, systems science, transport geography, economic geography, engineering, public policy, environmental science, and risk management. Anyone who has seen economists and engineers working with each other knows that drawing on concepts from all these disciplines in one document is a formidable challenge. This is due to a number of reasons, such as different terminologies and objectives. However, in essence, a purely “technical” or “engineering” solution to the challenge of developing an Asian integrated transport network does not appear sufficient from the national policy-makers’ point of view. Economic, business\(^5\), social, environmental and even geopolitical perspectives that can provide additional insight need to be taken into account and balanced against each other by policy makers.

However, it should be noted that the current document is addressed to national policy makers and their staff in national agencies that are working toward the realization of an Asian Integrated Transport Network. Developing such a network is an endeavour that will take many years, that requires significant financial commitments, and that is of salient interest to a wide range of stakeholders. That is why the study focuses on policy messages and takes an inter-disciplinary approach. We have tried to make the study as accessible as possible, by simplifying terminologies and by avoiding the use of quantitative and mathematical relationships.

We focus on concepts and selected issues that are illustrated through “stylized facts” and illustrative data. In this way, we provide a general picture of current trends and potential alternative future developments, both in transport infrastructure development and related regional cooperation in Asia and the Pacific. This approach is also least constrained by the significant data deficiencies for many ESCAP member countries.

While the focus is on regional issues, discussions of subregional and national specificities are also included. However, in contrast to the complementary subregional ESCAP studies mentioned earlier, this study is not a bottom-up study like many other United Nations reports that are essentially built on a compendium

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\(^5\) For example, the economic perspective provides answers to the optimal extent of the use of market-based instruments as compared to a planning approach, whereas the business perspective would take into account metrics typically used by the private sector, such as risk and private returns on investment.
of country studies together with a regional synthesis. Instead, we will highlight some essentially regional, international elements of an Asian Integrated Transport Network that are well beyond a simple sum of national elements.

Necessarily, the selection of issues and concepts is somewhat subjective, but it has been guided by the authors’ discussions with practitioners in transport cooperation in Asia over a number of years. In this regard, the authors are indebted to contributions from their colleagues in the Transport Division of ESCAP.

Finally, it should be noted that this study draws, inter alia, on the findings and material contained in the following earlier ESCAP reports or staff reports:

(i) Working paper input of the Transport and Tourism Division for the ESCAP theme study for the Commission in April 2006 entitled “Enhancing regional cooperation for infrastructure development, including that related to disaster management”, November 2005.


(iii) Reports and studies from ESCAP projects, particularly on the Asian Highway and the Trans-Asian Railway7.

(iv) Data contained in:


– ESCAP Transport and Tourism Division’s GIS system (TTDIS)

– Asian Highway database9.

– Project information sheets of the World Bank10.

Scope

The geographical scope of the study is the “ESCAP region”, which is defined as the area covered by the ESCAP member countries and associate members that are located in Asia and the Pacific (Figure 1). The ESCAP region stretches from Turkey in the West to French Polynesia in the East. 3.91 billion people or 62% of the world population live in this region11.

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8. www.unescap.org/tdw/statabs/index2.asp
Figure 1: Official map of the "ESCAP region"
The study’s focus is on land transport, including road, rail, and dry ports, and their efficient linkages to ports and airports. Ports, shipping, airports and the airline industry are only discussed to a limited extent, as they essentially form part of a global integrated transport network, in contrast to land transport, in many parts of Asia.

While all types of transport networks and their inter-linkages are being taken into account, mainly international transport aspects are discussed. In particular, the international land transport backbone network is covered in more detail. This consists of the Trans-Asian Railway and the Asian Highway networks, complemented by the routes identified in the Euro-Asian linkages projects. Most discussions are on freight transport, but needs of the passenger transport are also taken into account. The presented vision of an Asian Integrated Transport Network includes both freight and passenger transportation. It also requires integration with other physical networks, particularly in communications, as well as with non-physical networks.

While the Pacific islands will form an integral part of a future Asian integrated transport network, their situation is special due to very long distances and low overall population densities in the Pacific. To do justice to the special needs of the Pacific island countries, a separate study should be undertaken. Essentially, the present study focuses on inland sites of Asia.

It should also be noted, that while the study acknowledges the importance of geopolitical issues related to international transport, these issues are not explored further. Similarly, the possible peace dividend of further regional integration through international transport integration is not the subject of the current study that focuses on technical, social and economic aspects.12

Finally, the study explores possible developments over the next 25 years, i.e., the period from 2005 to 2030 with a mid-term point for benchmarking in 2015, the latter coinciding with the time-frame for the Millennium Development Goals of the United Nations.

Outline of the Study

The remainder of this Chapter I introduces and defines the concept of network integration.

Chapter II illustrates the most relevant concepts and issues that need to be taken into account by policy makers working toward an Asian Integrated Transport Network. Section II.1 explains the two-way relationship between infrastructure and globalization, while Section II.2 summarizes the role of infrastructure in economic development and poverty reduction. Section II.3 introduces and illustrates the concept of networks as a tool to identify major issues related to international infrastructure cooperation and integration. Section II.4 relates the concept of networks to that of “regionalization” (i.e., private sector driven regional cooperation) and uses it to identify issues in developing inter-country infrastructure networks and barriers to effective cooperation and integration. Section II.5 discusses recent trends and issues in “regionalism” (i.e., state-driven regional cooperation) to improve connectivity in Asia. Section II.6 identifies major systemic risks related to increased regional cooperation and integration.

Chapter III provides selected international examples in intermodal infrastructure and services (Section III.1), as well as cross-border facilitation and transit for landlocked developing countries (Section III.2).

Chapter IV covers extension of international production networks to inland sites in Asia (Section IV.1), and related investment needs and financing options (Section IV.2).

Chapter V spells out policy recommendations and explores the way forward. Based on the analysis in the preceding chapters, Section V.1 suggests long-term policy strategies, programmes and selected activities for regional cooperation in the area of infrastructure in Asia and the Pacific, with the ultimate goal of supporting development and promoting greater equity through better connectivity. Section V.2 lists selected suggestions for future regional cooperation (institutional regional mechanisms) that could be promoted in Asia and the Pacific in the next 25 years.

The Annexes include more detailed information about current regional and subregional cooperation in transport infrastructure development.
I.2

Network Integration

Introduction

The story of globalization is essentially one of technological change coupled with the development and organization of interacting physical and non-physical networks designed to take advantage of the change. This fact is reflected in the terminologies currently used for various economic and social activities. Today, we talk about fragmented international and regional production networks, which, in turn, are facilitated by logistics systems that are designed to ensure the efficient flow of goods, services, and information through a network that starts at the point of origin of raw materials to the point of consumption of the final product and back again (in the case of repairs, recycling or disposal). Integral components of the logistics systems are the transport networks that ensure the physical movement of goods and the communications networks that ensure the timely flow of information.

To varying degrees, customers, commercial entities and public sector agencies are connected to communications networks for various purposes, including tracking of the movement of goods and the performance of various fiscal, regulatory and security functions. In addition, there are many formal and informal networks and clusters that interact with these networks and with each other. These include sales, banking, businessmen, small and medium sized enterprises (SMEs), researchers, labour unions, non-governmental organizations (NGOs), civil society and community-based organizations (CBOs). In fact, one of today’s principal communications networks, the Internet, is providing the opportunity for interested parties to form any type of governmental, business or social network.

One of the keys to “success” of networks is their integration. This applies not only to interconnection and interoperability of physical networks in the same sector (for example, sea transport to land transport or rail transport to road transport) but also the interlinking of physical and non-physical networks (for example, international production networks and the information flows of logistics systems).

In other words, one might say that what is often termed as “globalization” is only the “tip of the iceberg” (Figure 2). Globalization itself is driven by the
integration of all kinds of networks, leading to seamless, fast and affordable connections and effectively an extended market size which allows for a higher level of international specialization.\textsuperscript{13} International production networks are the result of the integration of physical and non-physical networks.

Despite the popular use of the term “integrated networks” by national and international policy makers, experts and bureaucrats alike, there appears to be no generally accepted definition. This is particularly the case with the transport sector.\textsuperscript{14}

**Integrated Transport Networks**

The term “integrated transport” appears to have been developed separately in the freight transport community and the urban transport community. This Section discusses the various concepts related to integrated transport, the importance of integration to the development of “sustainable transport” and the significance of developing mechanisms to assist policy makers, managers of unimodal transport systems and integrated transport operators in ensuring the efficient operation of transport infrastructure and services. Having considered these concepts, the Section concludes by providing a working definition of an “integrated transport network” for the purpose of this study.

**Integrated freight transport**

In the context of freight transport, a number of related terms are used, that have a somewhat more restrictive meaning, namely, multimodal transport, intermodal transport and combined transport.

\textsuperscript{13} This relationship between efficiency, division of labour and market size has been famously documented already by Adam Smith (“That the Division of Labour is limited by the Extent of the Market”, Chapter 3 of “An Inquiry into the Nature and Causes of the Wealth of Nations”, 1776, http://www.adamsmith.org/smth/won-b1-c3.htm).

\textsuperscript{14} A search with Google on 29 November 2005 resulted in roughly 550,000 hits for “integrated transport network”. Yet, the retrieved documents only include vague indications of what is meant by the term. A comprehensive, satisfactory definition is lacking.
(a) Multimodal transport

A prominent definition of “multimodal transport” used by the United Nations Economic Commission for Europe (ECE), the European Conference of Ministers of Transport (ECMT), and the European Union’s European Commission (EC) is “the carriage of goods by two or more modes of transport”.

An early definition of “international multimodal transport” is contained in Article 1 of the United Nations Convention on International Multimodal Transport of Goods (1980): “International multimodal transport’ means the carriage of goods by at least two different modes of transport on the basis of a multimodal transport contract from a place in one country at which the goods are taken in charge by the multimodal transport operator to a place designated for delivery situated in a different country.”

(b) Intermodal transport

The concept of intermodal transport goes a step further than multimodal transport, in that it implies the use of a standardized loading unit, vehicle or “container”, that can be transferred from one mode of transport to another.

The United Nations Economic Commission for Europe (ECE), the European Conference of Ministers of Transport (ECMT), and the European Union’s European Commission (EC) define intermodal transport as follows: “The movement of goods in one and the same loading unit or road vehicle, which uses successively two or more modes of transport without handling the goods themselves in changing modes. By extension, the term ‘intermodality’ has been used to describe a system of transport whereby two or more modes of transport are used to transport the same loading unit or truck in an integrated manner, without loading or unloading, in a (door-to-door) transport chain”.

In this sense, intermodal transport is hardly a new concept. Modern intermodal transport was born with the emergence of railways. On the first railways in the 1830s, horse-drawn carriages were detached from their wheels and loaded onto flat wagons or attached to bogies, to save travellers the trouble of changing from carts to wagons. Unitization or “containerization” on railways was practised in France even before the first World War, where 2 x 2 x 2 metres wide wooden boxes were used which were called “cadres”. At the same time, an early road-rail-

sea tri-modal transport service was operated between Paris and London through Calais and Dover. In 1933, these international ventures led to the establishment of the International Container Bureau. But, of course, “containerization” in the modern sense received its overarching importance only during the 1970s and 1980s, when the ISO standardized containers were finally used widely in international trade of manufactured goods.

The underlying principle of intermodal transport is that the seamless movement of freight occurs from one mode of transport to another during its delivery. Three types of intermodal land transport movements commonly found within the ESCAP region are illustrated in Figure 3, namely, road-to-port, road-to-rail-to-port and road-to-rail-to-road.

**Figure 3: Three types of intermodal surface transport movements**

The Office of Intermodalism within the United States Department of Transportation defines intermodal transport from a business perspective and explicitly takes the network issues and competitive and environmental aspects into account:


“The concepts of ‘intermodalism’ have been applied by the freight industry for many years to provide the shippers with the most efficient movement of goods for the best value. The same concepts that work for freight have broad applications to all types of transportation. In its simplest terms, “intermodalism” covers all of the issues and activities which may affect or involve more than one mode of transportation. It has several aspects:

Connections: the convenient, rapid, efficient, and safe transfer of goods from one mode to another (including end-point pick-up and delivery) during a single journey to provide the highest quality and most comprehensive transportation service for its cost.

Choices: the provision of transportation options through the fair and healthy competition for transportation business between different modes, independently or in combination.

Coordination and Cooperation: collaboration among transportation organizations for the purpose of improving transportation services, quality, safety, and economy for all modes or combinations of modes in an environmentally sound manner.”

Due to economies of scale, the development of an intermodal transport network implies convergence of traffic at a number of “transhipment points”, such as ports, rail terminals, or dry ports, where loads are consolidated. As a result, higher load factors and higher transport frequency can be achieved, especially between terminals. Consequently, the efficiency of the emerging hub-and-spokes network mainly lies in the transhipment capabilities of the transport terminals, which explains the special focus of transport policy makers on the need for efficient intermodal “interfaces”, including ports, dry ports, inland container terminals, freight villages, etc.

(c) Combined transport

Another related term that is especially used in Europe is “combined transport”. This term is used by ECE, ECMT and the EC to include an environmental aspect into the concept of intermodalism. In essence, this boils down to the use of rail, inland waterway transport (IWT) and maritime transport for long distances, and road for the initial and/or final legs which are to be as short as possible.

In 1992, the EU officially defined “combined transport” as follows19: “.... ‘combined transport’ means the transport of goods between Member States where

the lorry, trailer, semi-trailer, with or without tractor unit, swap body or container for 20 feet or more uses the road on the initial or final leg of the journey and, on the other leg, rail or inland waterway or maritime services where the section exceeds 100 km as the crow flies and make the initial or final road transport leg of the journey:

– Between the point where the goods are loaded and the nearest suitable rail loading station for the initial leg, and between the nearest suitable rail unloading station and the point where the goods are unloaded for the final leg, or:

– Within a radius not exceeding 150 km as the crow flies from the inland waterway port or seaport of loading and unloading.”

In addition, the term “combined transport” has been used to also include social, economic and regional considerations, in addition to the environmental ones.

**Integrated passenger transport**

In the context of passenger transport, originally the concept of integrated transport was implemented mainly in urban areas, even though it has more recently been featured also on national and international scale. This Section illustrates the concept of integrated urban public transport.

A major direction of development in improving urban public transport is the integration of services provided by multiple operators often using different modes over a wide geographical area. Successful integration programmes can allow seamless travel between two points without the necessity of making separate payments for each segment of the trip and reduce the hassles of transfer at intermodal terminals or transfer points. Integration can make fare cost cheaper and journey time shorter for users as integration can improve the level of service considerably. Besides, an increase in public transport patronage can be expected following integration of public transport services.

Many cities in the region with advanced form of transportation, such as Singapore and Hong Kong, China, have successfully integrated their public transport services provided by multiple operators using different modes, such as the metro and bus systems. Introduction of smart card technologies for the collection of fare and capturing of real-time travel-related data, has made integration technically far more easier than in the past. It is understood that a number of cities in the region, which have introduced the smart card technology for their public transport systems, are now considering to apply the technology for city-wide integration of their public transport services.
Integration can occur at three levels: physical integration, operational integration, and institutional integration.

(a) **Physical integration**

Physical integration is the most basic and essential level of integration. It refers to the provision of jointly used facilities and equipment. Such facilities may include intermodal terminals, transfer points or stations, transit shelters, park-and-ride facilities, standardized identification symbols and display techniques used by all modes and services, etc. Comfort and safety of transfer passengers is vital to integration of public transport. Special passageways, escalators and moving sidewalks can greatly assist passengers in transferring between modes as well as accessing the public transport modes.

(b) **Operational integration**

Operational integration of services can be considered as the second higher level of integration. It allows matching of modes according to service requirements and rationalization/reorganization of existing services. Faster and high-capacity long-haul modes, such as metro and bus rapid transit (BRT) can be used for high-density travel corridors, while low-capacity modes, such as buses can be used as feeder to these high-capacity modes. Operational integration can also help eliminate wasteful duplication of service by competing modes and resources can be redeployed where they are better utilized. At this level, operational schedules of complementary modes are matched. Such matching of schedules can greatly reduce wait times at transfer points. Another important feature of operational integration is unification of the fare structure. A single area-wide fare structure can be established to permit users pay at the beginning of the trip and transfer freely between all modes or lines of service covered by the system.

(c) **Institutional integration**

Institutional integration refers to the creation of an organizational framework within which joint planning and operation of public transport services can be carried out by a number of independent transport operators. Such an organizational framework, however, can take different forms. There can be an organizational arrangement for working out a joint tariff and collection and distribution of jointly collected revenues. This type of arrangement works well where partners provide complementary services, do not compete but rather make end-to-end connections. The partners can go beyond this revenue collection and distribution by setting up a framework to coordinate routes and schedules. They can also establish a federated agency and delegate to it powers related to planning, joint facilities, tariffs, revenue
distribution and any other matter they consider appropriate. However, when multiple operators are to share common infrastructure facilities to run their services, such as BRT services over a dedicated corridor, a much stronger form of institutional integration, is necessary.

Integration and sustainability

Apart from facilitating global production and personal mobility, integrated transport networks support the concept of sustainable transport development – in other words, transport systems that are economically efficient, environmentally sound, safe, secure and socially inclusive.

Over the last around three decades, a number of forces have been set in motion that are directed towards sustainable transport. Global conferences have contributed towards increasing awareness and requiring action in the area of sustainable transport. It may also be pointed out that increased customer orientation, social responsibility, localization, including devolution, decentralization and urbanization, and awareness of the health and environmental impact of transport tend to be more of a consequence than a cause of globalization.

The following four features highlight the linkage between integrated transport networks and sustainable transport development.

Firstly, technological changes coupled with deregulation and liberalization in the transport and communications sectors have made a significant contribution towards a rapid growth in the movement of goods and people. This growth has, in turn, placed considerable pressures on unimodal transport infrastructure systems and their associated services as well as the modal interfaces between them. The clearest illustrations of these pressures are general road traffic congestion, congested road access to seaports and airports, ships waiting for berths outside seaports and air traffic congestion. To date, the solution to congestion problems has been to build more infrastructures by expanding existing unimodal systems, especially roads and highways. Given, however, limited land resources and financial constraints, as well as the health and environmental impacts of road transport, fundamental questions are being asked concerning “business-as-usual” unimodal transport policies. Integrated transport policies that draw upon the potential benefits of rail transport and mass transit schemes are being particularly considered.

Secondly, there has been a shift away from meeting output and production targets and towards meeting the needs of the customers. Addressing the needs of the customers, whether they be intermediate producers or final consumers, requires the provision of efficient and reliable transport services that provide value for
money. The search for increased efficiency, reliability and cost effectiveness demands not only improvements in existing systems, but also a search for alternative means of providing final outcomes to customers. These alternatives may include increased utilization of railways and inland container depots as part of an integrated freight transport system.

Thirdly, there has been an increased recognition of, and commitment to, social obligation with a specific focus on addressing the needs of the poor and marginalized communities. Physical access to economic and social opportunities is one of the contributions that transport can make towards this commitment: efficient, reliable and cost-effective integrated transport systems provide the means to fulfil this commitment.

Fourthly, there has been increased general awareness of the impact of economic activity on health and environment, and a more specific awareness of the significant contribution that transport is making to deteriorating health, including traffic accidents, non-renewable energy consumption, and various forms of pollution. Integrated transport offers the opportunity to considerably reduce these negative impacts of transport through, for example, the utilization of more energy-efficient and less polluting forms of transport.

**Integration and efficiency**

Unlike a good novel, a luxury cruise, amateur sailing or an “orient express”, transport is mainly concerned with “getting there”, not the journey. Stated alternatively, demand for transport is in general a derived demand: it is not required for its “our sake”. It is demanded because of the economic and social opportunities at each end of the trip.

Consequently, while integrated transport incorporates different transport modes, the transfer between modes and the integration with other physical and non-physical networks, there is a need to consider transport outcomes as distinct from specific modal outputs. This consideration is in line with the above observation that there has been a shift away from meeting output and production targets and towards meeting the needs of customers.

Transport and other associated networks add value by creating time and place utility. In marketing terms, the essence of these two utilities is getting the “right

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20. Broadly defined as being the satisfaction of needs and wants of consumers and producers.
items” needed for consumption and production to the “right place”, at the “right time”, in the “right condition” at the “right cost”. In other words, producers are looking for transport services that are frequent, reliable, punctual, and secure and that offer tracking services, competitive transit times and costs, regardless of the mode of transport or route taken to move the goods between places. Passengers are also looking towards transport services with similar qualities as well as dimensions, such as comfort, ambience, and ease of transfer within and between modes.

The key element in these qualities is that it is a transport service that is being sought as an outcome, not a trip on a ship, train, boat or plane. The focus on transport services calls for optimization of the efficiency of the whole transport system, not just its individual components, such as roads or ports. It allows for choice between transport modes, service providers, their scheduled or other services and a policy choice taking into account environmental and social impacts.

Efficiency measures of an integrated transport network relate resource inputs to intermediate or final outputs. They measure system performance and progress in terms of network integration.

On the one hand, efficiency measures measure progress in the performance of the transport system which is, of course, the ultimate objective of an integrated transport network. In particular, network integration extends the “effective” market size and thereby provides new opportunities for division of labour taking advantage of economies of scale. On the other hand, efficiency measures are actually good measures of transport network integration in its various dimensions.

Like other networks, transport networks consist of links and nodes. Therefore, in principle, any inefficiencies in, or missing links or nodes can affect the overall efficiency of the network (see Chapter II for a detailed discussion). Some important network effects need to be taken into account at that level when assessing the overall system efficiency and the risks of network “failure”. However, much of the dynamics of the system can be assessed by separately looking at efficiencies at higher, more aggregated levels (either for the national level or a particular subnetwork):

- Physical transport network efficiency: The efficiency of the physical transport network as a whole is determined by the efficiencies of the

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22. Inframarginal economics, essentially a formalized resurrection Adam Smith’s concepts, see also footnote 13.
various individual transport modes, their intermodal integration and the modal choices actually available.

- **Service delivery efficiency**: The efficiency of service delivery through any given physical network system will depend on organizational and other factors.

- **Efficiencies in environmental and social terms**: Choices made at the physical infrastructure and the organizational levels lead to a range of environmental and social impacts. Transport system efficiency in environmental and social terms can be measured in various ways, including by the concepts of eco-efficiency and allocative efficiencies.

Total integrated transport network efficiency is a composite indicator determined by efficiencies at the three levels mentioned above.

To date, unimodal efficiencies are often expressed as technical efficiency (or technical productivity) which refers to the physical relation between resources inputs and transport outcomes.

However, technical efficiency cannot directly compare alternative interventions, where one intervention produces the same (or better) transport outcomes with less (or more) of one resource and more of another. Therefore, total physical transport network efficiency as well as service delivery efficiency is typically expressed in terms of productive efficiency (or economic productivity). Productive efficiency refers to the maximization of transport outcome for a given cost, or the minimisation of cost for a given outcome. The use of productive efficiency measures enables the assessment of the relative value for money of interventions with directly comparable outcomes23.

Productive efficiency cannot address the impact of reallocating resources at a broader level, e.g., from urban to rural areas, because the transport outcomes are incommensurate. The concept of allocative efficiency also takes account of how the transport outcomes are distributed among beneficiaries. Allocative efficiency is achieved when resources are allocated so as to maximise the welfare of the “community”. The concept of allocative efficiency is used for measuring the achievement of environmental and social objectives as well as the total network efficiency from the perspective of various users (‘consumers’).

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23. It should be noted, however, that, to date, economic productivity measures unfortunately only exist for few ESCAP member countries (see, in particular, the 60-Industry Database of the Groningen Growth and Development Centre).
Introduction

As a result, a set of performance and efficiency indicators are needed for monitoring progress towards an Asian Integrated Transport Network. Yet, much of these data are not regularly collected by many ESCAP members and associate countries, and where they are collected they are not systematically shared among policy makers in the region. It is, therefore, of paramount importance to define a minimum set of efficiency indicators that should be shared and monitored by Asian policy makers.

Integrated transport

Integrated intermodal transport has been a major policy issue of concern to the governments in Europe and North America for the past two decades. More recently, this approach has also been adopted by an increasing number of countries in Asia and the Pacific region.

A current definition of integrated transport used by a local government in the UK is: “The planning, provision and operation of different modes of transport in such a way that journeys can be made as efficiently as possible and minimising the need to use the private car.”24. This is somewhat close to a combination of the definitions of intermodal transport and combined transport.

In the context of the transport system as a whole, including both freight and passenger transport, the UK Commission for Integrated Transport (CfIT) “takes a broad view of integrated transport policy and its interface with wider government objectives for economic prosperity, environmental protection, health and social inclusion. Physical integration - the principle of ensuring transport modes operate in conjunction with one another, is just one vital element of the bigger transport picture.”25 This view of integrated transport policy by CfIT, an independent advisory body to the UK government, emphasizes an ambitious combination of the concepts of intermodal transport and combined transport both for freight and passenger transport.

Similarly, broad views of integrated transport networks have been formalized by other OECD governments. Examples include the European Union’s Europe 2010 Vision, as well as the United States’ Intermodal Surface Transport Efficiency Act of 1991 and its follow-up initiatives.

26. Source: Ministry of Railways, China.
A number of developing countries in Asia and the Pacific have adopted similar approaches in recent years. A major difference is in (a) the stronger emphasis on promoting the adoption of new technologies, international standards and the building of national research and operations capacities; and (b) the promotion of market-oriented management methods.

For example, the Chinese Tenth Five Year Plan and 2015 Long-term Programs of the Railway Scientific and Technological Development specifies objectives and key tasks for the major role that Chinese railways are envisaged to play in the development of a national integrated transport system. It emphasizes the building of strategic research and development capacities in high-speed freight and passenger railways, including rolling stock (“technology self-reliance”). It covers the construction of new networks, improvement of efficiencies, development of IT and new management methods, achievement of social and safety objectives, as well as addressing the environmental protection issues.

The new approach suggested in the case of India explicitly mentions the aim of following the Chinese example and foresees the development and integration of dedicated rail corridors, provision of multimodal service and high-speed services for freight and passengers, integration with urban transport systems, and highlights the major environmental benefits from the pursuit of a national integrated transport system.27

The concept of intermodal connectivity has been promoted in Asia and the Pacific, through ESCAP’s Asian Land Transport Infrastructure Development project since the early 1990s.

More recently, one of the outcomes of the “Seoul Declaration on Infrastructure Development in Asia and the Pacific” of November 2001 was the agreement by the Ministers that they considered it essential that “Governments take a leading role in more effectively integrating the different forms of transport in order to develop sustainable intermodal transport systems that deliver efficient domestic transport services and at the same time provide access to international markets and wider hinterlands”.

Following this line of thought, we suggest to adopt the following working definition of an “integrated transport network” for the purpose of this study:

**Working definition:** An “integrated transport network” is a network:

(a) where a coordinated transport service is provided through the network by multiple operators using one or multiple modes that allows efficient transfer between modes and charges a single tariff (i.e., the network shows physical, service, scheduling and tariff integration); and

(b) that is designed to reflect a broad view of transport policy that also takes into account wider government objectives for economic prosperity, environmental protection, health and social inclusion (so-called “sustainability elements”).

The meaning and implications of an integrated transport network, as well as ways to achieve it in the ESCAP region are explored in the following chapters. In the international context, the availability of choice among alternative competing international transport routes is of key importance. Increased choice is a common consequence of network integration. Taking a perspective focussed on international routes, this leads to ESCAP’s “transport vision statement” of an integrated transport network in Asia and the Pacific²⁸.

**Transport vision statement:** “Integrated, intermodal international transport and transport logistics system that provides a choice of international alternative competing routes, thus reducing costs and improving quality of services. Such a system will have the capacity to change both the destination and the delivery path for goods already en-route.”

²⁸. The authors are grateful to Vladimir N. Timofeev for the transport vision statement.
II.1

Globalization and Infrastructure Networks

Domestic and international infrastructure connectivity in Asia and the Pacific has increased to unprecedented levels over the past two decades, a period of time that corresponds to the latest wave of globalization. This is no coincidence, as advances in network infrastructures, such as transport and communications, have always fueled waves of globalization in the past. Equally, globalization has been a dominant force that has shaped development trends in Asia. This introductory chapter makes a number of observations on the relationship between globalization and infrastructure that set the background for the following chapters.

The East Asian Miracle

In Asia, the process of globalization gathered momentum in the mid-1980s, when a number of countries of the region started to lower their barriers to trade and investment. This was particularly the case in the newly industrializing economies\(^{29}\) (NIEs) and ASEAN \(^{30}\), which introduced outward-looking structural reform policies that moved away from import substitution and towards export-oriented production. These policies included liberalization of trade and foreign direct investment (FDI) as well as deregulation of domestic economic activities, the aim being to stimulate economic growth.

The impact of these policies is often referred to as the ‘East Asian Miracle’. FDI inflows increased twelve-fold and East Asian exports increased five-fold between 1985 and the ‘East Asian Crisis’ in 1997. Annual economic growth in these economies during this period exceeded that of most other economies in the world.

Contribution of Networks to Globalization

*Physical networks: Transport, IT and communications*

Major infrastructures, such as roads, railways, ports, airports, canals, telephone lines, the Internet, mobile networks, pipelines, and electricity grids, form part of

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29. Hong Kong, China; Republic of Korea; Singapore; and Taiwan, Province of China.
30. Indonesia, Malaysia, Philippines and Thailand.
a physical network. These networks have played a significant role in the globalization process.

As in the past, the principal driving forces behind the current phase of globalization are lower barriers to trade and investment, lower transport costs, and lower information technology costs. The noticeable reduction in the transportation and communication costs has facilitated the division of the productive process, allowing participation by a larger number of geographical locations according to the advantages that each one contributes to the value added chain. This fact has broadened the opportunities, so the individual economies can participate more actively in the international production networks administered by large multinational companies.

It should be noted that there have always been strong complementary linkages between transport and communications. Since both are two-way networks, they exhibit similar characteristics, including significant externalities, thus reinforcing themselves as also each other in the process.

This is somewhat different from the typical one-way energy and water networks, and maybe this is one of the reasons why these networks have not been as prominent in the discussion of globalization as transport and communications.

**Non-physical networks**

The physical networks outlined above are not only interlinked in varying degrees, but they are also closely related to many non-physical networks, such as formal and informal communication channels within and between organizations. These non-physical networks are often of a commercial or social nature. Combinations of these physical and non-physical networks form more complex networks, such as the international production networks.

This simple insight can go a long way in clarifying and offering solutions to major infrastructure issues. In short, there is a clear need for various non-

31. Hardware, software and org(ani)z(tional)ware.
33. For example, Gruebler (Global Change, Cambridge University Press, 1993) shows that transport and communications volumes in France have been growing at the same, almost constant long-run rate for the past 200 years.
34. Note that one may look at networks in time and/or space. This paper discusses paths both in time (e.g., scenarios for strategy building), and in space (e.g., geographical paths from A to B through a network).
physical networks to strengthen and interlink the physical networks that could be argued to be the ‘backbone infrastructure’ of globalization.

**Mixed networks and regionalization**

Mixed networks are systems that consist of strongly interlinked physical and non-physical networks. Examples of mixed networks, such as logistics and regional production networks have created a largely market-driven form of regional economic cooperation that is commonly referred to as ‘regionalization’. Mixed networks are a major characteristic of the latest wave of globalization.

**(a) Logistics**

In parallel with the discussion on ‘globalization’, considerable attention has been paid to concepts, such as ‘logistics management’, and ‘supply threads’. These concepts are about the efficient flow of goods, services and information from the point of origin of raw materials to the point of consumption of the final product and in some cases return for repairs or maintenance, disposal and recycling, including all the intermediate planning and related decisions.

Prior to the relatively recent changes in transport and information technology, today’s networks and chains consisted of unconnected subnetworks and subchains. The recent developments in transport and information technology have facilitated the linking together of these subnetworks and subchains. As a result, information can be passed from point-of-sale through the network or chain to factories. Policies and inputs themselves are bound together in networks, whether they be social, operational, facilitatory or physical networks which, in turn, interact or are linked together to form the overall chain or network. These developments in logistics are at the heart of the ‘division of the productive process’ and ‘regional production networks’, which are the topic of the next subsection (see also Section IV.1).

**(b) FDI and regional production networks (RPN)**

One of the major features of FDI was that the multinational corporations active in the region established factories (in different countries) specializing in the production of specific components of finished goods. As a result, regional production networks (RPNs) were formed which have been a major reason for increased intra-industry trade in the region.

An example of one of these networks is the automobile industry network of South East Asia. In the Toyota supply chain, Thailand focuses on the production of diesel engines, Malaysia on steering gear, Indonesia on engine blocks and the
The interregional relationship and dependency among countries have grown. This process of increased specialization, interdependence, and integration, which is at the heart of globalization, has reinforced a largely market-driven form of regional economic cooperation, or ‘regionalization’.

**Regionalism: Government networks to reduce the risk of marginalization**

In practice, it has become increasingly apparent that ‘regionalization’ needs to be complemented with a similar collaboration among governments, that is often referred to as ‘regionalism’, in order to address the many social, economic and political inter-country challenges.

In particular, there is a need for policy intervention in the land transport sector. In this sector, deep concerns have been voiced that certain regions of countries, landlocked countries, and hinterlands located far away from the centres actively participating in regional production networks, will be marginalized.

Consequently, it is also recognized that ‘the important question for each nation is how to make the best of the advantages and mitigate the negative impacts of the process’.

In this respect, there is broad agreement that ‘in a period of growing global economic interdependence, regional cooperation offers Asia-Pacific countries an effective vehicle for promoting sustainable development.’

Whether one adopts a general approach that improved infrastructure and related services facilitate economic growth, an approach that links infrastructure and globalization to growth, or draws upon the experience related to policies adopted by the more dynamic Asian economies, it is generally agreed that regional economic

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35. It should be noted that, of course, almost all commercially-driven forms of regionalization are complemented by some form of regional government cooperation. For example, some might argue that the “Toyota supply chain” was realized through an ASEAN industrial complementation scheme and AFTA tariff liberalization which were both commercially and government-driven. A similar case could be argued for the Singapore – Johor (Malaysia) – Riau (Indonesia) Growth Triangle (SIJORI) where the three regions have pooled their human and natural resources in order to attract new investors.


cooperation in infrastructure offers a way forward for countries of the region to address such issues as market access, economic growth, marginalization and poverty reduction.

Marginalization has been one of the factors contributing to a large number of bilateral and multilateral agreements, organizations and programmes, particularly at the subregional level. Such a ‘proliferation’ of heterogeneous agreements calls for increased importance being placed upon regional coordination and harmonization. ‘Facilitating’ such ‘concerted action’\(^{39}\) of the governments of Asia and the Pacific and the “strengthening of economic relations of these areas [Asia and the Pacific] both among themselves and with other countries of the world”\(^{39}\) has been a major part of the mandate of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) since 1947.

**Conclusion**

The following four major conclusions gleaned from the role of infrastructure in the globalization process will guide the discussions in the succeeding chapters.

(i) The network concept is helpful in understanding the role of infrastructures in the current phase of globalization. Physical networks in transport and communications are closely interlinked with each other and also with the non-physical networks, combinations of which form more complex networks, such as the international production networks.

(ii) The physical networks should be analyzed together with non-physical networks. The commercially-driven form of regionalization (and RPNs) needs to be complemented with regional governmental collaboration, in order to address the many inter-country challenges.

(iii) The landlocked countries, certain regions of countries, hinterlands located far away from the centres actively participating in the regional production process, face the risk of marginalization.

(iv) There has been a proliferation of overlapping bilateral and multilateral infrastructure-related agreements, which highlights the increased importance of coordination and harmonization at the regional level.

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II.2

Network Infrastructure, Development and Poverty

Productivity and Long-run Growth

It is an indisputable fact that infrastructure development and economic development have always been closely intertwined. While a certain rate of infrastructure development is clearly needed to ‘support’ a particular rate of economic development, it has remained controversial as to whether an infrastructure supply-oriented approach can actually accelerate development. The confusion has largely arisen from the fact that infrastructure per se is almost without exception a necessary but not sufficient condition for development.

Most of the East Asian economies, that have been growing rapidly in recent decades, have followed a supply-driven approach with massive investments in infrastructure well ahead of demand\(^40\). However, these correlations do not necessarily imply a causality. Whether infrastructure supply-oriented policies actually foster long-run growth appears to depend on many factors, including the development stage of a country, the status of industries that rely most heavily on infrastructure and the extent to which non-physical supporting networks exist.

Van Duijin and others\(^41\) have documented how political and academic attention on the one hand and actual investments in infrastructure on the other hand have changed like waves over the decades. In the case of Europe and the U.S., the most recent wave of massive infrastructure investments particularly in highways and the maritime sector took place in the 1950s, 1960s and early 1970s, until huge overcapacities became obvious. Not surprisingly, those years have seen interesting literature on the role of infrastructure in economic development (see, in particular, Nurkse’s ‘Vicious Circles of Poverty’\(^42\), Hirschmann’s ‘Social Overhead Capital’\(^43\) and the concepts of ‘balanced and unbalanced growth’).

\(^{40}\) See also ADB’s earlier paper comparing investment in infrastructure in Japan and the Republic of Korea over the past century.


**Poverty Reduction**

*Vicious circles of infrastructure access*

Since the mid-1990s, development banks and donors have increasingly focussed their attention on direct interventions for poverty reduction, as the ‘trickle-down’ effect of infrastructure development alone was considered insufficient in terms of results.

Despite some popular scepticism, there are obvious direct poverty reduction impacts of infrastructure development. For example, Figure 4 illustrates a typical vicious circle of lack of access to transport facilities and services, which can be turned into a virtuous cycle through infrastructure development. In turn, this vicious circle implies that even direct poverty reduction intervention will be unsustainable in the long-run, if it is not supported by sufficient infrastructure development.

**Figure 4: Vicious circle of lack of access to transport facilities and services**

Sometimes the vicious circle of lack of access depicted in Figure 4 is taken further to include information flows, networks and other related factors. Since this amounts to taking the concept of international logistics to the local level, this is sometimes referred to as domestic logistics. To date, surprisingly, few activities of governments and international organizations have promoted integrated transport and logistics at the domestic level.
Millenium Development Goals

The principal international mandate governing activities at the national, subregional, regional and global levels is the Millenium Declaration and the associated Millenium Development Goals (MDGs). Under the goals, United Nations’ member states have pledged, by 2015, to: eradicate extreme poverty and hunger; achieve universal primary education; promote gender equality and empower women; reduce child mortality; improve maternal health; combat HIV/AIDS; ensure environmental sustainability; and to develop a global partnership. Surprisingly, there is little, if any, mention of how development of infrastructure facilities and services can contribute to achieving these goals. Consequently, there is a danger that the role of infrastructure interventions in poverty reduction may be neglected by omission.

In August 2002, however, the United Kingdom’s Department for International Development (DFID) published a paper entitled “Transport’s Role in Achieving the Millenium Development Goals”. This paper went through each of the goals and highlighted the contribution that transport could make to its achievement. In conclusion, it effectively inverted the question ‘what is the contribution of transport to achievement of the MDGs?’ and asked ‘can the MDGs be achieved without transport interventions?’ The clear answer to this question is ‘No’. A similar argument could be advanced in respect of information flows, including aspects of freedom of information as well as the underlying tools or networks for information exchange.

Sectoral Issues

(a) Transport

There is ample evidence that efficient transport infrastructure facilities and services are a key pre-requisite for sustainable economic growth and poverty reduction. The efficiency of the transport system depends on many factors, including technology and institutional change, regulation, business environment, human resources, and even geographical factors. Major efficiency improvements in international transport can be traced back to scale economies in containerization and seaports, as well as to applications of modern information and communication technologies (ICT).

44. Ref. Millenium Declaration.
Inter-country land transport has received less attention than maritime transport in Asia and the Pacific. For various historical reasons, land transport networks in countries with maritime coastlines are oriented towards their major seaports. This lack of connectivity between land transport networks of neighboring countries in Asia contrasts markedly with the situation in Europe and other parts of the world. It is also a serious disadvantage for landlocked countries. Better connectivity leading to lower transport costs would enhance export competitiveness and reduce the costs of imports.

(b) Information and Communication Technologies (ICT)

There is evidence that the application of modern ICT leads to significant productivity gains. However, these gains take some time to emerge. As with other infrastructure in the past, productivity gains usually emerge only after a critical level of market penetration for the infrastructure has been reached. This is a serious predicament for the least developed countries (LDCs) as they cannot yet afford the high levels of ICT usage that are needed to significantly gain from ICTs as well as to participate in the modern international production networks.

Secondary regional Asian Internet hubs have emerged in Japan; the Republic of Korea; Hong Kong, China; Singapore; and Australia to complement the larger, global hubs in Europe and North America. Developing countries, least developed countries and most transition economies can only benefit in such a hub-and-spoke system through bilateral and regional cooperation. Trends to such cooperation have become increasingly visible in the region. For example, Thailand has expanded data and communication services into Cambodia and Lao People’s Democratic Republic, through sharing agreements. Furthermore, there are regional efforts to create a regional high-capacity Internet backbone (both fixed and satellite-based) for Asia.

Issues of international transit and interconnection in communications are very similar to those in transport and pose a serious challenge to landlocked countries. It should also be noted that despite the prominent role of the private sector in ICT infrastructure, cross-border connections and issues (e.g., international interconnection pricing and standards) are a game of governments rather than that of the private sector in Asia, which is similar to the situation obtaining in cross-border transport.

(c) Energy

The noticeable reduction in transport and communications cost has opened up the possibility for a larger number of geographical locations to fully participate
in the international production process. Yet, the availability of cheap and reliable energy at specific locations has been a crucial factor in attracting FDI to specific locations, i.e., energy availability has a ‘pull effect’. In addition, energy is a fundamental input to the transport and communications sectors. Consequently, its availability and cost will influence the contribution that these sectors make to the globalization process and economic development in general.

**Conclusion**

There are following five major conclusions from the role of infrastructure in development process, long-run growth and poverty alleviation that need to be taken into account in designing strategies and programmes:

(i) The East Asian model of long-run infrastructure supply-oriented development has proven highly successful under certain circumstances, particularly where non-physical supporting networks were strong.

(ii) Direct poverty reduction interventions will be unsustainable in the long-run, if they are not supported by sufficient infrastructure development. This simple fact appears to have received insufficient attention of governments in recent years.

(iii) A lack of connectivity between land transport networks of neighboring countries is a serious disadvantage for landlocked countries in Asia.

(iv) The least developed countries are trapped in a vicious circle, as they can neither afford ICT infrastructure to the extent needed for significant economic gains nor can they participate in the modern international production networks.

(v) Due to the Internet’s hub-and-spoke network system, most developing countries and transition economies can only benefit from it through bilateral and regional cooperation.
II.3
General Network Characteristics

One of the principal themes highlighted in this paper is the concept of networks. This Chapter considers further the concept of networks and discusses some of the general characteristics of infrastructure networks that influence or condition their integration as well as negotiations of regional and subregional agreements. In doing so, it provides the background for formulating strategies, programmes and activities for network infrastructures.

Physical Networks

Links and nodes

The infrastructure sectors being considered within the context of this paper, including transport, ICT and energy, are all networks, consisting of links and nodes. A network is a system, the performance of which depends, to varying degrees, on the performance of individual links and nodes. One of the salient features of a network is that any inefficiencies, or missing links or nodes can affect the overall efficiency of the network.

Depending on the characteristics of the network, ‘failure’ of ‘critical’ links or nodes can shut down the whole network (‘Bracers effect’). The resulting ‘system’ failure is discussed under reliability theory. An example of what happens is that of the nuclear meltdown at the Three Mile Island nuclear reactor, which occurred due to the failure of a single component.

‘Closure’ of one link or node does not necessarily lead to failure, but it reduces choice. In the context of negotiation of issues related to cross-border land transportation, for example, closure of a link can substantially reduce bargaining power.

46. Similarly, networks of water pipelines are increasingly emerging as a major issue for the coming decades. However, they are not included in this paper’s discussions.
47. Cut the bracers and the trousers fall down...
48. The “(in)famous” nuclear accident at the Three Mile Island light-water reactor occurred in Middletown, Pennsylvania, on 28 March 1979. “A simple interpretation of the cause of the accident is that it was initiated by an equipment failure, a valve that failed to close, compounded by several operator errors” (see http://www.magma.ca/~jalrober/Chapter8e.htm.)
It should be further noted that, while the term ‘network’ in economics was originally used in ‘network externalities’ to refer to benefits that accrue from connections of physical networks, such as telephones or railway lines, the term was extended to include value created by networks of users sharing compatible products and standards\textsuperscript{49}. In fact, as long as there are significant complementarities between types of goods in a non-network industry, network externalities will play an important role. For example, the sales of icecream will influence the price and sales of waffles.

**Linking subnetworks together**

The linking together of two formerly unconnected or weakly connected national or international subnetworks is the principal objective of regional cooperation in infrastructure (Figure 5). This subsection briefly discusses the interconnectivity and interoperability issues associated with the establishment of such linkages.

**Figure 5: Linking two subnetworks\textsuperscript{50}**

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\( (a) \) **Interconnectivity**

The term *interconnectivity* simply refers to whether subnetworks are actually connected. For example, different rail gauges require special technical solutions to allow physical interconnection.

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In this context, the difference between *connectivity* and *accessibility* should be noted. While connectivity is an attribute of a network and measures the minimum number of links needed to reach all nodes from all other nodes, accessibility is an attribute of a node and measures the minimum number of links needed to reach all or certain nodes from a specific node.

Interconnection is critical for efficient operation of many network industries, as a relatively small investment in interconnecting two networks can quickly create a much more valuable network (see Metcalfe’s Law\(^51\)). From the users’ perspective, interconnection increases the variety of services from which they can choose. From the government’s perspective, it is important to assess the economic and social incentives for rival networks to interconnect so as to expand the range of services\(^52\).

The transportation industry has elaborate arrangements to convey shipments across non-overlapping networks. Even in North America, in the early days, it involved loading and unloading of freight when lines used different track gauges (a situation similar to that in the Asia-Pacific region today). After standardization of track and equipment, interlining agreements allowed rolling stock to travel over contiguous rail networks without transferring shipments.

Similar to the regional situation of fragmented regional electricity networks in Asia today, in the early days of the US electricity power industry, two standards of power transmission coexisted on disjoint networks\(^52\). While the direct current standard was adopted in urban distribution systems of the US\(^53\), the remainder used the alternating current method that enjoyed a cost advantage in serving the rural and outlying areas. Interconnection between the two systems awaited the development of the rotary converter which gave power plants expanded access to users and also added to the ranks of generators that could deliver power to the system\(^54\).

(b) *Interoperability*

The example of the rotary converter in the previous paragraph highlights the fact that interoperability may have to be ensured before some networks can be interconnected. On the other hand, even in cases where networks have been

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51. The so-called “Metcalf’s Law” states that the value of many networks is directly proportional to the square of the number of users
53. accounting for about two-thirds of installed generating capacity
interconnected, they may still lack interoperability. For example, railway networks that are interconnected and use the same gauge, may still not be interoperable, for example, due to differences in electricity supply or the signaling systems. This is the case even today in Europe for some neighbouring countries, where railway locomotives have to be exchanged at the border.

In the US, the trucking and rail industries have had to make themselves interoperable, in order to offer shippers end-to-end services. Under the ‘piggyback system’, tractor trailers are loaded aboard flatbed rail cars for the rail portion of their journey, thus ensuring interoperability between road and rail.

Containers are another good example where standards (ISO standards) have supported interoperability of networks of different transport modes and, consequently, have led to large productivity gains.

Technical considerations of interconnectivity and interoperability as illustrated here provide a useful perspective to identify issues in regional cooperation and integration in maintaining and developing inter-country infrastructure.

**Linking more than two systems (e.g., transit issues)**

When more than two systems are linked, more complex issues arise. In the case of transport and communications, probably the most important of these are transit issues. Examples are: transit through a third country (road, rail, water, air, communication lines, etc.) and simple right-of-way issues within a country (different communications network providers, fiber optic cables along railway lines, more than one railway company, etc.).

International transit issues have been perceived as highly complex matters, inter alia, due to the complicated distribution of costs and benefits derived from transit. In particular, international negotiations of transit fees, quotas and rights for land transport, air transport, oil/gas pipelines, have often proved long and difficult.

In an economic sense, the issue of transit fees depends on the marginal cost (to the ‘producer’55) as well as the willingness to pay (demand) which depends on alternative choices available in the network and their particular characteristics. By definition, sufficient choice for landlocked countries through agreements with all their neighbours is costly. However, most government policies have been geared to maximize choice, in order to minimize the economic and political risks.

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55. This means that the transit country is also a factor.
Key links and nodes that can limit or reduce possibilities of choice depend on the type of network. Figure 6 illustrates four types of network structures that typically arise in transport and communications. At any point in time, the optimal type of network depends on the specific economics of the links and nodes and government regulations. For example, international commercial air transport and maritime transport (ports) are organized along the hub-and-spoke system. However, the competing budget airlines typically follow the mesh structure. In other words, the hub-and-spoke system is not necessarily the optimal outcome for air transport in general. In fact, the structure which is optimal may change over time. A well documented example is that of the US Internet which changed from a linear set-up in the early 1970s, to a mesh network from the mid-1970s to the early 1990s, and to a hub-and-spoke system ever since due to the Internet’s commercialization.

In the hub-and-spoke system, interconnection pricing is an important issue due to the powerful position of the ‘owner’ of the hub. A typical example of the tree network is the land transport network of a country with a large hinterland but a small coastline where the major cities and most of the countries’ economic activities are concentrated.

Quality and capacity

In practice, it is necessary but not sufficient to ensure interconnectivity and interoperability. As illustrated by Figure 5, if we make changes in our network (e.g., by interconnecting to networks or more users), resulting ‘traffic’ flows will change. And some links will have to be of higher quality and sufficient capacity in order to sustain such changes. While it seems very clear in the case of transport, it similarly applies to all other physical networks. For example, in the case of the Internet, providing access to more users without upgrading the Internet backbone (i.e., the salient, high capacity links) would only lead to degrading quality and decreasing utility to all users.

Figure 6: Types of network topology

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In order to characterize networks in terms of their interconnectivity, interoperability and quality, economists refer to the concept of the ‘strength of the network’. This includes network characteristics of interconnectivity, interoperability and quality\textsuperscript{57}, together with current network size and expectations of future size. These characteristics determine the utility a user derives from the network.

\textit{One-way vs. two-way networks}

There is a clear distinction between two-way networks (e.g., telephones, railroads, the Internet) and one-way networks (e.g., ATMs, television, distribution and service networks). In the former case, additional customers usually yield direct externalities to other customers; in the latter case, the externalities are indirect, through increases in the number of varieties (and lower prices) of components. Most industries involve vertically related components and thus are conceptually similar to one-way networks.

\textit{From paths to corridors}

A \textit{path} is something like a route on a map. In the network terminology introduced above, it is a set of consecutive links involving different nodes.

Particularly in the case of transportation, corridors rather than paths are the focus of attention for development. Corridors may include only one path/route (e.g., when network density is very low) or many alternative paths/routes, sometimes even including small distribution networks.

\textit{Non-physical Networks}

All the classifications and issues of physical networks that we have just discussed also apply to non-physical networks. In fact, many of these non-physical networks are so closely interrelated to physical networks that it is more instructive to analyze them together.

There are many different types of non-physical networks, including social, economic, political/regulatory, information, knowledge, and environmental networks. For example, regional production networks would not have emerged without similar development of a variety of non-physical networks.

\textit{Linkages}

In addition to classifying network linkages relating to physical or non-physical networks, one should look at linkages between networks in the ‘same’ traditional

\textsuperscript{57} To be precise, the three network characteristics are actually compatibility, accessibility and quality. This is a more general terminology that also applies to complementary industries, etc.
sector (e.g., transport), or linkages between networks in ‘different’ sectors (e.g., between road transport and the Internet).

**Linkages between networks in the ‘same’ sector**

Figure 7 is an illustration of the various network linkages in the transport sector, including linkages between networks of different transport modes (e.g., shipping, roads, railways) and between various geographical levels (nation, region, locality). This is what is usually referred to as the intermodal transport system. This concept implies that it is useful to look at the networks of all transport modes in terms of a complex intermodal transport network system. An analogous situation exists in data communications where various standards, electronic, optical and all-optical transmission links are integrated into a complex communication system.

**Linkages between networks in “different” sectors**

It appears that an even broader perspective that includes linkages between different “traditional” sectors proves useful. In essence, this approach looks at a complex network, consisting of many networks of various types.

The tetrahedron of Figure 8 symbolically illustrates these linkages between physical and non-physical networks in transport, ICT, trade and governance. More dimensions can be added in a similar fashion (for example, FDI, banking, finance, production and sales), but those included in Figure 8 are of direct relevance to regional production networks. Another example of linkages between networks in “different sectors” are documentary credit operations (letter of credit) which involve networks in trade, banking, chambers of commerce (certifying letter of credits), shipping and communications. Yet other examples are freight forwarding, international commercial contracts, competition policy and international regulation.

The rapid emergence of new sectors (Figure 8) on the intersection of traditional sectors is evidence of increasingly strong linkages between the networks of formerly disjoint sectors. For example, the application of ICT in government has not only made government more efficient, but it has actually led to a new concept of governance in its own right, namely e-governance. Similarly, e-transport (ITS, logistics, etc.) has emerged as a separate field.

These developments do not replace the logic of traditional sectors, but they point to an increased need to fully consider the linkages to other relevant sectors and trends.

Finally, it should be noted that in various disciplines there are some attempts to widen the network perspective even further. For example, in Potts’ evolutionary model of growth economic systems are seen as “hyperstructures”, i.e., multidimensional networks. In this model, economic change and growth of knowledge are in essence a process of changes in connections, such as the creation of a more complex organization, new connections or the grouping of those connections.

Externalities and Network Effects

The fundamental idea of network externalities is that “the act of joining a network confers a benefit on all other participants in the network”60. Network externalities may cause markets to fail in allocating resources efficiently. And markets in which incompatible standards compete may tip in the direction of an inferior standard that gains an early advantage.

While the concept of network externalities was developed within economics to analyse market outcomes, there is no reason why these types of considerations

cannot be applied to nations and their international/regional integration, where a global or regional “regulator” does not exist.

Some economists distinguish direct from indirect externalities, depending on the different types of sources of benefit to participants in the network. *Direct externalities* are those typically seen by two-way networks in transport and communications. For example, the more phone users there are, the more useful it is for another person to become a phone user. Direct benefits do not exist for users of one-way networks (e.g., gas pipelines). *Indirect externalities* are externalities in the network of users of compatible systems61, even if they are not physically connected, such as in the case of computer soft- and hardware.

There is no clear consensus among economists as to the definition of the term “network effects”, as compared to “network externalities”. Some economists62 define network effects in a broader sense than network externalities: network effects are said to exist when “the net value of an action… is affected by the number of agents taking equivalent actions”. Other economists63 use the term network externalities to comprise all network effects.

**Conclusion**

Physical transport and communication infrastructure and related non-physical software issues are, or form part of, various types of networks. Taking such a comprehensive network view allows one to readily use the tools and terminology from the discipline of economics of networks.

Thus, strategies and programmes stand to benefit, if they are designed to take explicit account of general network characteristics (such as key links and nodes, interconnectivity, interoperability, quality, capacity, network types, paths, corridors, network externalities and effects), since these characteristics already (knowingly or unknowingly) condition negotiations of regional and subregional agreements in infrastructure.

Similarly, strategies and programmes should include explicitly the linkages between physical and non-physical networks, including linkages in one sector and between sectors.

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61. These users are said to form a virtual network.
62. e.g., Liebowitz and Margolis.
63. e.g., Economides and Klausner.
II.4
Regionalization and related Issues in Developing Inter-Country Infrastructure Networks

This Chapter applies the concept of networks introduced in the previous chapter, in order to identify major issues related to inter-country infrastructure networks, including barriers to regional cooperation and integration in maintaining and developing infrastructure. These issues are closely related to the process of regionalization.

Regionalization

Chapter II.1 introduced the term “regionalization” to refer to a form of regional economic cooperation that is largely driven by multinationals establishing factories in different countries for specialized production of specific components of finished goods. This process has led to regional production networks in Asia and has been characterized by increased international specialization, interdependence and integration.

Naturally, the possibility for countries to ‘participate’ in these production networks has been limited by the quality of their inter-country infrastructure networks. Landlocked countries, certain regions of countries, and hinterlands located far away from the centres actively participating in the regional production process, face the risk of marginalization.

In fact, regional production networks in Asia have largely been limited to coastal areas due to inefficient inland infrastructure, in terms of network strength including issues of interconnectivity, interoperability, quality and current and future expected inland network size. The major question that this Chapter addresses is under which conditions could this process of regionalization be extended to inland sites. In particular, can improved physical and non-physical networks contribute to “replication” at inland sites of the observed “coastal development”?

Issues in Developing Inter-country Infrastructures

In order to answer this question, we use general network characteristics to analyze a possible extension of the regional production networks, that are currently concentrated in the coastal areas, to their hinterlands and even to landlocked countries.
Physical networks

(a) Links

To enable inland production centres to emerge, a hub-and-spoke system\(^{64}\) of transport and communication infrastructure with hubs at inland sites needs to emerge. This requires efficient and high capacity national and international land-based backbone and access networks (road, rail, IWT, communications etc.). In addition to developing new links, rehabilitation and maintenance of existing links remains an important issue for most countries, including countries with economies in transition.

Defining paths (routes) and corridors (e.g., transport corridors and communication backbones) has proved a useful approach to achieving low-cost connections deep into the hinterlands. The corridor approach can be a catalyst for transforming linear networks into tree networks, meshes and finally into hub-and-spoke network systems. It should be noted, that this sequence is what is typically observed. However, this or any other such sequence does not necessarily exist, nor is the hub-and-spoke network necessarily the most desirable outcome.

Yet, if hubs emerge, accrued network benefits often concentrate around those hubs. Therefore, policies of hinterland and landlocked countries will need to be geared to promote the emergence of their own hubs. In a more general sense, this is in fact what was done explicitly or implicitly when so-called “growth poles” or “growth areas” were developed that linked “growth centres” with a strong backbone, trunk, path, corridor, or transmission system. Such concepts are an integral part of current thinking in some countries (e.g., the United Kingdom), where network-based or related cluster-based policies are used for regional development.

When more than two networks (of different countries or with different ownership) are linked, typical transit issues arise. These are of great concern, particularly to landlocked countries. Often the best approach to solving such issues is to take the perspective of the combined larger network, rather than that of national networks as competing agents. An obvious solution to controversial transit issues is some sort of integration\(^{65}\) which will be mutually beneficial.

(b) Nodes

For the strength and value of a network (in terms of network interconnectivity, interoperability, quality, as well as current and future expected network size), the

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64. For economic reasons, other network types such as the simple tree structure would imply that no veritable inland centre could evolve due to the additional cost factor.

65. Assuming the absence of significant negative externalities, of course (e.g., pollution and congestion).
nodes are as important as the links. In the case of transport, important nodes include
intramodal connections (change of gauge, transhipment), intermodal connections,
ports and border crossings. Governments and the private sector have promoted
and even created key inland nodes through the development of inland container
depots (ICDs), logistics centres, freight villages, and economic zones. Similar trends
can be seen in communications. For example, IT service industries cluster in close
location to high capacity international Internet backbones and hubs.

*Linkages between physical and non-physical networks*

Regardless of which level of quality and efficiency of land-based networks
is achieved, hinterlands and particularly landlocked countries will always face an
additional cost disadvantage due to their location and the lower relative costs of
maritime transport and communications\(^6\). However, specialized inland production
hubs may emerge, if these inland areas (or landlocked countries) can offer linkages
to superior non-physical networks, such as institutional networks, markets, human
resources and learning networks. As a matter of fact, the examples of the landlocked
countries of Austria and Switzerland illustrate this point in the case of Europe\(^7\)
where economic integration has been far-reaching.

While landlocked countries will tend to focus their economic policies on
services, their geographical location is not prohibitive for possible full participation
in the international production networks focusing on manufacturing. It should be
noted that transportation accounts on average around 4% of the costs of each unit
of output in manufacturing\(^8\). In OECD countries, transport usually accounts for
a quarter of total logistics costs (storage for a fifth, and inventories for a sixth)\(^9\).
In contrast, in the case of landlocked developing countries, transport appears to
account for much less than a quarter of total logistics costs\(^10\), due to inefficiencies
in the system and transit issues, including “under the table payments”. This implies

\(^{6}\) Maritime transport is generally cheaper than land transport due to economies of scale of ships
and ports. Most major inter-country communications lines are under-sea cables, since land-
based cables are more costly due to right-of-way and other issues.

\(^{7}\) For example it should be noted that the industrial mix of Austria and Switzerland differs
significantly from that of the Netherlands.

\(^{8}\) http://people.hofstra.edu/geotrans/eng/ch7en/conc7en/ch7c1en.html

\(^{9}\) http://www.worldbank.org/transport/ports_ss.htm

\(^{10}\) No reliable data seems to be published for Asian countries regarding the proportion of transport
costs in total logistics costs to and from inland locations. However, common-sense tells us that
this ratio must be lower than the one in OECD countries. Related measures collected by
UNCTAD, such as the ratio between transportation and insurance payments to the value of
exports, indicate a similar direction (e.g., UNCTAD/TD/B/LDC/AC.1/17 and UNCTAD/LDC/112,
June 2001), but these measures have not been corrected for the countries’ different mix
of export/import goods.
that the major constraints to improved competitiveness of landlocked countries in manufacturing are cross-border issues (including choice of product issues) and inefficient logistics systems rather than infrastructure issues or their geographical location per se.

Yet, transport remains an important issue for landlocked developing countries, since in these countries freight costs alone (transport and insurance) can make up to 40% of export values. In contrast, in OECD countries, total logistics costs are estimated to reach up to only 20% of total production costs. These shares are much larger than those quoted in the previous paragraph, due to: (a) a large share of exports of developing landlocked countries are bulk commodities of low unit value and high unit transport costs; and (b) shares quoted earlier are for OECD countries and manufactured products which are high-value goods.

**Network externalities and effects**

Network externalities in particular, and network effects in general, are at the same time a serious challenge and a great opportunity for smaller economies and landlocked countries. This is because regional cooperation and integration in both physical and non-physical networks increases the effective size of a network in terms of its associated user base and market size. In other words, if sufficiently integrated with larger or better geographically located neighbouring countries, smaller and landlocked countries will be able to offer foreign investors both the benefits of a large network/market as well as those of an easier manageable, flexible economy. For example, the relatively small Irish economy has benefitted considerably from European Union membership, as it has proved to be an attractive location for investment by multinationals that were motivated by the perspective of EU market access.

Similarly, even in the absence of far-reaching economic integration, Singapore and Hong Kong, China, are examples illustrating how relatively small and flexible economies can benefit from their special geographic location, by promoting themselves as major nodes in the global transport and communication network.

In general, the benefits of regional integration are mutual for all participating countries, as the value of the networks of even the larger countries and coastal areas will increase as networks/markets in hinterlands and neighbouring smaller economies get connected. An increased network size will make the combined network more useful and competitive, even when a newly connected economy does not significantly participate in the regional RPNs. For example, Thailand and

71. packaging, storage, transport, inventories, administration and management
the Lao People’s Democratic Republic both benefit from sharing Thai satellite capacities – Thailand through a larger user base, and the Lao People’s Democratic Republic through access to otherwise inaccessible services.

**Barriers to effective cooperation and integration in the infrastructure subsectors**

There remain many physical and non-physical barriers to effective cooperation and integration in the infrastructure subsectors. These barriers define the issues to be addressed, the nature of which is remarkably similar throughout the different subsectors. They are summarized in Table 1 for the cases of transport and ICT and

<table>
<thead>
<tr>
<th>Transport</th>
<th>Communications/IT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network formulation “”, design standards, and vehicle weight and dimensions</td>
<td>Network formulation “”: Emergence of secondary regional hubs in Asia (‘hub-and-spoke system’)</td>
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<tr>
<td>Network formalization</td>
<td>Network formalization</td>
</tr>
<tr>
<td>Infrastructure facilities and services at border crossings</td>
<td>International interconnection (e.g., pricing and standards)</td>
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<td>Road signage and traffic rules</td>
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<tr>
<td><strong>Software related issues</strong></td>
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<tr>
<td>Understanding of Documentation by Officials</td>
<td>Human resource issues; Software life cycle much shorter than organizational ‘clockspeeds’</td>
</tr>
<tr>
<td>Collaboration on Procedures and Practices between Officials</td>
<td>Taxation, “bit-tax”; DNS and intellectual property</td>
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<tr>
<td><strong>Transit issues</strong></td>
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<tr>
<td>Transit traffic (fees, standards, procedures)</td>
<td>Transit traffic (land-based fixed lines)</td>
</tr>
<tr>
<td>Infrastructure related transit issues (see also network formulation)</td>
<td>Fixed lines vs. satellite footprints</td>
</tr>
<tr>
<td><strong>Movement of people, goods, digital signals, etc. across borders</strong></td>
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<tr>
<td>Drivers and Crews</td>
<td>International outsourcing of IT services and IT-enabled services; software; open-source sharing and IP, etc.</td>
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<tr>
<td>Vehicles</td>
<td>Censorship of information flows by some governments at their ‘boundaries’</td>
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<tr>
<td>Containers</td>
<td>Protocols and integration of international testbeds (e.g., with IPv6); DNS</td>
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<tr>
<td><strong>Other considerations</strong></td>
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<tr>
<td>Safety (including carrier liability regimes)</td>
<td>Safety</td>
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<tr>
<td>Security (including terrorism issues)</td>
<td>Information security; system vulnerabilities (including issues in using ICT for international terrorism)</td>
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<tr>
<td>Environmental considerations</td>
<td>Indirect environmental effects</td>
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</table>

72. Whereas network “formulation” refers to identifying a network, network “formalization” refers to a formal, legal (possibly international) agreement on what constitutes the network. For example, in the Asian Highway project since 1957 an international highway network had been jointly identified by government officials in the region, but only since the coming into force of the *Intergovernmental Agreement on the Asian Highway Network* in 2005 has this network been formalized.
can be organized into four categories: (a) infrastructure (hardware) related issues; (b) software related issues; (c) transit issues; (d) issues of movement of people, goods, digital signals, etc. across borders; (e) safety, security and environmental considerations.

It should be noted that, while there are similarities, there is not a one-to-one mapping in Table 1 between the issues in the two sectors. The major differences between the transport and ICT issues arise from a very short time-scale for the ‘software layer’ and more significant increasing returns to scale in the case of ICT. These differences have implications for market regulation, the role of government, and time management (for example, requiring different organizational set-ups).

Transportation and energy networks also have somewhat similar characteristics. In fact, energy grids are closely related to transportation grids. In some instances, they even compete with each other, as is the case with LNG transport by ship versus natural gas transport through pipelines. Similar to different transport modes, different energy fuels require fundamentally different infrastructure, and the choice of fuel causes a strong lock-in. However, a major difference when compared to transportation is the fact that energy grids are usually one-way ‘pipes’, rather than two-way pipes.

Conclusion

In conclusion, though it appears possible it is challenging to extend the Asian production networks from the coastal areas to hinterlands and even landlocked countries. The key to such an extension is regional cooperation and integration in the physical and non-physical transport and communications networks and interlinked networks from other sectors.

While links, nodes, and linkages between different physical and non-physical networks need to be strengthened in a strategic fashion, there remain many physical and non-physical barriers to effective cooperation and integration in the infrastructure subsectors which are listed in Table 1. These barriers define the issues that need to be addressed in strategies and programmes.
II.5

Regionalism: Government-Level Regional Cooperation in Infrastructure

All the previous chapters have highlighted the overarching importance of regional cooperation in infrastructure, particularly due to its network nature. This chapter analyses in more detail the role of regional and international agreements, organizations and programmes in the process of extending international production networks from coastal areas to inland sites in Asia.

In order to examine this role more closely, the chapter, firstly, puts regionalism in perspective; secondly, it provides examples of international and regional agreements, organizations and programmes; thirdly, it reviews general organizational trends within the region; and, finally, it addresses the question of which path (bottom-up, top-down, or a combination of both) might be the “right” path to enter into multilateral agreements in the region.

What is Regionalism?

Whereas regionalization was defined as the largely market and private-sector driven form of regional economic cooperation, for the purpose of this paper, regionalism is the state-driven form of regional economic cooperation among governments.

A strong message throughout this paper is that regionalization and its expression in terms of regional production networks needs to be complemented with regional cooperation between governments in infrastructure development (i.e., regionalism) in order to address the many inter-country challenges and to reduce the potential risks of marginalization of hinterlands, landlocked countries, and small economies.

Examples of regional intergovernmental organizations, agreements and programmes

This Section provides some examples of major intergovernmental organizations, agreements and programmes in the region. Organizations’ full names, membership information and date of establishment is summarized in Annex II.
**Classification**

Regional and subregional cooperation in infrastructure takes many different forms. It ranges from activities and projects that include several countries, through official inter-country projects with government involvement, projects of international organizations and development banks, to policy cooperation through the United Nations regional commissions or formal intergovernmental agreements (IGAs).

For the purpose of this paper, we identify six different types of cooperation. They include:

(i) Global UN conventions

(ii) Intergovernmental agreements/organizations addressing regional cooperation

(iii) Intergovernmental agreements/organizations addressing subregional cooperation

(iv) Programmes addressing regional or subregional cooperation

(v) Frameworks for agreements

(vi) Guidelines for legislation

It should be noted that this categorization does not give a static picture. For example, programmes are often designed to have a catalytic role in leading to various formal, intergovernmental agreements. Also, some programmes, such as TRACECA, start out as a programme, but are later transformed into a specific intergovernmental agreement (IGC-TRACECA).

**Global United Nations conventions**

There are global United Nations conventions of a general nature, as well as those in specific sectors. These conventions have often set international standards which are applied in practice, even in some countries that have not actually acceded to the convention. These conventions are usually deposited with the Secretary General of the United Nations and are open to world-wide accession.

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73. The definition of what is considered to be “regional” varies substantially among organizations. For the purpose of this paper, the term “regional cooperation” refers to cooperation that engages many Asian countries from more than one geographically defined region (e.g. countries from South-East, South and North Asia). Sub-regional cooperation refers to cooperation between fewer countries, for example, cooperation in South-East Asia (e.g., ASEAN), or South Asia (e.g., SAARC).

74. and eight subcategories
(a) Global UN conventions of a general nature

Some of the global UN conventions of a general nature, that are most relevant in the context of this paper, include general international conventions on landlocked countries, such as the Convention on Transit Trade of Land-Locked States (New York, 1965)75, the Convention and Statute on Freedom of Transit (Barcelona, 1921), and the United Nations Convention on the Law of the Sea (1982).

(b) Global UN conventions in a specific sector

Global UN conventions in transport: There is an established set of more than 50 international conventions specifically dealing with transport issues (e.g., the seven conventions included in ESCAP resolution 48/1176), a large number of which are open to accession by any State. Because of the importance and rapid development of land transport in Europe over the last 50 years, the United Nations Economic Commission for Europe (ECE) has been designated by the Secretary General as the lead organization in matters related to land transport conventions.

It should also be noted that there are international UN initiated agreements that are deposited at the UN in New York77 and are open to accession by any State, but are of a purely regional nature (e.g., the European Agreement on Main International Traffic Arteries (AGR, 1975)78). In the transport sector, they provide a function similar to the one performed by the rule-based multilateral trade agreements embodied in the WTO Agreement and subsequent negotiations, in that they provide a firm basis79 (and end game) for the harmonization80 of regional, subregional, and bilateral transport agreements.

Global Internet communications agreements and cooperation: By its very nature, the Internet is global. As a result, international standards for the Internet

75. see the Website of the UN High representative for landlocked developing countries for detailed information, http://www.un.org/special-rep/ohrlls/ohrlls/default.htm
76. These seven conventions are covering issues such as road traffic rules, road signs and signals, transit of sealed containers, temporary importation of vehicles, harmonization of border crossing procedures and the commercial carriage of goods by road. http://www.unescap.org/tcdd/it/reso48_11.htm
79. However, it should be noted that, in the contrast to the case of the WTO, the UN transport agreements discussed here do not provide for a similar quasi-judicial dispute settlement system and sanctions for non-compliance.
80. It should be noted that liberalization is a more prominent objective of WTO than harmonization.
and the WWW have been set at the global level by new organizations, such as the W3C and ISOC, with ITU playing a relatively minor role compared to the past.

However, in a manner similar to transportation networks, the Internet is a physical network that is bound and shaped by geography (Figure 9). In fact, the network characteristics of fixed-line IP networks are similar to those of land and water transport networks, and those of satellite communications are similar to those of air transport. The laying of communications cables needs to overcome the same physical and economic constraints of space, such as right-of-way issues, as in the case of roads. For this reason, long-distance Internet backbones often follow least-cost transport routes. Figure 9 shows that the Trans-Europe-Asia Information Network (TEIN) follows the usual sea routes of container trade between Europe and Asia.

While there are striking resemblances between many of the issues that need to be addressed in the communications sector and the transport sector, only few international agreements exist in the ICT sector. These issues are either of a general nature (e.g., the Council of Europe’s Cybercrime Treaty) or focus on technical standard setting in telecommunications (e.g., ITU standards). In contrast to the transport conventions, W3C and ISOC standards have been developed by non-governmental organizations and are non-binding. However, they have become “de-facto industry standards”. There appears to be a growing need to move to consistent, binding international conventions for cross-border Internet use, similar to those relating to cross-border transport infrastructure, facilities and services.

Intergovernmental agreements/organizations addressing regional cooperation

Other types of formal intergovernmental agreements have been created for the purpose of promoting regional economic cooperation in general or at least in several pre-specified sectors. These agreements have usually set up a secretariat, an organization or some working mechanism that draws upon administrative and substantive resources. The examples of such agreements/organizations are summarized in Table 4 (Annex II).
(a) **IGAs addressing regional cooperation in general**

The earliest post-World War II example in Asia and the Pacific was the establishment of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)\(^1\) in 1947. This regional commission has been mainly serving the function of a regional intergovernmental forum. It has catalyzed the creation of many governmental and non-governmental regional organizations and networks, including, for example, the Asian Development Bank (ADB) and the Asia-Pacific Telecommunity (APT), which, in turn, have promoted regional cooperation.

(b) **IGAs addressing regional cooperation in a specific sector**

There exist an increasing number of intergovernmental agreements/organizations on regional cooperation in the transport sector and to a lesser extent in the communications sector (see Table 5 in Annex II).

A recent example in the area of cross-border road transport is the ‘Intergovernmental Agreement on the Asian Highway Network’ that was signed at Shanghai in 2004. The agreement covers issues related to routes, including their numbering, classification, design standards, and signage of the highway.

In terms of inter-governmental cooperation in IT, the Asia-Pacific Telecommunity (APT) has facilitated regional ICT standards and regional exchange of technical expertise. The ASEM process has also played a dominant role in Asia and in the Europe-Asia interconnections.

However, Asian regional cooperation in the key area of cross-border Internet backbones, has been very limited, compared to cooperation in other regions of the world and other sectors. IT cooperation has been rather global in nature, and has been driven by multinationals from North America, Europe, and (to some extent) Japan. These have emerged as global Internet hubs, with Asian countries at the end of the spokes.

**Intergovernmental agreements/organizations addressing subregional cooperation**

(a) **From regional to subregional organizations and programmes**

While a sizable number of regional and subregional intergovernmental organizations and programmes have been created in Asia and the Pacific since 1945 and particularly in the past 20 years, there has been a clear trend to establish ever more and often overlapping organizations and programmes. These have tended

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\(^1\) The original name was ECAFE (Economic Commission for Asia and the Far-East)
to have fewer and fewer members (Figure 10). All these organizations and programmes have promoted inter-governmental agreements and economic cooperation on many issues, including cross-border transport and communications.

Figure 10: Number of members of intergovernmental agreements, organisations and programmes addressing subregional or regional cooperation in Asia and the Pacific versus their date of establishment

(b) IGAs addressing subregional cooperation in general

A number of subregional, intergovernmental agreements have emerged, such as SAARC, ECO, SCO, BIMSTEC, and significantly ASEAN. These organizations are increasingly providing the forum for the creation of formal regional agreements.

(c) IGAs addressing subregional cooperation in a specific sector

Under the umbrellas of these organizations, formal regional agreements have been created on a large number of specific issues or in specific sectors, particularly

82. Smaller groups and groups of a “like-mind” can reach consensus easier, which increases the effective speed of implementation.
83. Data source: All organizations listed in Tables 4 to 7 were included (see Annex). It should be noted that the total number of member countries is plotted, including member countries that are not located in Asia and the Pacific. The criteria for inclusion of organizations was that they promote regional cooperation in Asia and the Pacific.
the transport sector. An example of this in the region is ASEAN. The resulting formal agreements on specific issues in practice serve the role of instruments for regional cooperation and integration.

Recently, there have been efforts by Japan and the Republic of Korea to foster regional cooperation on Internet backbones in Asia in order to develop them into regional Asian hubs. Initially, this cooperation was mainly on a bilateral basis. However, more recently, a multilateral approach has been gaining greater significance. Interestingly, the multilateral approach is driven by non-state actors. Such cooperation and the development of new hubs is likely to gain further importance in the coming years, as the Internet population of Asia and the Pacific (ESCAP region) has surpassed that of North America earlier this year. However, to date, official, inter-governmental cooperation in Asia on international Internet backbones has been much less ‘developed’ in comparison to transport.

**Selected programmes**

(a) *Selected programmes addressing subregional or regional cooperation in general*

ADB has been a pioneer in the promotion of general regional cooperation programmes such as GMS, CSATTF, CAREC and SASEC (Table 6, Annex II). These subregional programmes are organized through ministerial-level subregional conferences where high-level policy agreement is reached for subsequent programme activities. However, in contrast to the example of ESCAP and probably due to the fact that ADB is a bank, much of the programme activities themselves are on the national level (see also Table 2). Other organizations including the UNDP and the World Bank have created subregional, general cooperation programmes of their own (e.g., Tumen River Area Development Programme and the CIS-7).

(b) *Selected programmes addressing subregional or regional cooperation in a specific sector*

Programmes on regional cooperation specifically in the transport sector include the ESCAP’s Asian Land Transport Infrastructure Development (ALTID) project and the UNDP’s Silk Road Area Development Programme. Examples from Europe are the Trans-European Railway (TER) and the Trans-European Motorway (TEM) projects.

In the communications sector, the cluster “Trans-Eurasia Information Network (TEIN)”\(^{84}\) of the inter-governmental ASEM process has played a dominant role in

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84. TEIN was originally suggested by the Republic of Korea and co-sponsored by France.
Asia. Activities are organized under the so-called Information Technology Thematic Cluster\(^\text{85}\). On the technical and Internet network implementation level, a number of so-called AP* organizations\(^\text{86}\) have emerged under APNG leadership since the early 1990s. For example, there is an APAN network, which follows roughly the existing divisional lines of general, subregional, economic cooperation initiatives (Figure 11).

**Frameworks for Agreements**

Examples of frameworks for agreements include the ASEAN framework agreement on multimodal transport, the GMS framework agreement for facilitation of cross-border movement and the ECMT recommendation for bilateral agreements in road transport\(^\text{87}\). Such frameworks perform a number of functions, perhaps the most important of which is that they provide a consistent basis for negotiating bilateral, plurilateral and subregional agreements. In the case of the GMS transit transport agreement, it was initially used to govern bilateral and trilateral relationships between GMS member countries on specific routes. One of the principal advantages of the agreement is that it can be easily extended to additional routes and countries as it has been developed in a participatory manner by all the member countries.

Another advantage of the ECMT type of agreement is that it provides a ‘level playing field’ for partners in weaker negotiating positions or with weaker negotiating skills and capacities. Besides, there are also the reduced resource costs and less time required to negotiate agreements based upon agreed frameworks. A ‘disadvantage’, however, is that the initial negotiators ‘set the terms’, leaving others with only a ‘take it or leave it’ option.

\(^{85}\) http://europa.eu.int/comm/external_relations/asem/cluster/it.htm

\(^{86}\) The activities of the Asia Pacific Networking Group (APNG) have led to the creation of Asia-Pacific Internet-related organizations that are loosely connected with each other and are often referred to as “AP* organizations”. Examples include APNIC, APIA, APTLD, and APCERT.

\(^{87}\) http://www1.oecd.org/crs/resol/road/road97e.pdf
**Legislative Guidelines and Model Clauses**

There are a number of examples of such guidelines, including the UNCITRAL legislative guide on privately financed infrastructure projects (including model legislative provisions)\(^88\), and the ESCAP Guidelines for Maritime Legislation\(^89\). Such guidelines perform a number of functions. Firstly, they provide ‘checklists’ for countries in developing domestic legislation, thereby reducing resource costs and time-span as well as assisting in the capacity building process. Secondly, if they are related to the subject matter of bilateral, regional or international agreements, they can provide consistent advice in the formulation of domestic legislation. Thirdly, whilst they may be primarily related to domestic legislation, they introduce a consistency and familiarity that facilitates the attraction of foreign direct investment.

**Substantive content of regional cooperation in infrastructure, facilities and services**

Table 2 summarizes in a stylized form the major items of the substantive content of regional cooperation agreements in transport infrastructure. The results

<table>
<thead>
<tr>
<th>Type of activity</th>
<th>National</th>
<th>Bilateral/subregional/regional</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policy</strong></td>
<td>Policy planning and coordination; Public sector reform; Broader policies, including economic, safety, security, environmental and poverty aspects; Integrated assessment; Participation and transparency in infrastructure development.</td>
<td>Cooperation and dialogue; Transit policy; Bilateral and subregional agreements; International transport conventions.</td>
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<tr>
<td><strong>Infrastructure</strong></td>
<td>New construction; Rehabilitation/upgrading; Modernization (e.g., use of ICT); Equipment (vehicles, rolling stock); Facilities (intra- and intermodal); Maintenance.</td>
<td>Facilities (border-crossing); Infrastructure development coordination; Resource mobilization;</td>
</tr>
<tr>
<td><strong>Operations</strong></td>
<td>Services; Related businesses; Capacity building (e.g., for asset management).</td>
<td>Cross-border service coordination, including equipment exchange; Transit tariffs.</td>
</tr>
<tr>
<td><strong>Facilitation</strong></td>
<td>Improvement of business environment for transport operators working in international transport (e.g., one stop windows for processing export/import documents).</td>
<td>Border crossing facilitation.</td>
</tr>
</tbody>
</table>

\(^{88}\) [http://www.uncitral.org/english/texts/procurem/pfip-index-e.htm](http://www.uncitral.org/english/texts/procurem/pfip-index-e.htm)

are mainly based on ESCAP’s analysis of the work of the organizations and programmes listed in Table 4 through to Table 7 in Annex II.

The national-level work that is done under the umbrella of regional cooperation is in large part the work of development banks (ADB, EBRD and the World Bank), UNDP and bilateral agencies. It may be noted that Table 2 above appears to be heavily focused on transport. This is largely due to the fact that there are very few regional cooperation activities on cross-border communication issues in the region.

In terms of content, there is currently little cooperation on actual operationalisation of infrastructure.

While many regional cooperation initiatives generally seem to target socio-economic subregional development (e.g., along infrastructure corridors), the explicit link between the various network layers and regional development using a strategic and long-term network perspective, is surprisingly non-existent.

**Which path toward multilateral agreements?**

There has been a significant increase in the number, magnitude and extent of regional and subregional cooperation initiatives and organizations. In the second half of the 20th century and particularly in the past 20 years, a complex web of cooperation mechanisms and relationships has emerged in the infrastructure sectors of Asia and the Pacific.

Table 3 shows a matrix which lists a selection of the main agreements/organizations/programmes against their membership in Asia. As the regional arm of the United Nations, ESCAP is the organization with the most comprehensive membership coverage in Asia and the Pacific. Within the table, groupings of countries can be clearly identified which would appear to follow topographical, historical, religious and cultural lines. Furthermore, some countries are members of a large number of organizations, whereas others are members of only a few regional organisations\(^9\).

While it would be noted that the list of regional and subregional organizations and programmes is not comprehensive, a number of otherwise intuitive general trends are reflected in the table (with notable exceptions, of course). Landlocked countries, such as Tajikistan, Kyrgyzstan, Azerbaijan, Kazakhstan, Uzbekistan, as well as geopolitically important countries, such as Russian Federation, China, India, 

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90. The rank size distribution of membership size shows a typical power law distribution.
Thailand, and Turkey are the countries that are members of the largest number of agreements and organizations. In contrast, island countries and other developed or newly-industrialized countries in the region\textsuperscript{91} are only part of a limited number of such mechanisms or programmes in the region.

Table 3 also suggests that a “hub-and-spoke” system of agreements and programmes in the area of transport is evolving – for example, the International North-South Transport Corridor (INSTC) whose founding members were Russia, the Islamic Republic of Iran and India, and BIMSTEC that links a subset of members of SAARC with a subset of members of ASEAN. This network of agreements can be seen as yet another non-physical ‘soft’-network complementing the “hard”-infrastructure. The situation in transport is somewhat similar to that in trade, where some experts have been discussing the implications of an increasingly complicated ‘spaghetti bowl’ of overlapping bilateral, plurilateral, and subregional trade agreements\textsuperscript{92}. This has raised concerns regarding possible inconsistencies between these agreements and the multilateral trade agreements of the WTO. There are also concerns that such inconsistencies could lead to lock-in of negotiation positions at the WTO level. The proliferation of bilateral and subregional agreements in the transport sector raises similar concerns regarding their consistency with regional and global conventions. For example, the current proliferation of bilateral and smaller plurilateral agreements makes it increasingly difficult for countries like China to negotiate new commitments, since it has a large number of neighbouring countries that are parties to many different types of agreements.

This raises the question of the extent to which bilateral, subregional and regional transport agreements contribute to global multilateral conventions. Assuming that the ‘optimal’ solution is a consistent and fair multilateral, global, or at least regional convention, the question remains as to which path is the ‘right’ one to achieve such a goal. Due to an increasingly complex ‘spaghetti bowl’ of agreements, there is a pressing need to address this question.

Since issues, such as cross-border land transport\textsuperscript{93} and fixed line Internet communications are regional by nature, a large part of relevant harmonization can

\textsuperscript{91} Instead, NIEs tend to have more agreements with developed countries, many of which are not located in the region. These agreements are not reflected in the matrix of Table 3.


\textsuperscript{93} For example, it doesn’t matter very much whether land transport agreements in South America differ from those in Asia.
Table 3: Matrix of agreements/organizations versus its member countries in Asia94

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be achieved at the regional level. In the context of linkages with other regions (Europe, West Asia, Africa, Latin America and the Caribbean), global harmonization is highly desirable, if not necessary. The “spaghetti bowl” example of cross-border trade and transport agreements should also be considered as a lesson for similar future trends in ICT in the region.

**Key findings of Review of Regional Cooperation in Land, Maritime and Intermodal Transport Infrastructure development**

As part of the preparatory work for the ESCAP Theme Study for the Commission in 2006, a review of regional cooperation in land, maritime and intermodal transport infrastructure development was carried out. The key findings of the review are presented here (for more details, see Annex I):

**Asian Highway and Trans-Asian Railway continue to serve as reference for many new subregional cooperation initiatives in land transport development**

ESCAP’s regional cooperation initiatives in Asian land transport, the Asian Highway (AH) and the Trans-Asian Railway (TAR) continue to serve as reference points for both subregional and inter-regional cooperation initiatives. The Intergovernmental Agreement on the Asian Highway Network entered into force in July 2005 and the Intergovernmental Agreement on the Trans-Asian Railway Network was signed in November 2006. Noteworthy recent cooperation initiatives also include the UN Special Programme for the Economies of Central Asia (SPECA) since 1997 and the Euro-Asian Transport Linkages Project of UN Regional Commissions since 2002.

The major part of subregional cooperation in transport is promoted under the frameworks of subregional, intergovernmental organizations, such as ASEAN, ECO, FORUM and SAARC, which cover a multitude of economic sectors. Most recently, there has also been a proliferation of many other programmes, projects and initiatives with elements of subregional cooperation in land transport, such as BIMP-EAGA, IMT-GT, IMS-GT, AMBDC, GMS, and ACMECS. Most of these organizations and programmes aim to complement each other as well as the Asian Highway and Trans-Asian Railway.

**Competition issues in maritime transport development and special needs of Pacific Island States**

Regional cooperation in maritime transport takes significantly different forms in the case of the coastal regions of the Asian continent and its major economies, than in the case of small island developing states (SIDS) in the Pacific. Changes in technology, ship-route structures and the role of state-owned ports, have led to
consolidation, concentration, co-opetition and strategic alliances in shipping. Particularly, the emergence of port operating companies with dominant market positions has raised a number of competition issues that still remain unresolved. Regional and subregional cooperation in transport of small island developing states (SIDS) is promoted mainly by the ESCAP Pacific Operations Centre (EPOC) and the Pacific Island FORUM. The Global Action Plan for Small Island Developing States has been a guiding framework for regional cooperation in the Pacific since 1994.

Regional cooperation in the development of an Asian integrated transport system is in its infancy

While the private-sector driven maritime and civil aviation networks have developed into their characteristic hubs-and-spokes systems, governments have tried to promote scale and interconnection through inland container depots (ICDs) at the national level. Since companies in the maritime and air transport sectors are owning or running regional and global networks of their own, regional cooperation initiatives aimed at promoting integrated transport mainly focus on the land linkages to these networks. The ALTID project of ESCAP is an important example. The ESCAP Secretariat is working on a practical methodology for the development of an Asian Integrated Transport System and has promoted cooperation through a series of subregional studies. ESCAP has worked closely with ADB, supporting its comprehensive subregional cooperation programmes in Asia and the Pacific, all of which include components related to integrated transport: GMS, SASEC, CAREC, BIMP-EAGA, SECSCA, and the Pacific Plan for the small island states in the Pacific Ocean.

Conclusion

The large number of agreements and initiatives in Asia and the Pacific in the areas of trade, transport and to a limited extent in ICT are a general expression of the desire of governments to cooperate on the issues and of their recognition of the potential benefits of such cooperation, particularly as a response to the challenges of globalization.

As issues like cross-border land transport and fixed-line Internet communications are regional by nature, useful harmonization can be achieved at the regional level within a global framework.

The complex ‘system’ of overlapping agreements can be viewed as yet another non-physical network layer that emerges with, and complements the physical network infrastructure development.
Despite many similarities, there are also important sectoral differences in regional cooperation on networks’ infrastructure, facilities and services.

In terms of the content of regional cooperation, more cooperation in the area of actual operationalisation of infrastructures could prove beneficial. In this context, a strategic and long-term network perspective is needed that fully takes into account the explicit link between the various network layers and development.
II.6

Systemic Risks Arising from Increased Regional Integration

This Chapter uses the concept of networks (introduced in Section II.3) to identify major systemic risks related to increased regional cooperation and integration.

Introduction

Far-reaching processes, such as regional integration or globalization in general often lead to a re-distribution of costs and benefits, including ‘material’ and social well-being. Consequently, various groups of people and even countries will have different views on what is a desirable or undesirable effect of regional integration. For example, we can look at an expected re-distribution of income opportunities between two groups of people due to regional integration, and assess the probabilities of various possible outcomes. This approach provides measures of risk, a concept that by nature is neither positive nor negative.

Types of Risks

Most risks are simple direct risks. For example, the risk that the income of a certain group of rice farmers will increase/decrease due to regional integration is such a direct risk. Direct risks can usually be addressed by appropriate policies of national government, and are, therefore, not considered here.

However, there are also so-called systemic risks which are risks that are inherent in the “system”, as it becomes integrated. These types of risks often can only be addressed by regional cooperation of governments, not by policies of a single government.

Systemic risks

Examples of systemic risks arising from increased regional integration include the following:

(i) Strong networks usually lead to concentration on all levels, as specific groups become increasingly able to control key links and nodes within networks and between networks. Under such a scenario, power relations become an important issue. In the most extreme case, lobbying groups
may de-facto achieve increasing control over or “capture” the decision-making process of political representatives.

(ii) Co-opetition trends, where otherwise competing firms collaborate on specific issues (often related to networks), may become a serious challenge for governments, as national regulators and competition authorities actually have to deal with international networks. Due to the absence of efficient regional or even global regulatory institutions, it may be difficult to find the “right” balance between where to strengthen or refocus networks and where to foster competition.

(iii) Decisions made concerning investment in infrastructure can, due to its high capital cost and long gestation periods, initiate path-dependent processes and lock-in effects. Economic integration, as a whole, appears to be a path-dependent process which may lead to lock-in, resulting in potentially high costs for governments to change course in terms of their regional integration. Examples of the high costs of the reverse process of “disintegration” are the erection of borders that did not formerly exist following the dissolution of the Soviet Union, as well as events in the aftermath of the independence of the Indian Subcontinent (1947).

(iv) Governments need also to be aware that economic cooperation creates inter-dependencies that might eventually spillover into other fields.

(v) Countries that put on the “golden straight-jacket” by engaging fully in various forms of economic integration will prosper, but may also be left with fewer and fewer national policy options. Some argue that this will have adverse effects on social safety nets and human well-being in general.

(vi) Regional integration may lead to increased vulnerability of the ‘system’. For example, manufacturing and assembling activities may be deeply affected by political developments in a single yet small country that forms part of its regional production network, if adequate risk mitigation measures are not in place. Similarly, the security of the system of global container shipping lines has been of concern recently, as they form the backbone of the regional and international production system. Such vulnerability may have spill-overs to the world economy, where economic ‘hikes’ may become more pronounced than in the past.95

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95. One might consider a nightmare scenario for container shipping in which the ports of Singapore or Hong Kong, China, went out of action.
(vii) In regional integration, labour has been\textsuperscript{96} the only factor of production that has not been free to move across borders. This may eventually lead to additional imbalances within countries.

A proper risk management view needs to be taken by governments individually and jointly, in order to adequately quantify and address such inherent risks. Systemic improvements could minimize these risks from the outset.

Conclusion

Risks \textit{per se} are neither good nor bad by nature. The risks mentioned above are not arguments against regional cooperation. On the contrary, awareness of these risks ensures that regional cooperation in infrastructure can actually deliver what it promises. Risk management of regional cooperation is analogous to health insurance coverage. Awareness and preparation for the possibility of getting sick does not create sickness; it rather mitigates the risk of getting sick.

\textsuperscript{96} with few exceptions
III.1

International Experiences in Developing Intermodal Infrastructure and Services

Introduction

There are encouraging international examples of how to develop integrated transport systems, both from the ESCAP region, as well as from other parts of the world. Most of these examples are at the national level, but international examples have also emerged. More complete lists of such policies, initiatives and projects are contained in the Review of Developments in Transport in Asia and the Pacific, 2005\(^7\) and earlier versions of the Review.

These presented examples cover all areas of network integration, including intermodal infrastructure and (logistics) services, integration of sustainability objectives, as well as facilitation of cross-border transport and transit.

The purpose of this chapter is to provide a “flavour” of the high-level policies and many initiatives by governments and the private sector in developing intermodal infrastructure and related services. The chapter comprises of selected pen pictures of such policies and initiatives, and includes an overview of related, ongoing ESCAP activities at the subregional level.

Intermodal infrastructure and services

Overview

Countries within the ESCAP region have varying levels of intermodal infrastructure and services. And they face differing challenges (both physical and institutional) in upgrading existing or creating new intermodal infrastructure, or in promoting the use of these systems. Finally, these countries are at different stages in devising strategies to remedy existing deficiencies and planning for future needs.

But common ground amongst countries within the ESCAP region, despite these differences, is recognition by their respective governments and industry groups of the benefits that an intermodal freight system can deliver for social and economic performance. This section presents brief pen pictures of recent developments in

\(^{7}\) http://www.unescap.org/tdw/PubsDetail.asp?IDNO=178
selected countries which differ greatly in their level of income and the maturity of their intermodal systems. Examples from Australia, China, India, Malaysia, Nepal, and Philippines are given below.

**Australia**

Australia has recently witnessed a major trend towards intermodal transport methods to move freight. Several state governments have set targets for moving freight to rail (typically 30% to 40% of port-related container movements). In pursuit of these targets, the states, in conjunction with the Australian Federal Government’s new ‘Auslink’ funding programme and the private sector, have made provision for a significant amount of investment into intermodal facilities. As a result, Australia has an advanced intermodal framework of planning and infrastructure. Presented in Box 1 is a case study of Parkes, one of the significant intermodal facilities in

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**Box 1: Parkes facility, New South Wales, Australia**

The Parkes facility is located approximately 365 kilometres west of Sydney and 170 kilometres south of Dubbo. It is owned and operated by FCL. The facility is said to be located at the ‘crossroads of Australia’ where the Newell Highway (which links Melbourne and Brisbane) intersects with the transcontinental railway (which links Sydney and Perth). It is primarily concerned with the domestic intermodal market moving freight all around Australia.

The site covers 1,000,000 m\(^2\) of land, of which 15,000 m\(^2\) (1.5%) is paved hardstand. The facility includes a covered container storage area of 5,000 m\(^2\). The maximum train length that can be accommodated is 600 meters. On average the facility sees 7 trains per week and 30 trucks per day.

Total annual throughput by rail was nearly 20,000 TEU during the period July 2004 – June 2005. Also, total annual containerised throughput by road was 800 TEU and 70,000 tonnes of non-containerised cargo for this period.

Growth expectations for the terminal are high, with containerised cargo expected to double and non-containerised traffic expected to increase by around 50% over the next five years. Additionally, total non-containerised cargo throughput during the aforementioned periods is estimated at 75,000 tonnes and 100,000 tonnes within the next five years.

There are a number of driving factors behind the expected expansion of throughput to this facility. Firstly, The Australian Rail Track Corporation (ARTC) has signalled its intention to invest $21 million (AUD) on the Main Western Line linking Parkes and Broken Hill which is the main trade route of Sydney to Adelaide corridor. Improvements will focus on raising height clearances, upgrading communication systems, and strengthening and upgrading bridges to improve efficiency and capacity. FCL owns a significant area of land around its present facility, which has been earmarked for future factory and warehouse developments.

Australia. Unlike many intermodal facilities in Australia and other ESCAP countries, Parkes is concerned primarily with the movement of domestic rather than international freight.

**China**

The Chinese *Tenth Five Year Plan and 2015 Long-term Programs of the Railway Scientific and Technological Development*\(^98\) specifies objectives and key tasks for the major role that Chinese railways are envisaged to play in the development of a national integrated transport system. It emphasizes the building of strategic research and development capacities in high-speed freight and passenger railways, including rolling stock (“technology self-reliance”). It covers construction of new networks, improvement of efficiencies, development of IT and new management methods, social and safety objectives, as well as environmental protection issues.

In China, Hutchison Port Holdings operates an ICD at Guanlan in the Baoan district of China, about 32 km northwest of Yantian International Container Terminals. The Guanlan depot is strategically located in the middle of Shenzhen’s major cargo gateways, Yantian Port, Huanggang border crossing, Shekou and Huangtian airport. The depot is also near a number of large industrial areas allowing consolidators and freight forwarders to provide supply chain services, including quality inspection and customs clearance to their customers. Its location also provides empty container storage services for shipping lines.

To take further advantage of the depot, in September 2003, Hutchison Whampoa subsidiary, Logistics Network Enterprise (LINE) negotiated a licence with Guandong and Hong Kong, China authorities, which allows Guanlan Inland Depot to provide truckers with full export containers in return for empties. Prior to this, about half the 13,000 container trucks that crossed the Hong Kong, China-Shenzhen border daily were empty because mainland regulations had prohibited them from taking cargo back out of China.\(^99\)

**India**

The new approach suggested in the case of India explicitly mentions the aim of following the Chinese example and foresees the development and integration of dedicated rail corridors, multimodal service, high-speed services for freight and

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98. Source: Ministry of Railways, China.
passengers, integration with urban transport systems, and highlights the major environmental benefits from the pursuit of a national integrated transport system.\textsuperscript{100}

Projects, such as dedicated rail corridors, are seen as key solutions for the increasing congestion in Indian ports (e.g., in Mumbai) which is due to lack of an efficient intermodal system linking ports to major inland cities, for example, linking Mumbai and New Delhi. In essence, it appears that underinvestment in intermodal infrastructure at inland sites and into railways is seen as the prime culprit. This is despite the fact that an increasingly extensive network of ICDs is emerging with many more in the planning stage\textsuperscript{101}.

\textit{Malaysia}

Northport is Malaysia’s largest operator of a multi-purpose port, handling 60\% of the nation’s trade. It is also Malaysia’s first port bringing along with it 103 years of heritage. Eighty-one shipping lines as well as 44 conventional and 502 container vessels made approximately 8,000 ship calls to Northport in 2004, providing services to 300 ports of call in major parts of the world.

Northport is a major hub port and an integral component of the transportation pipeline in the region. With increased connectivity to ports in China and East Asia and an increase in the spread of services linking US ports, the Mediterranean and Europe, Northport now offers more links to world-wide ports than any other port in Malaysia and has emerged as one of the major hub ports in the region.\textsuperscript{102}

Previously, a number of constraints, including limited ability (due to capacity constraints) to cope with increasing demand, a single track linking Northport to national grid and technology bottlenecks (hampering the evolvement of a fast paperless port business environment) had hindered the further development of Northport.

The management of KTM Berhad Freight Services recently raised awareness regarding the rail mode among public policy planners and players in the logistics sector. It also stressed that apart from the economical aspect, the rail option would relieve stress on roads and ports and would be more environmentally friendly.\textsuperscript{103}

\textsuperscript{100} Indian Ports Association.. Container Rail Corridors: An Approach Paper, shipping.nic.in/ approach paper.htm.
\textsuperscript{101} Concor India, www.concorindia.com
\textsuperscript{102} http://edi.navis.com/aame.jsp. Visited 29/11/2005
\textsuperscript{103} http://www.northport.com.my/news_view.asp?nid={2005C082-FBD4-41CB-9AC0-E5317C02F343}
As a result of government and private sector initiatives and expenditure on intermodal infrastructure, numerous economic benefits have been witnessed for both Northport and Malaysia as a whole. For example, landbridging has reduced the transit time of freight of Malaysia to Bangkok from 5 days via a sea feeder to 2.5 days via rail. It is estimated that freight costs in the above scenario are 30% lower by rail. Consequently, rail connectivity has offered greater efficiency, shorter transit time and lower costs. It has also offered great potential in attracting refrigerated cargoes and motor vehicles from Bangkok – which, in turn, would be shipped out of Port Klang. Flow-on effects of the improvement in intermodal infrastructure have allowed Northport to support the distribution activities at Northport Distripark and Southpoint. Furthermore, it has eased pressure and lowered dwelling time of containers at Northport during busy periods.

Nepal

In Nepal, the increasing containerisation of trade and the need for streamlining transit trade, necessitated the implementation of the Nepal Multimodal Transport and Trade Facilitation Project (NMTTF). Detailed studies were undertaken in 1994-95. One of the major components of the trade facilitation project was the construction of three Inland Clearance Depots (ICDs) in the bordering towns of Biratnagar, Bhairahawa and Birgunj, which are key land customs points. The first two are road-based and the third one is a rail-based facility. The ICDs are designed to offer the complete range of modern infrastructure with a view to facilitate expeditious clearance of import and export cargo movement by containers.

The Biratnagar ICD is spread over an area of 2.86 ha and the Bhairahawa covers 3.23 ha. The Birgunj ICD, located at Srisiya, 4 km west of Birgunj town, is the biggest of all the three, stretching over an area of 38 ha. It is connected by broad gauge rail line with the Indian border town of Raxaul. Six full-length railway tracks inside the ICD were constructed with the grant assistance of the Government of India. The Birgunj ICD is equipped to provide rail/road transhipment, storage and customs facilities for containerized, break-bulk and bulk cargo moving by rail.

The construction of the Birgunj ICD was completed by the end of December 2000 with the completion of rail line construction in March 2001. In addition, the construction of a four kilometres long road link from the ICD to the main highway was also completed in April 2001. Under the project, three reach stackers of 45 ton and one reach stacker of 7.5 ton were made available at the ICD for handling empty and loaded 20-ft and 40-ft ISO containers.
In March 2002, management and operation of the road-based facilities at Biratnagar and Bhairahawa were handed over to a Nepal-India joint venture company selected through competitive bidding on a 10-year lease contract. The operation of the Birgunj ICD, however, is awaiting the finalisation of a bilateral Rail Services Agreement between India and Nepal. Once this happens, it is anticipated that the new land-based port will lead to improved efficiencies and cost savings in the movement of Nepal’s containerized exports and imports.\footnote{104}

An integral component of the NMTTF Project is to provide private sector freight forwarders with the opportunity to learn about the practices and principles of freight forwarding and intermodal transportation through training workshops and seminars. The project has also established a consultative mechanism – the National Trade and Transport Facilitation Committee (NTTFC) – to advise the Government of Nepal in implementing trade and transport facilitation measures, including policy reform.

\textit{The Philippines}

The Philippines, which requires freight to move through the archipelago combining air, sea and road, has a natural requirement for freight to be moved using more than one mode of transport. Consequently, intermodal transport systems have been identified as playing a crucial role in the economic development of the widely dispersed regions of the country and are intended to alleviate areas with high poverty incidence. Historically, many regions have suffered from inadequate infrastructure facilities, and lack of reliable and safe transport services which significantly impede the movement of freight.

In 2003, the Department of Transportation and Communications commissioned US$1 million to prepare an intermodal transport project to improve the existing infrastructure within the Phillipines\footnote{105}. This initiative will complement the Government of the Philippines efforts to develop the Strong Republic Nautical Highway.\footnote{106}

\textbf{ESCAP projects on subregional integrated transport networks}

As a first step to support and promote regional cooperation in the development of an Asian integrated transport network, the ESCAP Secretariat has started carrying out subregional studies on the issue. The first completed study focused on North-East Asia, as the countries concerned (China, the Democratic People’s Republic

\footnote{104. Purushottam Ojha, op. cit.}
\footnote{105. www.adb.org/Documents/Profiles/PPTA/37233012.ASP}
\footnote{106. This initiative is described in greater detail in Chapter 14.}
of Korea, Japan, Mongolia, the Republic of Korea and the Russian Federation) do not benefit from a formal economic grouping to facilitate trade and transport, in contrast to ASEAN, ECO and SAARC. The second such study currently being undertaken focuses on Central Asia, as mandated by the 2nd session of the Committee on Managing Globalization of ESCAP in October 2005. These and future subregional projects by ESCAP on integrated transport networks are expected to follow the ESCAP methodological approach explained in this monograph.

Among the countries of North-East Asia there is increasing demand for an integrated transport network that combines the different transport modes of rail, road and shipping and will facilitate trade flows and, in turn, trade-dependent economic growth. In order to address issues related to the development of integrated transport, the ESCAP Secretariat, in conjunction with the UNDP Tumen Secretariat is implementing a project on an integrated international transport and logistics system for North-East Asia. The main objectives of the project are to: (a) assist countries in adopting integrated transport planning and logistics concepts, thereby improving efficiency and reducing costs to enhance competitiveness; and (b) promote multilateral cooperation for the development of an integrated international transport and logistics system at the subregional level.

In the first phase of the project, a study was carried out to identify critical areas for transport and logistics performance improvement\(^ {107} \). Six international transport corridors in North-East Asia, including road and railway networks linking neighbouring countries and providing connections to major port clusters in the subregion, were identified (Figure 12). The basis for the subsequent route selection was the Trans-Asian Railway and Asian Highway. For each corridor, feasible unimodal/intermodal routes along the corridor with sea container or ferry services were analysed and in-depth route analysis was undertaken, in order to identify physical and non-physical barriers on selected routes. In particular, the study identified substantial losses of time and costs that are associated with intermodal transfers\(^ {108} \) and border crossings.

As part of the project, a policy-level expert group meeting was organized in Ulaanbaatar from 6 to 8 September 2004. The meeting adopted the proposed integrated international transport and logistics network for North-East Asia with its mix of major routes and corridors (appropriate roads, railways and water

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108. owing to logistics issues and the time needed to consolidate containers to form full train loads
transport), including connections to major seaports. Intermodal interfaces, such as inland container depots, freight terminals and distribution centres and border crossings were also identified as important nodes along the routes. The meeting adopted an action plan required to develop the integrated network (Box 2).

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<th>Box 2: ESCAP action plan for an integrated international transport and logistics system for North-East Asia</th>
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<td>– Eliminate missing links and improve conditions of related infrastructure along the major corridors and identify and prioritize infrastructure development requirements through analysis of the trade and transport markets to determine possible traffic volume along the routes and border crossings.</td>
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<tr>
<td>– Simplify and harmonize transport and trade procedures and documentation, particularly related to border crossings along the selected transport routes, and consider unification of such procedures and documentation.</td>
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<tr>
<td>– Strengthen the position of transport and logistics intermediaries, including freight forwarders, multimodal transport operators and logistics service providers.</td>
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<tr>
<td>– Carry out a study on the role of ICT in transport facilitation and logistics with the development of guidelines for ICT application in North-East Asia.</td>
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Most recently, the Intergovernmental Agreement on the Trans-Asian Railway network was signed in November 2006. The agreement specifies minimum standards for international container terminals (Annex II) and includes a list of stations that can handle ISO containers of at least 20ft dimension (Annex I).
Figure 12: Proposed integrated transport network in North-East Asia
III.2
Cross-border Facilitation and Transit for Landlocked Developing Countries

Due to the existence of national borders, a number of initiatives have to be taken to address cross-border transport and transit, in addition to the development of intermodal infrastructure and efficient services. This chapter provides a bird’s eyview of some of the issues that arise and how they are addressed, particularly through facilitation agreements. These initiatives are an integral part of the development of an Asian Integrated Transport Network.

Transit transport issues in landlocked and transit developing countries

There is an excellent ESCAP study, entitled “Transit transport issues in landlocked and transit developing countries”\(^{109}\), which includes detailed information based on case studies of Kazakhstan, Uzbekistan, Lao PDR, Mongolia and Nepal. This section draws on this study and the reader is referred to it.

Background

Owing to geographic and other related attributes, landlocked developing countries are confronted with a range of special constraints that inhibit their full participation in the globalization process. The ESCAP region is home to 12 of the world’s 30 landlocked developing countries. Of these, Afghanistan, Bhutan, Lao People’s Democratic Republic and Nepal are least developed countries, while Armenia, Azerbaijan, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan, Turkmenistan and Uzbekistan are economies in transition. Each of these landlocked countries is disadvantaged by its lack of territorial access to and distance from the sea.

For the landlocked countries, problems of distance are substantially compounded by their need to cross international borders and by their inability to regulate the through transport process. As a result, the delivered costs of imports are higher, exports less competitive and attraction for the foreign direct investment reduced.

Economic development in the Asian region and emerging opportunities for interregional trade are stimulating new directions of trade which are creating a demand for landlocked countries to become “land-linking” countries and provide important transit services to their transit neighbours. In this regard, both landlocked and neighbouring transit countries can benefit from actions taken to increase the efficiency of transit transport.

To highlight the continuing problems faced by landlocked and transit developing countries and the need to improve their transit transport systems, the General Assembly adopted resolution 56/180 of 21 December 2001 on specific actions related to the specific needs and problems of landlocked developing countries, by which the Secretary-General was requested to convene an international ministerial meeting on transit transport cooperation. Subsequently, by resolution 57/242 of 20 December 2002 on preparations for the International Ministerial Conference on Transit Transport Cooperation, it was decided that an International Ministerial Conference of Landlocked and Transit Countries and Donor Countries and International Financial and Development Institutions on Transit Transport Cooperation should be convened at Almaty on 28 and 29 August 2003.

By resolution 57/242, the General Assembly also requested the Secretary-General of the Conference to organize, in close cooperation with the regional commissions, a number of intergovernmental regional and subregional meetings as part of the preparatory process for the Ministerial Conference. In response to this request, the Secretariat developed a methodology for analyzing transit transport corridors and analyzed four case studies. The framework of recommendations and action plan were subsequently reviewed and endorsed by the Commission at its 59th session (first phase) on 24-25 April 2003 as the regional platform to be submitted to the International Ministerial Conference. The key issues contained in the action plan are:

- Policy-related actions
- Improved coordination within and between countries
- Trade and transport facilitation
- Promoting competition in the provision of transit transport services
- Better monitoring
- Enhancing transit infrastructure
- Application of ICT
- Capacity-building and human resources development for transit transport
Issues

Efficient transit transport is crucial for landlocked nations. Due to their lack of territorial access to seaports and the prohibitive cost of airfreight, landlocked countries have to rely on the transport of goods by land through one or more neighbouring countries. The additional costs incurred together with the problems of distance, make imports more expensive and render exports less competitive, thus putting landlocked countries at a disadvantage in the global economy. Some of the major factors influencing the transit transport systems of landlocked and transit developing countries in the Asian region are:

- Availability and quality of infrastructure
- Limited choice of routes
- Trade and transport facilitation and border crossings issues
- Opportunities of intermodal transport
- The importance of cross-border cooperation
- Transit transport agreements
- Changing global economy

Time-cost diagrams

For the analysis of routes and corridors, ESCAP has promoted the use of time-distance and cost-distance diagrams along specific paths through the networks across borders and across transport modes. This approach was also used for the case studies contained in the transit study mentioned above.

In the time-cost approach, costs and time associated with transport by any mode (road, rail, inland waterway and sea) and with transfers between modes (at ports, rail freight terminals and inland clearance depots) as components are included. The approach is based on the premise that the unit cost of transport varies between modes and this gets reflected in the cost curves. For volume movements, sea transport is generally cheapest per tonne per kilometre and road transport is normally the most expensive, with transport by waterway and rail in an intermediate position.

This simple approach has proved to be useful in the debate over the value of time in freight transport operations by analyzing transit times by mode and route. The longer freight takes to reach its destination (including dwell times at terminals), the greater will be the implicit interest costs of working capital. Total implicit costs may, however, be a good deal higher, since some goods may be needed urgently and business may be lost if goods arrive too late. The value of time will ultimately depend on the nature of the commodities being transported. It may be pointed out that the cost of delays has also to be taken into account when appraising the risks attached to specific routes and transport modes. As part
of the analysis of the transit routing decision, it is important to examine the trade-
off between the monetary outlays for transport and the implicit costs of time.

Points of transhipment, at border crossings or between modes, are incorporated
into the cost curves as vertical steps. For example, at ports and inland terminals,
a freight handling charge is levied without any material progress being made along
the supply chain; therefore, the costs incurred here are represented by a shift upwards
in the cost curve at these points. The vertical steps can also be broken down to
reflect different types of charges or processes involving time, such as
document fees, transit charges and
cargo clearance costs. In this
regard, bottlenecks at points of
transhipment can be analyzed in
themselves and as part of the
overall route.

Using this time-cost
approach, results from the ESCAP
transit study of 2003 are
summarized in Figures 13 and 14.

Recommendations
and action plan

The recommendations listed
below have been formulated and
refined through the four
subregional seminars held in
Kazakhstan, Lao People’s
Democratic Republic, Mongolia,
and Nepal and endorsed by the 59th
session of the Commission (first
phase) on 25 April 2003. They seek
to focus resources and inputs of
landlocked and transit developing
countries, donor countries,

Figure 13: Average transit time for the export of
containerized cargo (Per TEU; for Kazakhstan –
Germany per half of 12 meter semi trailer)

Figure 14: Average transit costs for the export of
containerized cargo (Per TEU; for
Kazakhstan – Germany per half of 12 meter
semi trailer)

110. The transit routes researched were: Ulaanbaatar – Zamiin Uud – Erenhot – Tianjin Port (rail);
Almaty – Kurlin – Krasnoe – Berlin (road); Kathmandu – Birgunj – Raxaul – Kolkata Port
(road); and Vientiane – Thanaleng – Nong Khai – Bangkok Port (road).
international financial organizations, development institutions and the private sector on improving the efficiency of transit transport and thereby access to global markets. The recommended actions also recognize the increasingly important potential of landlocked countries to provide transit opportunities for their neighbours, an important factor in the planning of future transit arrangements.

(a) **Policy-related actions**

While landlocked countries do need the cooperation of neighbouring countries in developing efficient transit transport and access to international markets, they also need to demonstrate their commitment to improve the transit process through the formulation and implementation of a clear and consistent national policy. It is important that landlocked countries coordinate among themselves, ensure representation at international meetings and articulate their position with a single voice.

(b) **Improved coordination within and between countries**

Along with the development of transport infrastructure comes the need to formalize arrangements with regard to the operation and facilitation of transit transport. Multiple agreements at a bilateral, trilateral and subregional level along with international conventions are resulting in some countries having overlapping and sometimes contradictory obligations. The need to ensure a consistent, and to the extent possible, harmonized legal regime for transit transport across the region is thus important.

(c) **Trade and transport facilitation**

Simplification and harmonization of transit transport documentation along transit routes and across the region could lead to immediate benefits in terms of simplification of procedures and reduction in transit costs and time. With the potential growth in transit transport through landlocked countries, both landlocked and neighbouring transit countries can benefit from actions taken to increase the efficiency of transit transport. As road transport takes on an increasingly important role in providing transit transport services, there is need to consider equitable approaches to the charging of transit/road maintenance fees.

(d) **Promoting competition in the provision of transit transport services**

Transport service providers from landlocked countries are sometimes restricted from offering services in the territory of their transit neighbour, even for the carriage
of national goods in transit. Limited competition between operators, modes of transport and alternative routes may lead to inefficient pricing policies and services.

(e) Better monitoring

The cost/time diagrams utilized in the ESCAP case studies can provide countries with a snapshot of the current performance of transit transport routes. They can also provide policy makers with a clear view of the critical problems facing transit transport and a methodology for monitoring the impact of efficiency improvements. They could facilitate comparisons with other transit routes/border crossings within and outside the country, with a particular focus on, and the identification and transfer of, best practices.

(f) Enhancing transit infrastructure

Development of transport and information and communications technology (ICT) infrastructure, and completion of the “missing-links”, would improve transit transport and enable landlocked countries to provide transit transport services to neighbouring countries. An integrated approach is needed to balance competing priorities in the development of road, rail and other infrastructure. While alternative transit routes are important, volume and economies of scale contribute to the reduction of unit costs. The availability of a choice of routes will allow the trade and transport industries to select the most effective route on a commercial basis. In this context, it may be pointed out that the role of the private sector in providing and managing infrastructure facilities along transit corridors is still limited.

(g) Application of information and communications technology

ICT applications can assist customs authorities in performing their duties and in building a data bank of information. ICT applications can also effectively increase the efficiency of various processes within the transport sector, provide connectivity between neighbouring countries and enhance the ability of shippers to track their goods.

(h) Capacity-building and human resources development for transit transport

Landlocked countries need to create a greater awareness of international developments with respect to transit transport and increase the capacity of government officials and private sector in addressing issues of concern.
Facilitation Agreements

Resolution 48/11

The forty-eighth session of ESCAP\textsuperscript{111} adopted resolution 48/11 of 23 April 1992 on road and rail transport modes in relation to facilitation measures, which recommended that countries in the region should consider acceding to seven international conventions in the field of international land transportation facilitation as a cost-effective prerequisite step towards enhancing road and rail transport routes throughout the region. Twenty-eight countries in the ESCAP region are members of the project.\textsuperscript{112}

In order to facilitate the movement of goods, people and vehicles across international borders, there are around 50 international conventions. In the ESCAP region, the ESCAP Secretariat has been working closely with the International Maritime Organisation (IMO) and the Economic Commission for Europe (ECE), the body designated within the United Nations system with the responsibility for land transport conventions, in promoting a selected subset of these conventions including the following:

- Convention on Facilitation of International Maritime Traffic (FAL 1965) (1998 edition);
- Convention on Road Traffic (Vienna, 8 November 1968);
- Convention on Road Signs and Signals (Vienna, 8 November 1968);
- Customs Convention on the International Transport of Goods under Cover of TIR Carnets (TIR Convention) (Geneva, 14 November 1975);
- Customs Convention on the Temporary Importation of Commercial Road Vehicles (Geneva, 18 May 1956);
- Customs Convention on Containers (Geneva, 2 December 1972);
- International Convention on the Harmonization of Frontier Controls of Goods (Geneva, 21 October 1982); and

\textsuperscript{112} http://www.unescap.org/tdw/
The implementation of Resolution 48/11 has been supported by a number of ESCAP activities, including:

(i) Seminars on implications of accession to land transport facilitation conventions for:

- ECO countries (Tehran, 15-17 November 1994);
- North-East Asian countries (Bangkok, 8-10 May 1996);
- Greater Mekong area (Bangkok, 26-29 November 1996);
- SAARC countries (Dhaka, 8-10 December 1997);
- World Bank/ESCAP regional technical workshop on South Asia regional transport and transit facilitation (Bangkok, 19-21 April 1999);
- national seminars: Myanmar and Thailand (Bangkok, April 1998); Hanoi and Vientiane (17-19 and 21-23 September 1998, respectively); for Bangladesh and India (New Delhi, 19-21 May 1999); Phnom Penh (31 May-2 June 1999); Beijing (19-21 July 1999);

(ii) Publications, including the proceedings of each of the above seminars as well as:

- “Transport Planning for Landlocked Countries: Transit and Border-Crossing Issues” (ST/ESCAP/1484, 1995);

During the period 2001-2002, Azerbaijan acceded to the Convention on Road Traffic (1968) and Georgia acceded to the Convention on Road Signs and Signals (1968). Mongolia also ratified the Customs Convention on the International Transport of Goods under Cover of TIR Carnets (TIR Convention) in 2002, which made the TIR system operational from Europe to northern part of North-East Asia through Central Asia.

The Agreement for Facilitation of Cross-border Transport of Goods and People in the Greater Mekong subregion has incorporated major provisions of the seven conventions into its annexes which are being negotiated.

**Subregional framework agreements**

Countries of the region are also developing subregional framework agreements designed to facilitate the movement of goods, people and vehicles across borders.
(a) **ASEAN**

By promoting the FAL convention and the seven conventions contained in resolution 48/11, the ESCAP Secretariat has assisted ASEAN in the development of a multimodal transport framework agreement, which will provide the basis for domestic legislation on multimodal transport.

The ASEAN Framework Agreement on the Facilitation of Goods in Transit was signed on 16 December 1998. Nine protocols on specific arrangements of transit transport were planned for implementation of the agreement. Following signing of the agreement, 3 protocols were concluded during the period 1999 – 2000. Two protocols were signed in 2001 and 2002, namely, Protocol 5, the ASEAN scheme of compulsory motor vehicle third-party liability insurance, and Protocol 9 on dangerous goods. Four more protocols on transit routes and border posts and customs procedures are expected to be signed in the near future: these will enable the practical operation of transit transport under the agreement.

The ASEAN countries are also negotiating the ASEAN Framework Agreement on the Facilitation of Inter-State Transport to simplify and harmonize requirements for cross-border transport.

(b) **Greater Mekong Subregion**

The Greater Mekong Subregion includes China (Yunnan Province particularly) and five ASEAN member countries, namely, Cambodia, Lao People’s Democratic Republic, Myanmar, Thailand and Viet Nam. The Agreement for Facilitation of Cross-border Transport of Goods and People was signed by Lao People’s Democratic Republic, Thailand and Viet Nam on 26 November 1999. It was acceded to by Cambodia on 29 November 2001 and by China on 3 November 2002. Myanmar is also expected to sign in the near future. The agreement is supplemented by 15 annexes and 3 protocols to form an operational system for cross-border and transit transport. The negotiation on 7 annexes and 1 protocol was started in 2002 as the first of three stages to be entirely completed in 2005.

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(c) TRACECA

The Basic Multilateral Agreement on International Transport for the Development of the Transport Corridor Europe-Caucasus-Asia routes, and its technical annexes were signed by Armenia, Azerbaijan, Bulgaria, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Romania, Tajikistan, Turkey, Ukraine and Uzbekistan on 8 September 1998. An Inter-Governmental Commission (ICG) TRACECA has been established to administer and promote the agreement. The signatories to this agreement are also contracting parties of major conventions on international land transport formulated under the auspices of ECE. The basic principles and requirements for international land transport under the agreement are complemented by the conventions. A project on harmonization of border crossing procedures commenced in 2001 to standardize the documents and control the processes.

(d) ECO

The members of the Economic Cooperation Organisation (ECO), namely, Afghanistan, Azerbaijan, Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkey, Turkmenistan and Uzbekistan, signed the Transit Transport Framework Agreement on 9 May 1998. In 2002, ECO undertook a reconciliation of the inconsistencies between this agreement and the Transit Trade Agreement signed on 15 March 1995. The eight annexes of the agreement will be in place after the completion of the reconciliation process.

ECO is making efforts to promote the application of the TIR Convention across the ECO region. The Central Asian countries issued 9,450 TIR carnets in 2002.

Bilateral agreements

In addition, an increasing number of bilateral agreements have been concluded. See, for example, the Review of developments in transport in the ESCAP region, 2003\textsuperscript{116}.

\textsuperscript{116} http://www.unescap.org/tdw/Publications/TPTS_pubs/pub_2307.pdf
IV.1

International Production Systems and Connectivity of Hinterlands

The Story

In contrast to previous phases of globalization in world history, this time transport infrastructure development has been a major driver of far-reaching qualitative changes in the internationalization of production. In fact, the impressive growth of shipping in Asia is in large part due to the formation of regional production networks (RPN) in Asia\footnote{117. similar to those in other world regions, e.g., in Europe.}, whereby countries have specialized in the production of particular components which are shipped from one country to another until final product assembly, a process that is often referred to as ‘regionalization’ (see Section II.4). The following “story” captures the essential ingredients of this process:

In Asia, the process of internationalization of production gathered momentum in the mid-1980s, when a number of countries of the region started to lower their barriers to trade and investment. This was particularly the case in the newly industrializing economies (NIE) and ASEAN 4, which introduced outward-looking structural reform policies that moved away from import-substitution production towards export-oriented production. These policies included liberalization of trade and foreign direct investment (FDI) as well as deregulation of domestic economic activities, the aim being to stimulate economic growth.

The impact of these policies is often referred to as the “East Asian Miracle”. FDI inflows increased twelve-fold and East Asian exports increased five-fold between 1985 and the “East Asian Crisis” in 1997. Annual economic growth during this period in these economies exceeded that of most other economies in the world. One of the features of the FDI was that the multinational corporations active in the region established factories that specialized in the production of specific components of finished goods. As a result, regional production networks (RPNs) were formed which, in turn, increased intra-industry trade within the region.

In assessing the contribution of transport to the emergence of RPNs, it has been the developments in the maritime sector that have been the primary motivating
force. Probably the most important factor contributing to the massive productivity and cost savings in transport was the advent of the marine container and the container ship. Since the 1970s, container ship size has increased more than fivefold to over 5,000 TEUs in Post-Panamax Plus ships, in order to exploit economies of scale. In order to keep these ships moving, operators have introduced various network structures, including mainline-feeder (hub-and-spoke) and pendulum services. These route structures, combined with increased ship speed and reduced time in port, have reduced transit times, improved service reliability and increased service frequency (with many operators providing “day-of-the-week” calls at named ports).

Further, to achieve the significant productivity gains from the container and changes in shipping technology, complementary, large-scale investments were required in seaports. Access provided by these seaport locations to international and domestic markets has attracted the FDI of corporations engaged in RPNs, a process which has received policy support through the development of industrial estates and special economic zones. As a result, it is mainly the coastal areas of East and South-East Asia that have benefited economically from this process (Figure 15). These coastal areas are not only richer than inland sites but have seen much faster growth too, exacerbating spatial inequalities in each of these national economies.

In addition, spatial concentration of economic activities, particularly in megacities, has been a key feature of rapid development in Asia. In essence, megacities have taken up the role that special economic zones played in the past three decades. For example,

Figure 15: Night light density map of Asia and location of major ports. Night light density is a good proxy for GDP (linear relationship). Created with ESCAP’s GIS tool.

Data source: NOAA\textsuperscript{118}

Bangalore accounts for 25% of India’s software exports, with some 100,000 workers (or 0.01 percent of population) in the city producing 3% of India’s exports. Another key feature is sectoral concentration. There is surprisingly little overlap in the top product lines of quite similar countries.119.

Vision

As it has been mainly coastal regions of Asia and the Pacific that have benefited from the current phase of globalization by becoming important nodes in the regional production networks, how could these international production networks be extended to all ESCAP member countries, their national hinterlands and even landlocked countries that currently face marginalization?

Systems view

One comprehensive way to describe the vision of a desirable future transport network in Asia and the Pacific is to take a systems view that aims to take into account all important interrelationships between all relevant subsystems.

A strategy to support such an extension in terms of its transport aspects could be based on strong linkages to trade, investment and ICT, and could be predicated upon a model that promotes physical access to hinterlands and neighbouring countries. Such a model envisions a phased approach which commences with capacity building in developing unimodal transport links and nodes of international importance. It then moves towards integrating the modes into an intermodal network. In parallel, the model envisions development of nodes that support increased efficiency of the system, adding value and creating employment in areas that are in danger of being marginalized in the globalization process. Such nodes may include a spectrum of functions ranging from inland container depots simply providing transfer facilities, the addition of value added logistics services to the nodes through to special economic zones. In implementing the model, attention will be paid to both the development of infrastructure and operationalization of the network.

In particular, ESCAP has been focusing on the development of international transport corridors that have been designated as priority by ESCAP member countries. This is the approach taken by ESCAP’s Trans-Asian Railway Network (TAR), the Asian Highway (AH), the Euro-Asian Linkages Project and other initiatives.

These corridors provide pieces of an intercontinental Euro-Asian ‘puzzle’ that is geared to promoting an extension of production networks. In essence, the vision of such an extension follows the historical process of transportation network development that leads to corridors. For example, it happened in North America and elsewhere in the world. Following is an excellent description by Jean-Paul Rodriguez:\(^{120}\):

“Phase A (Scattered ports): A set of small trade ports are established along a coastline. They are connected to a wider network of trade and provide access to locally supplied resources.

Phase B (Penetration lines and port concentration): Trade lines accessing the hinterland are constructed permitting the development of new resources and/or markets. The ports to which they are connected grow in proportion to the new traffic generated.

Phase C (Development of feeders): The hinterland of penetrating lines is further expanded by the development of feeders.

Phase D (Beginning of interconnections): The transport networks that have so far been developing independently gradually become interconnected. Intermediate centers also start to emerge.

Phase E (Complete interconnection): As the level of connectivity increases, traffic tends to concentrate in the most connected ports (often corresponding to the largest cities), implying that several less well-connected ports decline or disappear.

Phase F (Emergence of high priority links): Economies of scale favour the concentration of traffic along the most efficient links, supporting the emergence of transport corridors. Links having lower volumes can even be closed down. The regional transport system has thus reached a phase of maturity and the structure of the network is unlikely to change unless there are significant economic or technological developments.”

Countries of Asia and the Pacific are at various stages of this development process. ESCAP’s Asian Highway Network is aiming to support Phases B, D, and F of this extension network, as it will provide the backbone land transport network. In fact, in Section IV.2, we will argue that upgrading the Asian Highway (everywhere to at least grade three) implies only a doubling of currently committed investments.

into the Asian Highway of the order of US$20 billion. This amount is small compared to total financing needs of roads in Asia and the Pacific, hence the benefit of prioritization.

As population densities in East, South-East and South Asia are considerably higher than in North America, and are more in line with those in Japan and Europe, it is likely that railways will play an increasing role in Asia in the future, to complement and substitute for road transport in the backbone network functions. In other words, a desirable vision of the land transport system of Asia would see a re-emergence of railways (Phase G). Early signs of this can be seen, for example, in China today. Such a phase G would also have substantial environmental and safety benefits.

It appears that strategic transport infrastructure investment at a regional level could lead to a similar rapid growth pattern of those Asian countries that are currently facing marginalization. The timeline for this process will vary from country to country, but an ambitious scenario would see all ESCAP member countries participating in and benefiting from the world’s most important regional production networks at least by 2030. Finally, it should also be noted that this extension process to inland sites would not come at the expense of coastal areas and port development. On the contrary, ESCAP container forecasts foresee a huge expansion of container shipping and berth development (see Box 3).

**International routes**

Another way to describe the vision of a desirable future transport network in Asia and the Pacific is to focus on what it would mean for international routes. This perspective is essentially the one that shippers and many national transport policy makers take. In contrast to the systems view, it is easier to apply and provides hands-on indication on what might need to be done to make the vision happen.

In the international context, the availability of *choice* among alternative competing international transport routes is of key importance. Increased choice is a common consequence of network integration. Taking a perspective focused on international routes, the ESCAP Secretariat suggests to consider the usefulness of the following “transport vision statement” of an integrated transport network in Asia and the Pacific:121, 122

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121. The authors are grateful to Vladimir N. Timofeev for providing the transport vision statement.
Box 3: ESCAP Forecasts of container shipping for 2015 with the Maritime Policy Planning Model

Forecast of container shipping service requirements: According to a recent joint study of UNESCAP, APEC and KMI, utilizing the Maritime Policy Planning Model developed by UNESCAP, the annual average growth rate of the world’s full container trade was estimated at 6.5 percent during the period from 2002 to 2015 compared to 8.5 percent during 1980 to 2002. The increasing prominence of China in the world container transport market is noted now as it accounts for 20 percent of the world container handling and nearly a half of the Asian total.

Forecast of container port throughputs: It was estimated that the world port throughput of international container cargo will increase from 242.5 million TEU in 2002 to 576.4 million TEU in 2015, representing 6.9 percent of annual average growth rate. During the same period, international container port throughput in Asia and the Pacific will increase from 133 million TEU to 352 million TEU, equivalent to an annual average increase of 7.7 percent, increasing the region’s share from 55 percent to 61 percent. World container transhipment volume will increase from 30 million TEU in 2002 to 76 million TEU in 2015 at an annual increase rate of 7.7 percent. According to the preliminary study forecast, 927 new container berths in the world, of which 569 berths in the ESCAP region will be required to meet the increased throughput in 2015.

Extension of the Maritime Policy Planning Model (MPPM): The ESCAP Secretariat is currently working on an extension of its MPPM model to land transport in order to be able to give better quantitative policy guidance on the process described above.

Transport vision statement: “Integrated, intermodal international transport and transport logistics system that provides a choice of international alternative competing routes, thus reducing costs and improving quality of services. Such a system will have the capacity to change both the destination and the delivery path for goods already en-route.”121,122

The key word in this description is choice. This may also include choice in various dimensions, such as choice in terms of economic and financial performance, flexibility, speed, quality of service, reliability, safety and security, and, above all, choice in terms of the availability of physical routes which may increase system resilience and help mitigate risks related to natural disasters and political instabilities.

Main building blocks of such a system are international unimodal and intermodal transport routes formalized through intergovernmental agreements, such as in para (b) below.

From a route-specific point of view, the achievement of the transport vision in Asia and the Pacific will require various elements to be put in place, such as:
(a) **Identification of Integrated Eurasian Transport Corridors**

In terms of land transport routes in Asia, long-distance linkages between Europe and Asia are of key importance. In view of huge Eurasian landmass and in order to support national prioritization for land transport infrastructure development, various steps have been taken in recent years to *formulate* (i.e., identify) broad corridors and eventually *formalize* (i.e., through international agreements) international routes.

For example, since 1998, a series of Euro-Asian Conferences on Transport have been held in St. Petersburg at the initiative of the Russian Federation and with the support of ESCAP and ECE. The 2\textsuperscript{nd} such conference in Sept. 2000 identified four main Euro-Asian transport corridors as the backbone network:

*Trans-Siberian:* Europe (PETCs 2, 3 and 9) – Russian Federation – Japan, with three branches from the Russian Federation to: (a) Kazakhstan – China; (b) Korean Peninsula; and (c) Mongolia – China;

*TRACECA:* Eastern Europe (PETCs 4, 7 8, and 9) – across Black Sea – Caucasus – across Caspian Sea – Central Asia. TRACECA was initiated as a programme more than 10 years ago by the European Union (EU) as an additional route to the existing transport corridors and promotes optimal integration with the Trans-European Networks (TENs);

*Southern Corridor:* South-eastern Europe (PETC 4) – Turkey – Islamic Republic of Iran with two branches to: (a) Central Asia – China, and (b) South Asia – South East Asia/Southern China; and

*North-South Corridor:* Northern Europe (PETC 9) – Russian Federation, with three branches: (a) Caucasus – Persian Gulf, (b) Central Asia – Persian Gulf, and (c) Across the Caspian Sea – Islamic Republic of Iran – Persian Gulf.

The third St. Petersburg Conference held in September 2003 recommended a *Strategy for the Development of an Integrated Euro-Asian Transport System*\textsuperscript{123}, as well as several support measures and a number of specific initiatives. The strategy focuses, inter alia, on:

- formulation of integrated intermodal international Euro-Asian transport routes/corridors and networks;
- formalisation of international transport routes/networks through related international agreements or amendments to existing ones, as a basis for their coordinated development;

\textsuperscript{123} Proposed by ESCAP. Details were published later in ECE document number TRANS/2004/12.
facilitation of transport at border-crossings and ports based on relevant international conventions;
- analysis of routes/corridors;
- operationalization of international transport routes and their periodical performance evaluation;
- development of Public-Private Partnership with freight forwarders and multimodal transport operators.

(b) Compatible international transport agreements in both Europe and Asia

The Strategy for the Development of an Integrated Euro-Asian Transport System recommends that formulation of corridors need to be complemented by formulation and formalization of international routes. A number of international agreements in Europe and Asia have emerged as building blocks in this process:

Asia\textsuperscript{124}:
- Intergovernmental Agreement on the Asian Highway Network, 2005;
- Intergovernmental Agreement on the Trans-Asian Railway Network, signed in November 2006;

Europe\textsuperscript{125}:
- European Agreement on Main International Traffic Arteries (AGR), 1975;
- European Agreement on Main International Railway Lines (AGC), 1985;
- European Agreement on Important International Combined Transport Lines and Related Installations (AGTC), 1991;
- European Agreement on Main Inland Waterways of International Importance (AGN), 1996;

Europe-Asia:
- Organization for Cooperation of Railways (OSJD) Agreement on organizational and operational aspects of combined Euro-Asian transport, 1997.\textsuperscript{126}

The vision of a desirable future transport system in Asia and the Pacific would foresee these agreements to serve as initial building blocks for the eventual

\textsuperscript{124} http://www.unescap.org/tdw
\textsuperscript{125} http://www.unece.org/trans/conventn/legalinst.html
\textsuperscript{126} This agreement identified a number of Euro-Asian railway corridors and routes.
development of a formalized intermodal network in Eurasia which will also comprise of IWT, sea and air routes.

(c) High performance land transport links between major trade partners

Once formalized, these networks need to be optimized in terms of their performance. In particular, the performance of the future integrated intermodal Eurasian transport system will be measured in terms of its provision of high performance land transport links between major trading partners. Regular integrated assessment of specific alternative routes (e.g., Astana, Kazakhstan to Berlin, Germany) according to objective criteria may help improve route performance. Common criteria used for this purpose are of a technical (e.g., container dimensions), commercial (e.g., time, money, and level of service, including reliability and en-route information), or operational (e.g., reasonable, reliable, sustainable) nature. They may also refer to logistics capacities (e.g., dry ports, logistic centres, communications bandwidth), relate to necessary equipment (e.g., cranes for 40ft containers), or to broader policy objectives, including environmental, safety and poverty aspects.

(d) Multilateral solutions for transit issues

Finally, it should be borne in mind that it may not be possible to realize this vision in a unilateral fashion. Multilateral solutions will need to be found to solve the many transit and cross-border transport issues. Development of such solutions may best be organized as some kind of public-private partnership with the possibility of participation by all relevant stakeholders.

Synthesis

This Section briefly outlined two complementary perspectives of the same vision of desirable future transport system in Asia and the Pacific. Depending on the purpose, either one of these perspectives may be more useful to decision-makers. However, it should also be noted that a perspective focused on international routes, while being easier to apply and understand, is necessarily an incomplete description of the vision and, therefore, needs to be cross-checked with more comprehensive views, such as the systems view presented above.

Remaining Gaps

In order to make the desirable vision of a future transport system a reality, a significant number of gaps and deficiencies which remain would need to be removed, and are, therefore, of particular interest to transport policy makers.
As a result of the emerging regional production networks organized along major ports in the region, the benefits of globalization have been confined to coastal areas. Another factor contributing to the concentration of development in coastal areas of countries of the region has been inadequate land transport infrastructure and services connecting seaports to their deeper hinterland. A typical landlocked developing country has transport costs that are 50 percent higher and volumes of trade that are 60 percent lower than countries with coastal access.

Due to various historical reasons, land transport networks of UNESCAP member countries with maritime coastlines are oriented towards their major seaports; inter-country land transport linkages are not well developed; and goods in the hinterland of one country have to follow a circuitous route to reach the hinterland of another country (if they move at all).

The ‘logical extension’ of the ocean fleet to double-stack train services with direct transfer from ships to trains, as is the case in the United States, is one example of how integrated, intermodal, international transport services can change the concept of transport from that of a stop-start process to a smooth flow of goods and people. In parallel with the discussion on “globalization”, considerable attention has currently been focussed on concepts, such as “logistics management”, “supply threads”, “supply chains”, “value threads”, “value chains” and “production networks”. These chains and networks are being developed within an environment that encompasses physical trade and investment policies, and inputs including: human resources; infrastructure; services; and capital equipment. Each of these policies and availability of inputs will influence location decisions for each of the activities in the chain or network as well as the way in which goods, services and information flow through the chain or network.

Huge disparities in terms of land transport development persist in the ESCAP region. Essentially, in most areas such development has only started. This also applies to port hinterland areas on the subnational level, including even the West of China.

In order to economically move inland sites closer to the coastal production networks, inland container depots (ICDs) have been promoted and connected efficiently to ports. The idea is to realize similar scale economies around ICDs as exist around ports. In fact, 80 percent of general cargo in terms of value and 50 percent in terms of weight, today move by containers. A recent ESCAP study127

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reviewed the status of ICD development in Asia, clearly indicating that this process has just started and will require large-scale investments in the medium-term future.

Furthermore, there appear to remain major gaps in many ESCAP member countries in terms of addressing imminent urban transport issues. This is despite the fact that megacities have become major nodes in international production systems. In fact, megacities have taken the place that export processing zones, special economic zones etc. had taken in the past. This raises a wide spectrum of policy issues that need to be addressed in a coherent fashion from the local to the national government level. ESCAP has been addressing these types of issues through a number of its programmes, including the creation of CITYNET, an institutional network of cities that promotes city-to-city cooperation.
IV.2

Infrastructure Investment Needs and Financing

This chapter provides order-of-magnitude examples of investment needs and possible financing mechanisms that might be considered in extending fragmented, international production systems to inland sites in Asia, thus developing an Asian Integrated Transport Network.

Investment Needs

By any measure, investment needs for transport infrastructure in Asia and the Pacific in the coming years are the largest of all world regions, due to burgeoning economic growth and further integration of Asian economies into the world economy. It should be noted that investment needs presented in this Chapter are sums of actually identified priority projects of governments. Of course, such a wish-list approach produces different estimates than those based on the usual econometric estimates which essentially assume a continuation of historical dynamics. In other words, numbers presented here are the lower limits of what needs to be invested in order to achieve the desirable future targets. Yet, they are higher than estimates based on historical dynamics, implying a need to significantly increase infrastructure investments in the region.

International transport backbone network

The international backbone of the transport system consists of nodes, such as airports, ports and ICDs, as well as inland links, such as major railway lines and roads. In the case of Asia, the latter two have been formalized as Asian Highway and Trans-Asian Railway lines. In terms of international accessibility, these are the highest priority assets for investment purposes.

According to the annual forecast of ESCAP’s Maritime Policy Planning Model (MPPM), about 930 new container berths will be required in the world to meet the increased throughput in 2015. About 570 of these berths will be required in the ESCAP region and ESCAP estimates total investment needed at around US$36 billion for the ESCAP region, which is 65 percent of the total world investment needs. As inland sites in Asia are increasingly developed through ICDs and efficient intermodal connections, a similar level of investment will be required for the construction of ICDs in the future as for container ports today.
Under the recent ESCAP project on “Identifying investment needs and priorities for the development of the Asian Highway Network and related intermodal connections”, three subregional EGMs were organized in 2004 and 2005\textsuperscript{128} that reviewed the status of the Asian Highway network, identified investment requirements for the development of the network, including intermodal connections and prioritized projects of subregional importance. A consolidated picture from the meetings indicates that about US$21 billion is currently being invested or committed for the development of various sections of the Asian Highway routes in member countries. The subregional meetings also identified a shortfall of about US$18 billion required to further upgrade and improve about 26,000 km of Asian Highway in 26 member countries.

The ESCAP Secretariat estimates immediate investment needs to be of the same order of magnitude as those of the Asian Highway. In addition to more than 80,000 km of Trans-Asian Railway (TAR) network, thirteen major missing links have been identified. They make up a total of 7060 km requiring roughly US$13.5 billion for construction of single track lines. Furthermore, several thousands of TAR lines are still only single-track. To upgrade them to double-track lines would cost several billions of US dollars.

A significant share of global airport and air navigation services investment requirements of more than US$ 300 billion between 2000 and 2010 is being committed to airport infrastructure in the Asian and Pacific region, in order to cater for the growth in both passenger and cargo traffic and to accommodate new large aircraft and emerging budget airlines. Over the past decade, major new airports in the Asian and Pacific region at Chubu Centrair International Airport (Nagasaki), Baiyun International Airport (Guangzhou), Kuala Lumpur International (Kuala Lumpur), Chek Lap Kok (Hong Kong, China), Imam Komeini International Airport (Tehran), Osaka (Kansai), Incheon International Airport (Seoul) and Pudong International Airport (Shanghai) required a combined investment of more than US$ 50 billion. Bangkok’s new Suvarnabhumi Airport is due to open in 2006 and new airports are being constructed at Bangalore and Hyderabad in India. Current plans are to continue the development of these new facilities, to upgrade existing hub airports and to construct completely new airports requiring at least another US$20 billion funding by 2010. In the past two years in Asia and the Pacific, eight new terminal and building extensions have been completed, while work is underway for the construction of three terminals and seven new terminals have been planned.

\textsuperscript{128} For SAARC (with participation of Afghanistan and the Islamic Republic of Iran) on 21-23 Sept. 2004 in Islamabad; North, central and South-West Asia on 23-25 January in Tehran; and for South-east Asia (with participation of Mongolia) on 25-26 April 2005 in Bangkok.
Access networks and secondary and feeder routes

Typically, more than half of a developing country’s public investment in the transport sector is in roads. This is also mirrored by the fact that roughly 70 percent of the World Bank transport loan portfolio remains to be for the road sector. This is despite the Bank’s policy change since the early 1990s to focus on direct poverty alleviation rather than an approach targeting merely economic growth. However, this shift and the full adoption of the results-based budgeting approach has led to an increased investment in rural access roads, in order to make it possible to define a clear target group of people whose poverty has been reduced as a result of the infrastructure intervention.

Financing of rural roads has become a big issue. The grand total for connecting all the currently unconnected villages (roughly 50 percent of the total) with all-weather black-topped roads has been estimated at US$ 26 billion (Rs. 1,11,000 crore), excluding the cost of major bridges129. This compares with currently130 committed investments in the Indian sections of the Asian Highway, i.e., the road backbone network, of roughly US$ 3.6 billion. Similarly, the Chinese government plans to construct 400,000 kilometres of new rural roads to connect 80 percent of all villages in China by 2020, compared to currently committed investments of US$ 6.6 billion in the Chinese sections of the Asian Highway. This indicates that financing needs for rural roads in the region might be one order of magnitude larger than for the road backbone network.

As governments and donors have focused on international connectivity on the one hand and access networks on the other hand, the part in-between, i.e. the secondary and feeder roads have been increasingly neglected. In some cases, this has become a serious issue, as the efficiency of the road system depends on the state of all its links and nodes.

No reliable overall estimates exist of the financing needs for urban transport, including mass transit systems, in Asia and the Pacific. However, rough estimates of investment needs for urban transport are approximately as large as those for airports and seaports combined.

Contributions of individual, private investments

While investments in road and railway infrastructures have been almost entirely public investments by governments, the fact is often overlooked that such public investments lead to much larger private investments.

129. PMGSY project in India, http://www.pmgsy.nic.in/pmg216.asp
130. as of July 2004
For example, for each dollar of public investment in new roads there are typically ten dollars of private investment (e.g., in cars, etc.) to make the system operational and to be able to provide road transport services.

**Future liabilities for maintenance**

Besides investment costs, future liabilities for maintenance costs need to be taken into account. This applies especially to rapid national rural road access projects. If a large share of the roads have a similar age, subsequent maintenance needs will also cluster at one point in time. A case in point is the massive rural road projects in South Asia which, not surprisingly, coincide with serious underfunding for road maintenance. Similarly, road and rail maintenance is a major issue in Central Asia.

**Transport Investment needs to achieve the MDGs**

The question that is often asked is about approximate transport investments needed in order to help achieve the MDGs. The focus of the answers is then mainly on provision of rural access roads, and the replicability of direct poverty interventions is discussed. While this seems to be the obvious direction to take, it does not appear the most efficient approach. In this context, comparison between poverty effects of infrastructure investments in China and India is often made. China’s phased focus first on international connectivity and later on domestic access has been more successful in overall poverty reduction, but has led to higher inequality. While there are clearly problems with such a direct comparison, the superior performance of the Chinese infrastructure model is easily understandable for at least two reasons:

(i) Investment needs for transport backbone networks are only a fraction of the investments needed for providing nation-wide access, yet the economic benefits derived by countries are very large, even though they initially accrue only to few locations. The ESCAP Secretariat estimates the investment needs\(^{131}\) for transport infrastructure in developing and transition economies of the ESCAP region at an average of US$224 billion per year between 2005 and 2015\(^{132}\). This compares to only US$14-18 billion per year for the transport backbone networks (including roads, rail, airports, ports and dry ports).

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131. Dynamics-as-usual assumption.
(ii) It is simple logic that building a road to a rural village will not make much difference if the linkages to the rest of the network are not well-developed. In the end, what really counts is whether the infrastructure intervention improves the linkage to economic opportunities. The significant poverty alleviation effect in a corridor (with a width of walking distance) along inter-city trunk roads in India is a case in point\textsuperscript{133}.

In conclusion, it appears that the most cost-effective transport infrastructure intervention for achievement of MDGs is a phased one that tries to adjust an optimal combination of international and domestic connectivity at any point in time.

\textbf{Financing Mechanisms}

In view of the large investment needs identified in this study, countries will have to explore all possible financing options that are available to them, including traditional public expenditure, loans provided by development banks, official development assistance, and different types of private sector participation.

\textit{Private sector participation}

\textit{(a) Current trends}

A number of different mechanisms exist via which the private sector may participate in the development projects in general, and in transport infrastructure projects in particular.

\textit{Reduced private sector capital flows into the transport infrastructure development in the region:} A recurrent ESCAP publication, the ‘Review of Developments in Transport’ details trends in investments in transport infrastructure projects with private sector participation (PPI) in the ESCAP region and the rest of the world, between 1990 and 2003, and includes management and lease contracts, concessions, Greenfield and divestitures. Over this period, the majority of PPI projects in the ESCAP region, both in terms of the number of projects and their value in 2003 US dollars, were concession and Greenfield projects\textsuperscript{134}. The number and value of PPI projects in developing countries fluctuated dramatically between 1990 and 2003. In 1997, investment totalled US$22.4 billion, before dropping rapidly in the following years. As a result, despite a modest increase between 1999 and 2001, in 2003 total PPI transport investment amounted to only US$4.5 billion (Box 4).

\textsuperscript{133} Study by the Asian Institute of Transport Development (AITD), 2004.
\textsuperscript{134} All references to US$ value of PPI projects in this section from this point forward are in US$(2003).
Box 1: Transport sector project investments in ESCAP countries with private sector participation, 1990 - 2003 (millions of 2003 US dollars)

<table>
<thead>
<tr>
<th>Airports</th>
<th>US$ million</th>
<th>Sea Ports</th>
<th>US$ million</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vietnam</td>
<td>15</td>
<td>Myanmar</td>
<td>50</td>
</tr>
<tr>
<td>Thailand</td>
<td>16</td>
<td>Vietnam</td>
<td>100</td>
</tr>
<tr>
<td>Armenia</td>
<td>50</td>
<td>Russian Federation</td>
<td>102</td>
</tr>
<tr>
<td>India</td>
<td>125</td>
<td>Thailand</td>
<td>199</td>
</tr>
<tr>
<td>Malaysia</td>
<td>130</td>
<td>Sri Lanka</td>
<td>240</td>
</tr>
<tr>
<td>Cambodia</td>
<td>185</td>
<td>Turkey</td>
<td>335</td>
</tr>
<tr>
<td>Turkey</td>
<td>390</td>
<td>Pakistan</td>
<td>448</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>413</td>
<td>Philippines</td>
<td>960</td>
</tr>
<tr>
<td>Philippines</td>
<td>520</td>
<td>India</td>
<td>1,256</td>
</tr>
<tr>
<td>China</td>
<td>1,677</td>
<td>Malaysia</td>
<td>2,231</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Indonesia</td>
<td>2,586</td>
</tr>
<tr>
<td></td>
<td></td>
<td>China</td>
<td>4,884</td>
</tr>
<tr>
<td>ESCAP total</td>
<td><strong>3,520</strong></td>
<td>ESCAP total</td>
<td><strong>13,392</strong></td>
</tr>
<tr>
<td>Global total</td>
<td><strong>12,435</strong></td>
<td>Global total</td>
<td><strong>21,157</strong></td>
</tr>
<tr>
<td>ESCAP share of global</td>
<td><strong>28%</strong></td>
<td>ESCAP share of global total (percentage)</td>
<td><strong>63%</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Railways</th>
<th>US$ million</th>
<th>Toll Roads</th>
<th>US$ million</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>85</td>
<td>Bangladesh</td>
<td>-</td>
</tr>
<tr>
<td>China</td>
<td>2,070</td>
<td>Cambodia</td>
<td>7</td>
</tr>
<tr>
<td>Thailand</td>
<td>2,772</td>
<td>Vietnam</td>
<td>10</td>
</tr>
<tr>
<td>Malaysia</td>
<td>5,687</td>
<td>Lao PDR</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thailand</td>
<td>632</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Indonesia</td>
<td>934</td>
</tr>
<tr>
<td></td>
<td></td>
<td>India</td>
<td>961</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Philippines</td>
<td>1,309</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Malaysia</td>
<td>6,214</td>
</tr>
<tr>
<td></td>
<td></td>
<td>China</td>
<td>14,358</td>
</tr>
<tr>
<td>ESCAP total</td>
<td><strong>10,615</strong></td>
<td>ESCAP total</td>
<td><strong>24,525</strong></td>
</tr>
<tr>
<td>Global total</td>
<td><strong>27,627</strong></td>
<td>Global total</td>
<td><strong>64,330</strong></td>
</tr>
<tr>
<td>ESCAP share of global total (percentage)</td>
<td><strong>38%</strong></td>
<td>ESCAP share of global total (percentage)</td>
<td><strong>38%</strong></td>
</tr>
</tbody>
</table>

Shares by Subsector (percentage)

<table>
<thead>
<tr>
<th>Global</th>
<th>Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airports</td>
<td>10</td>
</tr>
<tr>
<td>Sea Ports</td>
<td>17</td>
</tr>
<tr>
<td>Railways</td>
<td>22</td>
</tr>
<tr>
<td>Toll Roads</td>
<td>51</td>
</tr>
</tbody>
</table>


The East Asian economic crisis greatly contributed to this contraction in private investment. Of all the ESCAP subregions, East Asia has historically received the greatest level of investment in transport infrastructure projects with private sector participation; on a global scale, it is second only to Latin America and the Caribbean. Since the crisis, however, investment has never returned to its pre-crisis position, attributable to private sector wariness towards the risks of such investment\textsuperscript{135}. In 1996, for example, PPI projects in East Asia totalled US$8.5 billion; after a notable variation in the intermediary period, by 2003 this had plummeted to US$1.7 billion.

\textit{Flows concentrate on few countries and few sectors:} The aggregate value of PPI transport projects completed world-wide during 1990 and 2003 was over US$120 billion, almost 40 percent of which were in the ESCAP region. Yet this activity took place in only 16 ESCAP countries, and mainly in 5 countries, namely, China, Malaysia, Thailand, The Philippines and Indonesia. Investment was the greatest in the roads sub-sector (US$ 25 billion), which accounted for one-half of all PPI transport projects. And over 50 percent of the 188 road projects took place in China, where US$14 billion was invested. In the same period, investments in projects with private sector participation in ports totalled US$13.4 billion, in railways US$10.6 billion and in airports US$3.5 billion.

\textit{(b) Public-private partnerships}

The 2005 and 2003 editions of the aforementioned ESCAP publication \textit{Review of Developments in Transport in Asia and the Pacific} include a list of major PPI projects. The publication also discusses examples of institutional development and policy and regulatory frameworks that have been introduced recently, in order to promote private sector involvement in infrastructure development. One major issue is the general lack of seed financing for feasibility studies, in order to take the governments’ project ideas to a stage where the private sector would get interested. This is a particularly acute problem in the smaller ESCAP economies.

\textit{Public sector}

Traditionally, it has been mainly the public sector that has directly borne the bulk of transport infrastructure investments. This is still the case in most ESCAP countries and particularly in the land transport sector, due to the concentration of private sector flows into few sub-sectors and few selected countries. As a result, the roles of private and public sector need to be defined on a country-by-country and subsector-by-subsector basis.

Cross-border financing

As differences in living standards are very large in the countries in the ESCAP region and benefits of transport infrastructure development spill over national borders, the possibility of cross-border financing (well beyond the ODA type) has recently received increased attention. It is particularly discussed in the context of transit transport and landlocked countries, as well as in terms of seed financing. One example of actual cross-border financing is the construction of a road for transit through Lao PDR connecting China to Thailand (Box 5). Innovative financing mechanisms such as in this case, hold particular promise for the region, particularly

Box 5: Subregional cooperation in road infrastructure development between Thailand, Lao PDR, China (Road between Boten and Houayxay)

One particularly interesting example of subregional cooperation for road infrastructure development is the current upgrading of the existing 228-kilometer road between Houayxay and Boten in the Lao PDR, with the objective to create an international north-south corridor linking Thailand and the People’s Republic of China (Figure 16).

This project is carried out under the framework of the Northern Economic Corridor of the Greater Mekong Subregion Programme (GMS) promoted by the Asian Development Bank (ADB). The project will help accelerate trade and transport in the GMS. It will also link two remote provinces of the Lao PDR to fast growing economies. Louang Namtha province is the most transport deficient province in the Lao PDR whereas Viangphoukha district of Bokoe province is among the poorest in the country. The project includes a social action plan for the ethnic minorities, and capacity building in environmental and social monitoring.

The improved road will follow a combination of class II and class III standards, with seven-meter wide paved road and pavements ranging between 1.5 meters and 2.5 meters in width. The total project cost is estimated at US$96 million. The governments of Thailand and the PRC have provided concessional loans estimated at US$30 million each on a bilateral basis to the Lao PDR. ADB will finance another third of the project cost through a loan of US$30 million, covering construction of 74 kilometers in the middle section, whereas the Government of the Lao PDR will cover the remaining costs amounting to US$7.3 million. The estimated project completion date is 31 December 2006.

Road maintenance will be financed through transit charges. In order to determine the level of fair and sustainable charges, ESCAP undertook a study of transit charges which also includes comparisons with charging practices in other parts of the world. The findings of the study are currently being assessed under Protocol 2 of the GMS Agreement for the facilitation of cross-border transport of goods and people (http://www.adb.org/GMS/Cross-Border/milestones.asp).
when combined with some sort of private sector participation (e.g., through transit fees).

Indeed, the general case for regional cross-border financing of transport infrastructure is very strong, as illustrated by a recent ESCAP study on Central Asian Accessibility\textsuperscript{136}. This study illustrates the accessibility impact of road upgrades, based on a comprehensive view of Central Asian road system. Take, for example, the route between the nationally and internationally accessible Shymkent and the less accessible Aktyubinsk. Assuming an upgradation of this route leads to a 10 percent increase in average speed along all links on the route, there are significant improvements in potential accessibility\textsuperscript{137} not only nationally in Kazakhstan, but also internationally, thus showing large positive externalities across international borders (Figure 17). The positive changes in accessibility are quite

\textbf{Figure 17: Changes in potential accessibility due to an upgrade of the road between Shymkent and Aktyubinsk, leading to an increase in speed by 10 percent}

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Figure17.png}
\caption{Changes in potential accessibility due to an upgrade of the road between Shymkent and Aktyubinsk, leading to an increase in speed by 10 percent.}
\end{figure}


\textsuperscript{137} Geographical accessibility assesses the potential for interaction through average time to reach places, while the potential accessibility is based on a gravity concept, where accessibility is a trade-off between attractiveness of places and the effort to reach them. More focus is put on the accessibility of the largest/capital cities than on other places, as these cities are more likely to function as growth poles.
striking along the route, and in places whose connectivity is dependent on this route\textsuperscript{138}.

The few other existing examples of such cross-border financing (mainly in Europe) show the great potential of such an instrument. However, they also show the need for adequate institutional mechanisms that are required for an efficient larger-scale application of such instruments and that are currently absent in the ESCAP region.

**Conclusion**

Under any plausible scenario, the ESCAP region faces increased investment needs in transport infrastructure in the coming decades. In particular, this chapter identified the need to significantly increase overall infrastructure financing in all ESCAP member countries to the order of US$ 220 billion per year for the ESCAP region as a whole, in order to create an Asian integrated transport network for international production networks to be gradually extended to inland sites of Asia.

A major challenge for countries in the region has been the reduced private sector investment flows and their concentration only in a few countries and sectors. ESCAP members have been exploring new financing mechanisms. A major constraint in attracting private sector participation has been the lack of seed financing that would be needed for initial feasibility studies. Selected examples exist that show the great potential for possible cross-border financing and other innovative financing.

\textsuperscript{138} This study also showed that the potential accessibility generally follows the same rank size rule as that for city population. Consequently, a focus on improvement of interconnection of major cities has the greatest impact on potential accessibility within the transport system.
V.1
Strategies, Programmes and Activities for Consideration

Introduction

The principal theme running through and highlighted in this paper is that of networks. Globalization can be interpreted in terms of increased specialization, interdependence and integration. International and regional production networks (IPNs and RPNs) as well as value-added chains can be considered as being an integral part of the process. Infrastructure networks (transport, ICT) can be assigned a leading role in supporting the development process. Interventions that provided greater access to infrastructure networks and services can be argued as necessary in order to reduce poverty. Strategies being adopted by the private sector in providing transport and ICT-related services can be described in terms of the formation of various types of network configurations. Transport logistics and the wider “value-chain management” can be shown to have their foundation in network concepts and regionalism.

Transport

For various historical, political, economic and topographical reasons inter-country transport of goods and people by land on the Asian continent has been negligible. Since the late 1980s, however, there have been major political and economic changes in the economies of Asia whereby more outward-looking and cooperative policies have been adopted. These changes have created an atmosphere that is more conducive to the development and promotion of international land transport.

Considerable progress has been made over the last decade or so in moving towards increased inter-country movement of road transport in Asia and the basic framework for these movements is being set in place. Examples include the financing and development of domestic road transport networks of regional importance; the formalization of inter-country road linkages and establishment of their design standards under the auspices of the ESCAP Intergovernmental Agreement on the Asian Highway Network, which entered into force in July 2005; and the construction of new inter-country roads, for example, in the Greater Mekong Subregion. Similarly, the ESCAP Intergovernmental Agreement on the Trans-Asian Railway Network was signed in November 2006.
The provision of inter-country road transport infrastructure is, however, a necessary, but not sufficient condition for the movement of inter-country traffic. There is a need to meld together the various physical, non-physical, production, service, governance and social networks. One of the steps in this process is to ensure that non-physical barriers are minimized. Most of these can be removed through accession to and implementation of various international conventions.

These efforts need to be continued. However, the absence or low level of development of effective regional networks in Asia whether these be in the area of infrastructure, information or knowledge are acting as a constraint to development and participation in the globalization process. What is needed now is to direct resources towards implementation, operationalization and capacity-building.

Clearly, the central role of regional initiatives is to cooperate in the building of the trunk routes, backbone or transmission lines of the network, with feeder, local and distribution networks that provide access to intra and inter-regional networks being developed nationally or locally.

One direction in which current efforts are moving is towards the development of corridors. This, for example, is the case for TRACECA, the UNECE/UNESCAP Euro-Asia Transport Linkages Project and the three corridors of the GMS Project. In network terminology, the strategy is concentrating upon specific paths through networks, thereby providing focus for activities and tangible demonstration effects.

**ICT**

The issues to be addressed in the modern ICT sector are similar in nature to those in transport. Similar mechanisms for regional cooperation and sharing of resources are slowly being developed. It is somewhat surprising that so few real agreements and sharing arrangements have been achieved at the regional level so far. This appears to be due to the earlier misexpectations of "death of distance and geography" in general due to the ‘revolutionary’ nature of the Internet. In fact, increasing evidence indicates that the opposite may be true. Due to increasing returns, closeness to major ICT centres is more important than ever before and landlocked countries face the same types of constraints as they face in terms of transport.

There is a clear need for regional cooperation in the development of a high-capacity international Internet backbone for Asia, with a special focus on a fixed-line, land-based part for the landlocked Asian countries.
The major difference between the modern ICT and transport sectors that has to be taken into account in the designing of strategies and programmes, is a rather huge range of time scales due to the hardware/software paradigm, and the differing significance of the role of regulation and competition policies at the national level.

**Strategies**

In developing strategies for regional cooperation and integration in the field of infrastructure, it is instructive to draw upon recent experience. In this respect, the work of the organizations and programmes considered in Section II.5 and listed in Annex 2 provides some insight.

**ALTID refined strategy**

ESCAP initiated the *Asian Land Transport Infrastructure Development Project (ALTID)*\(^\text{139}\) in 1992. It is essentially an umbrella project, comprising the Asian Highway and the Trans-Asian Railway projects, as well as components related to the facilitation of cross-border land transport. Two basic principles are to minimize the number of roads and railway lines to be included in the networks and to make the maximum possible use of the existing infrastructure.

A refined strategy\(^\text{140}\) for the implementation of the ALTID project was adopted in 1998 which includes the following components:

- Facilitation of land transport at border crossings and maritime transport at ports through the promotion of the relevant international conventions and agreements in Asia to improve the efficiency of international transport along land and land-cum-sea routes.
- Completion of formulation of Asian Highway and Trans-Asian Railway networks covering the whole of Asia as well as completion of missing links.
- Formalization of the Asian Highway and Trans-Asian Railway routes/networks.
- Improvement of the operational efficiency of the Asian Highway and the Trans-Asian railway routes, including transport logistics.

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– Improvement of transport logistics.
– Asian Highway and Trans-Asian railway promotion.

**Strategy for the Development of an Integrated Euro-Asian Transport System**

The third St. Petersburg Conference in Sept. 2003 recommended a *Strategy for the Development of an Integrated Euro-Asian Transport System*, as well as several support measures and a number of specific initiatives. The strategy focuses, inter alia, on:

– formulation of integrated intermodal international Euro-Asian transport routes/corridors and networks;
– formalisation of international transport routes/networks through related international agreements or amendments to existing ones, as the basis for their coordinated development;
– facilitation of transport at border-crossings and ports based on relevant international conventions;
– analysis of routes/corridors;
– operationalization of international transport routes and their periodical performance evaluation;
– development of public-private partnership with freight forwarders and multimodal transport operators.

Specific initiatives were recommended in the areas of infrastructure development, modern freight technologies, attraction of transport infrastructure investments, promotion and development of tourism, information technologies, safety and environment, improvement and rationalization of customs procedures and simplification of border crossings, as well as in regard to expansion of access to the market of transport services.

**Insights from the Greater Mekong Subregion (GMS) Project**

In general terms, a strategy is a plan designed to achieve a particular long-term objective. For the GMS project, “the ultimate objective of subregional economic cooperation is to facilitate sustainable economic growth and improve the standard of living of the people in the subregion.” It is further noted that

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141. ECE document number TRANS/2004/12.
“subregional programmes and projects should reflect a balance among economic growth, human resource development, poverty reduction and environmental protection”.

During the period from August 1992 (the date of commencement of the ADB’s technical assistance for the GMS) and the Third Conference (April 1994), broad areas of cooperative effort had been identified, sectoral studies had been conducted to identify impediments to subregional economic cooperation, and consensus had been arrived at on priority subregional projects.

In the transport sector, roads emerged as a high priority with the Third Conference agreeing upon: (i) the Bangkok - Vung Tau Road Project; (ii) the Thailand-Lao People’s Democratic Republic - Viet Nam East-West Corridor Project; and (iii) the Chiang Rai - Kunming road Improvement Project. The Conference also agreed that the consultants’ Final Report should consider legal and other impediments to coordination in the transport sector.

After the Third Conference, these projects commenced and a significant percentage of works have since been completed; a Cross Border Agreement for the movement of goods and people was signed and the protocols and annexes are being negotiated; and the above-mentioned road projects evolved into a concept of more broad-based economic corridors.

One of the insights that can be gained from this experience is the step-by-step nature of the strategy. This approach is conditioned by the need to obtain consensus among members, the relatively long planning and construction periods, and the need for demonstration of progress. In this last respect, the Third Conference noted that “a viable, even symbolic project at the earliest stages would do much to enhance the cooperative spirit in the subregion”.

In addition to reaffirming the objective of regional economic cooperation, the Third Conference reaffirmed a number of other “general principles”, including the importance of linkages among sectors and the necessity of the participation of the private sector.

Over the intervening period of time since the Third Conference, the importance of networks and networking in most areas of human endeavour has emerged.

Experience in the GMS has also shown that the “plan to achieve the long-term objective” does not need to be detailed and have rigid time schedules. In many respects the strategy evolves as the plan proceeds. For example, the priority
roads identified in the early stages of the project evolved into the North-South, East-West and Southern Economic Corridors.

**High-level strategy**

In order to achieve the goal of supporting economic development and promoting greater equity through better connectivity, in particular, through the extension of the regional production networks to the Asian hinterlands, the high-level strategy may include the following:

(i) Develop infrastructure;
(ii) Promote specific corridors and paths through networks;
(iii) Ensure that the traffic moves smoothly across borders and through countries;
(iv) Select specific nodes to create demonstration effects (e.g., one-stop-shops at border crossings, ICDs, etc.);
(v) Support development of RPNs and SMEs;
(vi) Build institutional and human capacity;
(vii) Promote focus and commitment to the goal;
(viii) Involve all relevant stakeholders in the process (including the private sector);
(ix) Set in place mechanisms for identification, analysis and development of policy options to address persistent and emerging issues and systemic risks before they arise (early warning systems).

**Network-related elements of a strategy and related implementation modalities**

On a lower level, there are a number of elements of a strategy as well as modalities for its implementation. Looking at the various infrastructure issues through the lens of the many physical and non-physical networks opens up the possibility to design new and consistent strategies to tackle the issues. For example, we can make use of concepts and tools that were developed for analyzing networks in many disparate disciplines. Besides, we can make use of new technological opportunities, better exchange of information, and develop a better understanding of fundamental relationships between the various networks.

In the following text, *eight elements that such a strategy could incorporate as well as some modalities for their implementation* are outlined. These elements can be applied to regional cooperation and integration in general; infrastructure
more broadly interpreted to include physical, non-physical, institutional and social networks; specific traditional infrastructure sectors and even infrastructure subsectors.

(a) *Adopt a network approach to target high impact issues and locations*

It is proposed that network and cluster concepts and tools are used to target high impact issues and locations. For example, with these tools, bottlenecks in the system (e.g., network interconnection points) can be identified and the quantitative tools (e.g., graph theory) and network models can be used to investigate the impacts and means of removing such bottlenecks.

Often a corridor or path approach to operationalization (implementation) is useful, whereby specific paths or corridors are identified and a concerted effort is made by all concerned parties to operationalize the path or corridor. Typical steps in this process may, inter alia, include: (a) identification of all relevant physical and non-physical barriers on the corridor; (b) a focus on infrastructure development on the path or corridor; (c) support for initiatives to facilitate movement along the path or corridor; (d) support for HRD in commercial aspects of operationalization of the path or corridor.

(b) *Create sectoral strategies with a systems view to melding physical and non-physical networks*

Cross-sectoral and even sectoral strategies should be designed taking a holistic systems view of melding physical and non-physical networks. Similarly, networks should not be regulated in isolation from each other. Where trade, transport and ICT networks are melded together, they should be regulated together.

(c) *Identify clusters to organize participatory approaches to policy and decision-making*

The strategy should include a cluster approach that incorporates all relevant stakeholders to organize participatory approaches for policy and decision-making. Such an approach can increase transparency and democratic accountability. It is of paramount importance that the policy-makers (e.g., committees etc.) are included.

(d) *Organize regional institutional networks of research organizations and government agencies in order to increase just-in time awareness for better policies*

Strategies should routinely include the organization or at least consultation with existing institutional networks of research organizations and government
agencies, such as CITYNET, LOGOTRI, APETIT, ANTLER, etc. As many of these institutional networks have been created by the UN-ESCAP in the past, it is possible to relatively easily learn from a variety of best practices of creation of regional institutional networks. It should be noted that these networks are institutional, independent and undertake their own activities, which is a major difference in comparison to many of the recent networks of a purely informational nature.

Such institutional networks are best organized along the lines of existing networks and clusters. In addition, networks of information can be used for awareness creation that ultimately will influence policy-making. A major challenge is usually to encourage analytical studies on relevant issues and to make research findings available in appropriate form to decision-makers.

(e) Use modern knowledge networking tools and processes to create new forms of regional collaboration

Modern knowledge networks drawing on new developments in networked companies and smart communities that have emerged since 1998 could play a key role for governments to steer networks into the right directions. While many so-called “knowledge networking” initiatives exist in governments and international organizations, hardly any one of them actually deserves that name, since they often are purely informational in nature and do not draw on knowledge standards of any kind. Yet, both tools and processes have been tested amply by networked dot-com companies in the past 6 years or so which often had to draw on rather low-key infrastructures.

Such new types of knowledge networks when applied to governments could eventually lead to new forms of horizontal and vertical regional governmental and non-governmental collaboration. They could also serve as mechanisms for monitoring progress in operationalization of the paths or corridors.

(f) Introduce regional risk management strategies that address systemic risks

A strategy should include not only provisions for project or programme risk management, but also look at a higher level of regional risks. In some instances, the latter may be much larger than the former. Similarly, the strategy should not focus solely on financial risks, but should also include economic, political, regulatory, technical, organizational, stakeholder, environmental risks and force majeure.

Regional risk management should address the issue of possible emergence of incompatibilities of certain regional standards with those at the global level.
In general, risk management should also address systemic risks, so that eventually their consideration becomes a standard input for policy-making. The key question to ask in the strategy is whether all inherent risks have been adequately quantified and a strategy developed to deal with them.

(g) Develop strategies based on analytical studies (“Research Agenda”)

Policy and decision-makers need to be aware of and understand the various policy options and their impacts. While academic research results exist in various disciplines on the nexus between globalization, infrastructure, development and the role of regional cooperation, these have not been made available in a suitable and comprehensive form for policy-makers. Analytical studies of a number of key issues drawing from all relevant disciplines and especially focussed on the situation of developing countries, economies in transition and landlocked countries in Asia and the Pacific are needed, so that decision-makers can draw on a menu of options and understand some of the long-term consequences of their actions.

Key issues to be analyzed in the context of Asia and the Pacific include, inter alia:

(i) Forces for and against globalization: While there is a generic, intuitive understanding of the contribution of network infrastructure to globalization (and vice versa), the details, particularly relating to hinterlands and landlocked countries are not well understood. A comprehensive view taking into account physical and non-physical networks needs to be taken to analyze the interplay of the various forces operating for and against globalization.

(ii) Balancing competition and strengthening of networks (“co-epetition”): Governments face the challenge of balancing competition and the strengthening of networks. Strategies need to be explicit on this point, in order to avoid an ideological view. In fact, the “strengths” of physical and non-physical networks in many Asian countries have not been studied in detail. There is a lesson to be learnt from the situation in Internet communications for the more investment-intensive transportation networks.

(iii) Implications of full cost pricing of transport modes: A common policy advice of economists, international donors, and agencies alike has been to move toward full cost pricing in order to eventually recover all economic (and possibly also environmental and social) costs. As full-cost pricing (similar to increased energy prices) will have differential
impacts on coastal areas vs. hinterlands, scenarios are needed to better understand the implications. Another related question is whether we are in effect “subsidizing globalization”, since full cost pricing of transport modes is not applied in most parts of the world.

(iv) Inefficiencies in the logistics system: Will land transport always be at a disadvantage? Since there are currently enormous inefficiencies and unofficial payments in the logistics system of many countries, one might argue that transport costs are of relatively minor importance in the overall logistics costs.

(v) Impact of urbanization: What are the impacts of continued urbanization on infrastructure networks and the competitiveness of hinterlands in the current wave of globalization?

(vi) Possible political implications of increased regional cooperation and integration: An OECD report in 2001 on trade blocs states that the political impetus to integration has often been “based on the belief that increasing trade would reduce the risk of intraregional conflict” 143, as evidenced by the examples of ASEAN, APEC, the EU 144 and the CACM145, which “include potential political and military opponents”143.

(h) Develop regional strategies (“Strategy for Regionalism”)

While inter-agency coordination mechanisms (such as CCA and UNDAF) exist at the national level for coordinating the work of donors, international organizations and governments, no such mechanism exists at the regional level. It would be highly beneficial to have at least some sort of a regional strategy for Asia and the Pacific in the area of regional cooperation in infrastructure. A “regional” version of the CCA or UNDAF frameworks may be worthy of consideration.

144. Similarly, the preamble to the 1951 treaty establishing the ECSC, out of which the EU grew, stated its aim as follows: “To create, by establishing an economic community, the basis for broader and deeper community among peoples long divided by bloody conflicts.” The OSCE Ministerial Council in Maastricht (2003) went even further and declared “Convinced that more effective co-operation by all the OSCE participating States on an equitable, mutually beneficial and non-discriminatory basis to counteract threats and challenges caused by economic and environmental factors, can make a crucial contribution to security, stability, democracy and prosperity in the OSCE region”; OSCE Strategy document for the economic and environmental dimension, MC(11)JOUR/2, 2 December 2003, Annex http://www.unece.org/trade/workshop/OSCE_0304/bk_docs/OSCE%20New%20Strategy%20Doc.pdf.
145. Central American Common Market
It would be advisable to go even a step further and to work toward a “strategy for regionalism” that is shared by the countries in Asia and the Pacific. Such a strategy would not only set a common vision and broad goals for the various forms of cooperation and partnerships between organizations, but could also set voluntary, broad “ground rules” for current and future bilateral, plurilateral and subregional cooperation initiatives. Alternatively, a number of “strategies for regionalism” could be worked out by different country groupings that would, however, coordinate with each other.

Programmes

Figure 18 shows the schematic outline of a potential programme structure. Due to the strong commonalities between the various network infrastructures, this appears to be a reasonably generic structure that is equally applicable to transport, energy and communications. This is despite the fact that the term ‘facilitation’ is not used so commonly in energy and communications. However, most of the issues to be addressed are similar, including, for example, transit agreements, incompatibility of regulatory regimes, cross-border taxation, customs, etc.

![Figure 18: Schematic outline of potential programme structure](image)

Major programme areas include (Figure 18):

- Assembly and dissemination of what we already know (including good practices);
- Reactivation/revitalization/reenergization of what we have done already;
Identification, prioritization, financing and development of infrastructure requirements;

Facilitation of cross-border and transit;

Private sector and enterprise development, e.g., building capacity of freight forwarders and multimodal transport operators

Figure 18 focuses on infrastructure, facilitation and commercial aspects of infrastructure. There are, however, other aspects, including social and environmental aspects, that would need to be included in a comprehensive programme.

Activities

Following the suggested programme structure, we have come up with twelve types of activity groups, that are classified into three areas, namely, infrastructure, facilitation and operationalization.

Infrastructure

(a) Maintenance and upgrading of existing assets

In some countries of the ESCAP region (e.g., CIS), maintenance of existing infrastructure assets should be accorded the highest priority, as future rehabilitation or reconstruction costs will far exceed the cost of timely maintenance. However, maintenance of infrastructure is not perceived as a high-profile activity by governments and, therefore, tends to be too often neglected.

Whether the focus will be on upgrading or maintenance ranges widely depending on the country and the subsector. For example, upgrading to larger capacities dominates the ICT sector, in contrast to the energy and transport sectors.

(b) Financing of infrastructure maintenance and development

A strong political case needs to be made for increased provision of adequate funds for infrastructure maintenance, as deteriorating infrastructure imposes large resource costs.

The pros and cons of taxation of road, rail, air and water transport users to cover the marginal cost that users impose on society (e.g., road deterioration, traffic congestion and environmental costs) should be explored on sector-by-sector basis.

(c) Administration of agencies responsible for physical infrastructure

The capabilities of many agencies are limited, due to financial and human resources constraints and systemic issues. Similarly, the capacity of regulators of newly privatized markets is often inadequate.
Some of the administrative systems in the region are of an extremely hierarchical nature. This applies in particular to the economies in transition, where administrations in the past had to serve the needs of a centrally planned economy. Strong hierarchies often do not meet today’s requirements of a fast-changing environment. The introduction of devolution and decentralization policies in many countries of the region has compounded these problems which need to be addressed on a priority basis.

(d) Increasing competition and private sector participation

While increased competition can be a means of increasing the efficiency of resource allocation, competition issues related to networks and infrastructure in general are a serious challenge for many countries in the region.

Institutional arrangements to promote private sector participation (PPP) need to be promoted, including PPP units and the setting-up of regional institutional networks of such units. While best practices in competition and PPP issues have been documented, models for replication are needed that are tailored to the needs of the countries in the region and that can be readily implemented by them.

(e) Commercial networks and clusters

Commercial networks are some of the most important non-physical networks. They themselves as well as their linkages to the physical networks need to be strengthened. Recently, an approach to organize participation and even implementation through existing commercial and industrial clusters has been used in projects (e.g., by UNCTAD).

(f) Social networks and participation

Social networks can be utilized for creating awareness and for organizing participatory approaches to infrastructure development, particularly at the local level. Recently, many countries have increased local involvement, for example, in the construction and maintenance of rural roads. There appears to be a general trend toward decentralization in the provision of infrastructure facilities. The strength of social networks in the context of infrastructure could be supported by networking Web tools.

(g) Infrastructure development at transit nodes

Multimodal transport offers benefits, particularly to landlocked countries. Landlocked countries together with their transit neighbours, need to consider the development of adequately equipped inland container depots and dedicated
warehousing facilities at the interface between different modes of transport. In this context, the use of financial and economic planning models should be promoted in partnership with various organisations.

**Facilitation**

(a) *Accession to international conventions*


Similarly, ESCAP has promoted accession to the Convention on Facilitation of International Maritime Traffic, 1965, as amended (FAL Convention). Central Asian countries have started to access and implement additional nine international and European agreements and conventions, supported by the Project Working Group on Transport and Border Crossing (PWG-TBC) of the UN Special Programme for Economies of Central Asia (SPECA).

In order to accelerate the process of accession to these conventions, policymakers may wish to consider initiating the following activities: (i) translation of international conventions into national languages for wider dissemination and better understanding; (ii) convening national seminars for awareness creation and discussion of various issues involved; (iii) setting up national transport facilitation committees, chaired by a high-level authority, say a minister or deputy minister; (iv) formulating national action plans for acceding to the international conventions; (v) organization of training programmes for efficient implementation of the conventions as well as for creation of national transport associations; (vi) sharing experiences in the implementation of conventions, on the basis of technical cooperation between developing countries (TCDC); and (vii) examination of domestic legislation with a view to ascertaining the changes which may be necessary to incorporate the provisions of international road transport conventions.

Similarly, in the communications sector, issues such as interconnection agreements and charges, and implementation of international standards need to be addressed.
(b) **Institutional mechanisms for facilitating transit transport**

In order for countries to accede to international conventions, there is a need to understand the implications and benefits of the conventions, and to establish committees and bodies necessary to accelerate the process of accession. There is also a need to monitor and promote the implementation of the agreements at the policy and operational levels. Various institutional mechanisms for facilitating transit transport need to be explored.

(c) **Harmonization of rules and regulations**

Harmonization of rules and regulations can lead to major reductions in transport costs. Harmonization may include: (i) simplification and harmonization of documents and procedures for border-crossing and transit; (ii) common standards and certification in such areas as road safety, vehicle and driver testing and road permits; (iii) adoption at the bilateral, subregional or international levels of driver licensing and vehicle standards; (iv) harmonization of axle-load regulations; and (v) introduction of mutually acceptable third-party insurance documents.

(d) **Mechanism to tackle soft infrastructure issues**

Soft infrastructure includes standardization, harmonization and simplification of transit policies, regulations, formalities, procedures and documents as well as institutional issues. Soft infrastructure is particularly important for transit trade and border-crossing. For the landlocked countries, the issues of transit and border-crossing cannot be separated from those relating to the facilitation measures in general.

Following issues might be considered: (i) provisions to facilitate trade; (ii) measures relating to official control, promotion and use of standards, customs operations, commercial trade practices, payment procedures, insurance, and the use of ICT; (iii) networking of relevant committees and bodies; and (iv) measures that could be incorporated in bilateral and multilateral arrangements.

**Operationalization**

(a) **Human resources development**

It is necessary to ensure that the officials responsible for the day-to-day application of the various conventions, agreements, rules and regulations, fully understand their provisions. There is also a need to strengthen the freight-forwarding and clearing industry, particularly at the small and medium-scale levels.
(b) **Information systems and corridor studies**

Modern information and decision-support systems can support the planning, development and maintenance of infrastructure facilities, facilitate transit traffic, identify bottlenecks, and monitor adherence to agreements. Also, corridor studies are an effective means of identifying the impediments to transit traffic and can form the basis for developing action plans.

(c) **Commercialization and enterprise development**

In the case of the least developed countries and the economies in transition in Asia and the Pacific, one of the major constraints in implementation or operationalization has been insufficient capacity by institutions, including the private sector. Enterprise development and promotion of related commercialization activities need to be supported in these countries.

(d) **Regional coordination and consistency**

An overall strategy for regional cooperation in infrastructure is needed, in order to ensure consistency between the many bilateral, plurilateral and subregional agreements and other initiatives. In particular, strategic frameworks and monitoring systems might be developed within which inter-country, subregional, regional and international projects and programmes can be efficiently implemented. Similarly, mechanisms for ensuring consistency with and between infrastructure-related networks at the various levels (national, subregional, regional and international) would be very useful.

(e) **Promotion of demonstration projects**

One of the most powerful means to convince relevant stakeholders that change is possible is to demonstrate by example. Consequently, promotion of, for example, demonstration runs of container block trains or joint border facilitation at specific sites is an effective means of developing integrated transport systems. The development and dissemination of examples, case studies and good practices, for example, those cited in Section III.1 of this document, also make an important contribution to demonstrate the feasibility and direction of change.
V.2

Selected Institutional Proposals for Consideration

Chapter II of this study provided a glimpse of the wealth of regional cooperation initiatives for transport infrastructure development in Asia and the Pacific (see Annex 1 for more details). There are many conceivable, potential “ways forward” for the region in terms of such cooperation. The purpose of this final section is to provide selective, rather ambitious “futuristic” proposals for future regional cooperation that could be promoted in Asia and the Pacific in the next 25 years. The focus is on institutional regional mechanisms rather than elements of a “work programme” (see previous section). Only such initiatives are included that could potentially be promoted by ESCAP.146

**Strengthening existing financial institutions and the need for new specialized ones**

In order to meet the large and increasing infrastructure financing needs in all countries of the ESCAP region throughout for the next 25 years, current means of financing must be strengthened and new innovative ways explored. For example, the Asian Development Bank (ADB) and the World Bank (WB) must be strengthened. However, most likely, their lending volumes will not be sufficient and would be mainly geared to lending to sovereign countries due to their mandate and institutional set-up.

Consequently, this study confirms earlier calls for the need of new financial instruments, such as an *Asian Investment Bank (AIB)*, following a similar rationale as in the case of the European Investment Bank (EIB) by focussing on lending to the private sector for infrastructure investments. It should also complement the work of other institutions, such as the EBRD, OECD (Marshall Plan), European Structural and Cohesion Funds, TEN financing mechanism, and national reconstruction banks that were created after WWII.

In addition, there are three compelling reasons for establishing an AIB in addition to the already existing ADB:

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(a) Need to bring the decision-making process on infrastructure financing back to the region

In fact, large elements of the process still remain outside the region which may lead to different priorities. For example, the strong voice members of ADB and WB members from outside the Asian region dates back to a time when these members provided the bulk of international infrastructure financing after WWII.

(b) Need for a more inclusive approach

None of the current financial institutions operating regionally in Asia and the Pacific has the same comprehensive membership as ESCAP. In fact, from the perspective of the Asian transport system, it is imperative to include countries like the Russian Federation, the Islamic Republic of Iran and Democratic Republic of Korea in any such arrangement.

(c) Need for leveraging more private financing, particularly from within the region

ADB and WB still lend mainly to sovereign countries, even though much of their work has increasingly moved to co-financing options with the private sector and technical assistance.

It should be noted that ADB was established under the auspices of ESCAP in 1966, in order to address the then pressing needs of lending for infrastructure to governments in the region. Its institutional set-up also reflected the fact that most of this financing came from outside the region. Today’s much larger role of the private sector, the increased weight of Asian economies in the world economy, and the large saving rates in Asia are facts calling for a new bank lending to the private sector primarily for infrastructure projects, run by Asia for Asia, to fill in the remaining financing gaps.

Trans-Asian Networks

It is envisaged that AIB would provide financing in transport, communication, energy, and water sectors for infrastructure projects of:

(a) Regional importance

This would involve the development of “Trans-Asian Networks” (TAN), similar to the existing frameworks of “Trans-European Networks” (TEN) together with the “Transport Infrastructure Needs Assessment” (TINA) mechanism in the European Union. With regard to the land transport sector, TAN would be based on the Intergovernmental Agreement on the Asian Highway and the planned
agreement on the Trans-Asian Railway. Essentially, TAN should include a joint financing mechanism for infrastructure of regional, international importance. For example, the possibility of 10 percent seed financing of regional projects could be explored, based on the rationale of positive cross-border externalities.

(b) National importance

In particular, financing support seems critical for *feeder route, rural and urban transport access programmes* that are promoted by governments (such as PMGSY in India).

It is suggested that AIB should promote an *increase in overall infrastructure financing* in all ESCAP member countries by a factor of four on average. In addition, the AIB should also *explore new approaches to lending*, including, for example, the lending to supranational bodies, the provision of seed money, and the development of new financing instruments that are tailored to the region’s specific needs.

Even though the following suggestions are worth exploring in their own right, they would ideally be carried out under the common umbrella of a future AIB or a relevant financing institution:

**Seed financing**

There is a need for a regional mechanism to provide money for feasibility studies to make potential infrastructure projects “ready” to attract domestic and international private sector investors. In fact, the insufficient size or complete lack of such seed money has been a major constraint to private sector participation in infrastructure development in the region. We, therefore, suggest the creation of an Asia-Pacific Fund for financing and the promotion of private investments in infrastructure. The role of such a fund would be: (a) to provide money to PPP units or relevant government departments for feasibility studies of infrastructure projects; (b) to serve as a clearing house for more effective pipelining/screening of projects; (c) to promote marketing of projects to investors¹⁴⁷; and (d) to provide technical assistance to PPP units and related departments on legal instruments and to certify standards. The proposed fund would ideally be an independent entity (under AIB umbrella), in order to avoid the types of conflict of interests that are sometimes seen in the case of development banks which are eventually interested in providing a loan for the full project. In terms of institutional set-up, it could

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¹⁴⁷. In essence, it would be single, trusted entry point for investors interested in investing infrastructure in Asia, thereby to cutting investors’ search costs for good projects.
follow a system of quotas and some kind of “special drawing rights” and an Executive Board as in the case of the IMF. Similarly, resource allocations could be adjusted based on regulatory criteria that enable PPPs, thus creating positive incentives for member governments to reform their legal framework for PPPs, following the same idea as the regulatory incentives in the case of EMEAP’s regional bond fund ABF2.

**Public-private partnerships**

More generally, there is a need to strengthen public-private partnership (PPP) capacities. In particular, more technical assistance on legal and economic instruments is needed. In this regard, the creation of an Asia-Pacific Network of PPP Units, as is currently promoted by the ESCAP Secretariat, could play a significant role. Furthermore, innovative co-financing options and modalities need to be explored. The proposed Fund could play a catalytic role in this regard. Co-financing options should be explored not only with the private sector, but also between countries. In fact, we have shown a strong rationale for international co-financing based on the size of positive cross-border spill-overs of transport infrastructure investments, e.g., as measured in terms of potential accessibility\(^{148}\) (Section IV.1).

**Research and demonstration capacities**

There is a need for increased financing of regionally important research and demonstration capacities, in order to improve the understanding of: (a) the overall cost-benefit of transport investments (including at the regional level), and (b) their relationship to the achievement of MDGs. In the longer term, the region might want to create an Asia-Pacific Framework for Research and Development Cooperation in transport and communication technologies and their demonstration, operationalization and deployment. Such a framework could be based on joint private-public sector financing and management\(^{149}\) of major research and demonstration projects in infrastructure of international importance, such as regional transport and communication backbone networks. This would help leverage the emerging research capacities in the region and could be based on existing partnerships, such as AP* in the case of communication.

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\(^{148}\) ESCAP study shows these are of the order of 10% for highway projects in Central Asia.

\(^{149}\) The framework could be organized along the lines of the model pioneered by the ACTS programme of the EU.
More efficient use of existing infrastructure

There is a need for initiatives to promote the more efficient use of existing infrastructure. Examples include:

(i) Improving cross-border facilitation through the creation of an Asia-Pacific “Single Window” for Cross-border Customs, Trade and Transport Facilitation: Rather than going through a lengthy bilateral and regional harmonization of cross-border practices, a single-window system might be jointly developed by all interested countries in the region. This would not only be much more cost-effective, but would also provide additional marketing benefits and be of particular interest for smaller economies, as well as for the economies that have not yet proceeded very far in adopting their own e-trade system, i.e., almost all economies of Asia and the Pacific. Operational models for such a regional “single window” might be fully private-sector driven, based on concessions provided by an intergovernmental organization. Such an approach would also make the governments’ networks more international and on par with powerful regional and global networks of multinational “flagship companies”.

(ii) Addressing the proliferation of transport-related agreements in the ESCAP region through a comprehensive monitoring, policy analysis and technical assistance mechanism for transport-related international agreements: This would include all agreements on transit, cross-border facilitation, infrastructure development, standards, financing, policy coordination, investments, and sharing agreements. This monitoring mechanism should come up with policy suggestions and provide technical assistance to governments interested in joining and/or implementation of such agreements (including information on the costs and benefits of such agreements). In particular, relationships to the evolving complex webs of trade and investment agreements need to be clarified (Section II.5 and Annex 1). Initially, such a function could be kick-started by the ESCAP Secretariat, to be “spun off” thereafter.

(iii) Exploring options for bilateral and subregional infrastructure sharing and development agreements: One could imagine many such sharing possibilities, particularly in the case of landlocked countries, ports and dry ports.

(iv) Promotion of improved infrastructure asset management and maintenance: In particular, the creation of road funds for maintenance has been promoted by ESCAP for many years.
(v) A special Infrastructure Investment Forum of Pacific Island Countries could be held on a regular basis, in order to promote private sector investment in the specific case of small island developing countries. A similar forum could be created for least-developed landlocked countries.

**Regulatory reform and competition**

Finally, innovative regulatory reform could go a long way in further improving efficiency, creating a fairer level playing field, and providing incentives to better tap the increasing pool of Asian savings for infrastructure development, beyond the purely financial efforts of regional bond funds, such as ABF2 and related initiatives. First and foremost among these are policies and regulations that target cross-border investment behaviour:

Firstly, there is a need for a better coordination mechanism for regional and industrial policies in Asia and the Pacific, particularly because they relate to the development of transport infrastructure of regional importance. Regional and industrial policies, in particular with respect to transport infrastructure development (including issues such as tax breaks and the designation of special economic zones, etc.) have been major tools of governments in the region to promote foreign direct investment of multinationals, in order to fully integrate their economies into the regional and international production and distribution networks. In some cases, uneven market power (“flagship networks”) has led to the undesirable situation of more competition between governments and less competition between companies. A strong international policy coordination mechanism could help reverse this undesirable trend. Optimally, such a mechanism would also incorporate an institutional network of policy research organizations and universities that would provide policy recommendations on IPNS and related issues.

As a second step, regional institutional mechanisms could be explored that can set binding rules for cross-border infrastructure investments in the region. A regional approach that is focussed purely on infrastructure could have more potential for realization than the much more ambitious MAI initiative of the OECD in the 1990s. In addition, in contrast to the OECD grouping of countries, Asia and Pacific region consists of economies that either receive a lot of investment from outside the region or receive only a negligible amount, thus providing more incentives for the realization of some kind of Asian MAI.

In the longer term future, ideally the creation of an Asia-Pacific competition authority would have major benefits for the region. The initial focus of such an agency could be on the ports and shipping sector. At a later stage, other sectors
might be added. In fact, the creation of such a competition authority for the ports and shipping sector has been recommended earlier by the World Bank: “As a consequence of (i) the spreading of port concessions in specific traffic niches, like container terminal operations, and (ii) the relatively few number of international professional operators in the market, a new form of competition limitation develops along regional coastlines, crossing countries’ boundaries. It has now become possible to anticipate that in the short run, one or two terminal operators might control a string of terminals on a given range, thereby establishing a new case of dominant position at a regional level. The appropriate answer to this situation should at first sight come from regional economic cooperation bodies, which should therefore be vested with specific authority regarding competition in transport services on a regional scale.” However, to date, the implementation of this important issue has not been pursued in Asia and the Pacific.
Annex 1

Review of Regional Cooperation in Transport Infrastructure Development in Asia and the Pacific

Regional Cooperation in Asian Land Transport Development

Sections II and III identified a special need for policy intervention in the land transport sector. In this sector, deep concerns have been voiced that hinterlands, certain regions of countries, and landlocked countries, located far away from the centres actively participating in regional production networks, will be marginalized. In order to address this risk, governments of the region have increasingly engaged in the development of interregional, regional, subregional and national policies for land transport.

This Annex provides an overview of the major ongoing regional and subregional cooperation initiatives in land transport in Asia in order to illustrate the level and types of existing cooperation.

Regional initiatives

(a) Early forerunners (1959-1992): Asian Highway and Trans-Asian Railway

Asian cooperation initiatives of a truly regional nature of continental geographical coverage have been rare. Even subregional initiatives encompassing a handful of neighbouring countries have been a rather recent phenomenon (see next Section).

In fact, until the late 1980s, there were only two significant regional cooperation initiatives in the Asian land transport that had a fairly comprehensive geographical coverage: the Asian Highway (AH) and Trans-Asian Railway (TAR) projects of the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP).

The Asian Highway Project was initiated in 1959 by the then United Nations Economic and Social Commission for Asia and the Far East (ECAFE) that was later renamed ESCAP. This initiative was followed by the Trans-Asian Railway Project, which was commenced in the 1960s by ESCAP with the objective of providing a continuous 14,000 km rail link between Singapore and Istanbul (Turkey), with possible onward connections to Europe and Africa.
The international events that punctuated the 1960s, 1970s and early 1980s, coupled with inward-looking policies of many countries and lack of funding for the projects, influenced the momentum of these two initiatives. However, the dynamic economic, trade, investment and tourism development in the region since the 1980s, as well as the concomitant adoption of outward-looking policies, positive changes in the political environment and the advent of container technology, have resulted in the revival of a keen interest in regional cooperation as a means of improving and developing intraregional and interregional land transport linkages.

Until today, the Asian Highway and the Trans-Asian Railway have played a pivotal role in regional cooperation in land transport, both in terms of their achievements as well as models for many subregional initiatives of the past 15 years. These are described in more detail below.

(b) Asian Land Transport Infrastructure Development (ALTID) since 1992

The revived interest in land transport since the late 1980s led to the creation of the Asian Land Transport Infrastructure Development Project (ALTID)150 by ESCAP in 1992. It is essentially an umbrella project, comprising the Asian Highway and the Trans-Asian Railway projects, as well as components related to the facilitation of cross-border land transport.

The strategy of the ALTID Project for the development of both the Asian Highway and the Trans-Asian Railway networks includes assisting countries in identification and formulation of routes, setting standards, formalization of the networks, putting the networks into operation or their “operationalization”, integration of the various modes of transport (road, rail, inland waterways and shipping), and integration of transport networks with other relevant networks or “molding of networks” (freight forwarders, multimodal transport operators (MTOs), banking, customs, health, security, etc.).

In regard to the formulation of road, rail and road-cum-rail routes, it was decided that existing and potential trade flows should be the main factor for route selection151. Reflecting this factor, the criteria include:

- capital to capital links (for international transport);
- connections to main industrial and agricultural centres (links to important origin and destination points);

150. Endorsed by the Economic and Social Commission for Asia and the Pacific at its forty-eight session in 1992.
151. These criteria were endorsed by ESCAP’s Committee on Transport and Communications.
– connections to major sea and river ports (integration of land and water transport networks);
– connections to major inland container terminals and depots (integration of road and rail networks); and
– connections to major tourist attractions (in the case of the Asian Highway).

The two basic principles, however, are to minimize the number of roads and railway lines to be included in the networks and to make the maximum possible use of the existing infrastructure.

A refined strategy\footnote{152} for the implementation of ALTID project was adopted in 1998 which includes the following components:

– Facilitation of land transport at border crossings and maritime transport at ports through the promotion of the relevant international conventions and agreements in Asia to improve the efficiency of international transport along land and land-cum-sea routes.
– Completion of formulation of Asian Highway and Trans-Asian Railway networks covering the whole of Asia as well as completion of missing links.
– Formalization of the Asian Highway and Trans-Asian Railway routes/networks.
– Improvement of the operational efficiency of the Asian Highway and the Trans-Asian railway routes, including transport logistics.
– Improvement of transport logistics.
– Asian Highway and Trans-Asian railway promotion.


The Asian Highway project is aimed at enhancing the efficiency and promoting the development of road transport infrastructure in Asia. The key tenets of the

\footnote{152}Major issues in transport and communications: Asian land transport infrastructure development: Refinement of the strategy for implementation of the ALTID project, ESCAP Committee on Transport and Communications, 1-4 December 1997, ESCAP document E/ESCAP/CTC(3)/2. The refined strategy was developed by Vladimir N. Timofeev and adopted by the Commission at its 54th session (1998). As mandated by the Ministerial Conference on Infrastructure (2001), the implementation of the strategy by ESCAP resulted among others in the development of the Intergovernmental Agreements on the Asian Highway Network (2005) and the Trans-Asian Railway Network (2006).
project have been to promote international and bilateral trade and tourism to encourage regional economic and social development.

The Asian Highway network now comprises approximately 140,000 kilometres of roads, passing through 32 member states (Figure 19). The ESCAP Secretariat supported the conversion of the Asian Highway project into an Intergovernmental Agreement.

The Intergovernmental Agreement on the Asian Highway network was adopted in November 2003 by 32 member states and has entered into force on 4 July 2005. To date\textsuperscript{153}, 28 member states have signed the Agreement and thirteen\textsuperscript{154} have ratified, approved or accepted it. These commitments clearly indicate the importance of developing the regional transport network in the Asia-Pacific region.

The main obligations of the contracting parties within the Agreement are to:

- adopt the Asian Highway network as a coordinated plan for the development of highway routes of international importance;
- bring the network in conformity with the Asian Highway classification and design standards; and
- place Asian Highway route signs along the network.

The Agreement also established a Working Group on the Asian Highway to review its implementation. The ESCAP Secretariat acts as secretariat for the agreement. The Agreement plays a catalytic role in the development of international highways in the Asia-Pacific region. UNESCAP Resolution 60/4, adopted at the 60\textsuperscript{th} Commission session at Shanghai in 2004, invites international and regional financing institutions and multilateral and bilateral donors to provide financial and technical support for the development of the Asian Highway network and related infrastructure, particularly taking into account the special needs of landlocked developing countries (see Box 6).

Supported by the ESCAP Secretariat, member countries have identified a list of priority projects and prepared project profiles for potential donors. The highest priority has been given to the upgrading of substandard sections of the Asian Highway. ESCAP aims to play a role in the dissemination of high priority projects that have not yet received adequate funding, but are of such importance that, if realized, the whole Asian region would benefit.

\textsuperscript{153} As of 7 November 2005.

\textsuperscript{154} These include Armenia, Azerbaijan, Bhutan, Cambodia, China, Japan, Mongolia, Myanmar, Pakistan, the Republic of Korea, Sri Lanka, Uzbekistan and Viet Nam.
Figure 19: Map of the Asian Highway, 2003

Source: ESCAP
Box 6: Asian Landlocked Countries, ESCAP and the Almaty Programme of Action (APA)

Of the 30 landlocked countries in the world, 12 are located in Asia, namely: Afghanistan, Armenia, Azerbaijan, Bhutan, Kazakhstan, Kyrgyzstan, the Lao People’s Democratic Republic, Mongolia, Nepal, Tajikistan, Turkmenistan and Uzbekistan.

Each of these countries is disadvantaged by dependence on a limited number of commodities for their export earnings and a lack of access to sea ports and international markets. These factors contribute to lower levels of income, high costs of imports and decreased competitiveness of exports. In most cases, the transit neighbours of landlocked countries are developing countries, often of broadly similar economic structure and with problems of their own, including scarcity of resources. Transit developing countries bear additional burdens deriving from transit transport and its financial, infrastructural and social impacts. Also, transit developing countries need to improve technical and administrative arrangements in their transport, customs and administrative systems to which their landlocked neighbours are expected to link.

Over the years, international attention has focused on the special situation of landlocked countries. The international community has recognized and in part addressed some of the constraints faced by landlocked countries through international legal instruments (e.g., the Barcelona Convention of 1921, the New York Convention of 1965, and UNCLOS in 1982). More recently, there has been increased recognition of the dependencies between landlocked and transit countries which has provided a new impetus to increased regional cooperation. The Lao People’s Democratic Republic, for example, has been referring to itself as being “land-linked” and not “landlocked”.

The United Nations convened an International Ministerial Conference of Landlocked and Transit Developing Countries and Donor Countries and International Financial and Development Institutions on Transit Transport Cooperation at Almaty, Kazakhstan, in August 2003. The Conference adopted the Almaty Programme of Action (APA): Addressing the Special Needs of Landlocked Developing Countries within a New Global Framework for Transit Transport Cooperation for Landlocked and Transit Developing Countries, and the Almaty Declaration. The work of ESCAP in the area of landlocked and transit countries focuses on the implementation of the APA. APA aims to: (a) secure access to and from the sea by all means of transport, (b) reduce costs and improve services so as to increase the competitiveness of their exports, (c) reduce the delivered costs of imports, (d) address problems of delays and uncertainties in trade routes, (e) develop adequate national networks, (f) reduce loss, damage and deterioration enroute, (g) open the way for export expansion, (h) improve the safety of road transport and the security of people along the corridors. The five priority areas of APA are: (a) policy improvements, (b) improved rail, road, air and pipeline infrastructure, (c) international trade measures, and (d) technical and financial international assistance.

(d) The Trans-Asian Railway after 1992

Similar to the case of the Asian Highway, the Trans-Asian Railway Project is aimed at enhancing the efficiency and development of rail transport infrastructure in Asia, thereby promoting international and bilateral trade and regional economic and social development.
Given the extent of the territory covered by the Trans-Asian Railway (Figure 20), the differences in standards and in the levels of technical development between railways in the region, a step-by-step approach was adopted to define the network, initially based on four major corridors and with a focus on break-of-gauge points and missing links. In addition, “software” aspects were reviewed with particular attention to tariff-related issues and the institutional framework pertaining to the passage of goods across borders.

With support from ESCAP and OSJD, four demonstration runs of container block trains along different routes of the northern corridor of the Trans-Asian Railway were carried out between Nov. 2003 and July 2004, based on a ministerial-level Memorandum of Understanding (MOU)155 and Steering Committee Meetings (SCM). The first such run was successfully organized between the Chinese port of Tianjin and Ulaanbaatar in Mongolia, the second one between the Chinese port of Lianyungang and Almaty in Kazakhstan, the third one between Ulaanbaatar and Brest, and the fourth one between Vostochny in the Far East of the Russian Federation and Malaszewicze in Poland (Figure 21). Meanwhile, other services have also been tested or are being tested.

It should be noted that a container block train between Western Europe and the Far East that travels at about 1,000 km per day on average would have at least seven days advantage in transit time as compared to sea transport.

The demonstration runs have already been followed by more than 200 commercial container block trains between 2004 and 2005156. However, all routes in the northern corridor of TAR connect at some stage with the Trans-Siberian main line, whose current capacity of around 300,000 TEU per year will soon become a constraint157. This illustrates the benefits of exploring and developing other routes.

On 10 November 2006, the Intergovernmental Agreement on the Trans-Asian Railway Network was signed by 18 member states at the Ministerial Conference on Transport in Busan, Republic of Korea. Looking beyond the Agreement, the formalization of the Trans-Asian Railway Network constitutes one step towards the identification of an international intermodal network covering the continent as mandated by the Ministerial Conference on Infrastructure held in Seoul, Republic of Korea, in November 2001.

155. China, Kazakhstan, Mongolia, the Republic of Korea, and the Russian Federation have signed the MOU at the ministerial level. Relevant authorities of DPR Korea have indicated their agreement in principle. The other participating countries are Belarus, Germany and Poland. 156. Source of information: OSJD. 157. In fact, containers carried along the Trans-Siberian line have increased from 48,800 in 2001 to 119,000 in 2003, with a majority of cargo destined for and originating in Finland.
Figure 20: Map of the Trans-Asian Railway, September 2005

Source: ESCAP Secretariat
(e) **UN Special Programme for the Economies of Central Asia (SPECA) since 1997**

At the request of, and following consultations with the Central Asian Republics\(^{158}\), the United Nations Economic Commission for Europe (ECE) and the Economic and Social Commission for Asia and the Pacific (ESCAP) jointly initiated a programme in 1997 focusing specifically on economic issues of concern to those countries.

The UN Special Programme for the Economies of Central Asia, or SPECA, assists the participating countries in strengthening cooperation for their economic development through more efficient use of resources and facilitation of their integration into Europe and Asia. The implementation of the programme started by selecting priority areas for national and regional actions, and setting up project working groups in those areas. This includes a Project Working Group (PWG) on Transport and Border Crossing (TBC). The PWG adopted an Action Programme for Transit Transport Cooperation for SPECA Countries (APTTCC).

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SPECA activities on “enhancing transit infrastructure” include, inter alia: (a) accession to multilateral agreements on infrastructure (AGR, AGTC, AH Agreement, etc.); (b) road and rail infrastructure asset management; (c) promotion of favourable legal environment to attract investments; (d) identification of priority projects; and (e) logistic centre pilot projects.

(f) Euro-Asian Transport Linkages since 1997

As noted earlier, there are large and increasing overall trade volumes between Europe and Eastern Asia: 3.2 million TEU from Eastern Asia to Europe and 7.2 million TEU in the other direction in 2005\textsuperscript{159}, almost all of which is currently transported by sea. ESCAP has promoted a number of initiatives to improve “Euro-Asian Linkages” along land routes. These efforts are geared to the opening up of the almost untapped potential of land transport infrastructure in this respect. Furthermore, they are also promoting infrastructure development in order to improve transport linkages between Central Asia and Europe, as well as between East Asia and Central Asia.

Series of St. Petersburg Conferences since 1998: At the initiative of the Russian Federation, and with the support of ESCAP and ECE, a series of Euro-Asian Conferences on Transport were held in St. Petersburg since 1998. The 2\textsuperscript{nd} such conference in Sept. 2000 identified four main Euro-Asian transport corridors as the backbone network: the Trans-Siberian, TRACECA, Southern, and the North-South Corridors (Box 7).

The third such conference in Sept. 2003 recommended a strategy for the development of an Integrated Euro-Asian Transport system, as well as support measures and a number of specific initiatives\textsuperscript{160}. The strategy focuses, inter alia, on: (a) formulation of integrated intermodal international Euro-Asian transport routes/corridors and networks; (b) formalisation of international transport routes/networks through related international agreements or amendments to existing ones, as a basis for their coordinated development; (c) facilitation of transport at border-crossings and ports based on relevant international conventions; (d) analysis of routes/corridors; (e) operationalization of international transport routes and periodical performance evaluation; (f) development of public-private partnership with freight forwarders and multimodal transport operators.

Specific initiatives were recommended in the areas of infrastructure development, modern freight technologies, attracting transport infrastructure

\textsuperscript{159} Source: Containerisation International.
\textsuperscript{160} ECE document number TRANS/2004/12
Box 7: Main Euro-Asian transport corridors identified by the 2nd

**Transsiberian Corridor**
- Europe (PETCs 2, 3 and 9) – Russian Federation-Japan, with three branches from the
  Russian Federation to: (a) Kazakhstan-China; (b) Korean Peninsula; and (c) Mongolia-
  China.
- The rail corridor became an important double track railway line, fully electrified, stretching
  about 10,000 km up to the port of Nakodha. Infrastructure on this corridor is undergoing
  continuous modernization and important improvements in originating ports and railway
  stations on the borders in North-East Asia. In 1993, an International Coordinating Council
  on Transsiberian Transportation was established, in order to enhance the competitiveness
  of the corridor. Road reconstruction along the Transsiberian corridor has also been going
  on for some time.

**Transport Corridor Europe–Caucasus–Asia (TRACECA)**
- Eastern Europe (PETCs 4, 7 8, and 9) – across Black Sea – Caucasus – across Caspian
  Sea – Central Asia.
- TRACECA was initiated as a programme more than 10 years ago by the European Union
  (EU) as an additional transport corridor to the existing ones to promote integration with
  the Trans-European Networks (TENs). When the TRACECA corridor is completed,
  intermodal rail-cum-sea routes will follow part of the ancient Silk Road from the Chinese
  port of Lianyungang on the Yellow Sea to the Georgian ports of Poti and Batumi on the
  Black Sea and then across the Black Sea into Western Europe. A so-called “transport
delta” will be created on the Georgian coast of the Black Sea. TRACECA member states
  have set up an Inter-Governmental Commission (IGC), consisting of the highest
  governmental authorities of member states or their representatives.

**Southern Corridor**
- South-eastern Europe (PETC 4) – Turkey – Islamic Republic of Iran with two branches
  to: (a) Central Asia – China, and (b) South Asia – South East Asia/Southern China.
- The ESCAP study entitled “Development of the Trans-Asian Railway–Trans-Asian Railway
  in the Southern Corridor of Asia-Europe routes” has explored the potentials of this corridor.

**North-South Corridor**
- Northern Europe (PETC 9) – Russian Federation, with three branches: (a) Caucasus –
  Persian Gulf, (b) Central Asia – Persian Gulf, and (c) Across the Caspian Sea – Islamic
  Republic of Iran – Persian Gulf.
- The corridor is expected to offer both quicker and cheaper transportation than the primary
  alternative—the shipment of goods from South Asia through the Suez Canal and the
  Mediterranean and then into the Atlantic and North Sea to Baltic ports. According to some
  estimates, delivery time using the North-South Corridor will be reduced by 10-20 days
  and the cost per container will decrease by US$ 400 to 500.
investments, promotion and development of tourism, information technologies, safety and environment, improvement and rationalization of customs procedures and simplification of border crossings, as well as in the area of expansion of access to the market of transport services.

OSJD Agreement 1997: In the railway sector, the Organization for Railways Cooperation (OSJD)\textsuperscript{161} concluded an agreement on organizational and operational aspects of combined Euro-Asian transport in 1997. This agreement identified a number of Euro-Asian railway corridors and routes (Figure 22).

Project of the United Nations Regional Commissions since 2002: An example of inter-regional cooperation in all modes of land transport is the United Nations project “Capacity-building in developing interregional land and land-cum-sea transport linkages”\textsuperscript{162} since 2002. It is implemented jointly by the five United Nations Regional Commissions, namely the Economic Commission for Europe (ECE), the Economic and Social Commission for Asia and the Pacific (ESCAP), the Economic Commission for Latin America and the Caribbean (ECLAC), the Economic Commission for Africa (ECA) and the Economic and Social Commission for Western Asia (ESCWA).

The common approach adopted in the project is to use the regional transport networks which have been developed by the respective regional commissions as the basis for identifying major interregional routes which can be further developed through cooperative strategies by participating countries. These strategies range from the sharing of information on the current conditions of infrastructure and future investment plans; assessment of bottlenecks which hinder the smooth transit of goods, particularly at border crossings and intermodal nodes; and the exchange of ideas and experiences on approaches to remove such bottlenecks.

In the ECE-ESCAP\textsuperscript{163} and the ECE-ESWA-ESCAP\textsuperscript{164} components of the project, countries have indicated a set of major road, rail and inland water transport routes linking the two continents.

\textsuperscript{161} http://www.osjd.org/
\textsuperscript{162} This project was funded through the UN Development Account.
\textsuperscript{163} Participating countries: Afghanistan, Armenia, Azerbaijan, Belarus, Bulgaria, China, Georgia, the Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Moldova, Romania, Russian Federation, Tajikistan, Turkey, Turkmenistan, Ukraine, and Uzbekistan.
\textsuperscript{164} Participating countries: Iraq, Syria, Jordan, Saudi Arabia, Kuwait, United Arab Emirates, Palestine (OPT), Egypt, the Islamic Republic of Iran, Pakistan and Turkey
Figure 22: Euro-Asian Corridors

Source: OSJD
Subregional initiatives

While the Asian Highway and Trans-Asian Railway networks have been formulated from national networks, they now form the primary corridors for interregional, subregional and national movement of goods and people. In so doing, the subregional networks provide more inclusive access to subregional hinterlands, while national networks provide even more comprehensive access to national hinterlands. Consequently, regional cooperation plays an important role in not only developing inter-country linkages but also in promoting physical access at the national level.

(a) Subregional intergovernmental organizations

The major part of subregional cooperation in transport is promoted under the frameworks of subregional, intergovernmental organizations, such as ASEAN, ECO, FORUM, SCO and SAARC, which cover a multitude of economic sectors. There is also the CIS and IGC-TRACECA consisting of a number of countries, located inside and outside of the region, which formed part of the former Soviet Union. Yet, these subregional organizations are rather diverse in nature with significant differences in terms of the depth of integration and types of cooperation.

Association of South-East Asian Nations (ASEAN) since 1967: The Association of Southeast Asian Nations or ASEAN was established on 8 August 1967 and presently has ten members. ASEAN is particularly active and has established some 20 bodies for the transport sector, at the working group, senior officials and ministerial levels.

The most recent instruments of regional cooperation are the ASEAN Vision 2020, the Bali Concord II, and the Vientiane Action Plan. In the Vientiane Action Plan, the Heads of State and Government of ASEAN member countries committed themselves to gearing-up ASEAN transport as a critical logistics and services support sector through the implementation of the ASEAN Transport Action Plan for 2005-2010. The Action Plan focuses on cooperation activities towards facilitating seamless movement of peoples and goods; enhancing integration and efficiency of multimodal transport infrastructures, facilities and services; accelerating open-sky arrangements; and advancing liberalisation in air and maritime transport services.

165. ASEAN members: Indonesia, Malaysia, Philippines, Singapore, Thailand, Brunei Darussalam, Viet Nam, Lao Peoples Democratic Republic, Myanmar and Cambodia.
166. adopted at the 10th ASEAN Transport Ministers Meeting held at Phnom Penh in November 2004.
Commonwealth of Independent States (CIS) since 1991: The Commonwealth of Independent States (CIS)\textsuperscript{167} was created in 1991. In 1993, an Agreement on the creation of an Economic Union was signed, in order (a) to form a common economic space based on free movement of goods, services, labour force, capital; (b) to elaborate coordinated monetary, tax, price, customs, external economic policy; (c) to bring together methods of regulating economic activity; and (d) to create favourable conditions for the development of direct production relations.

Joint activities of the member states in the development of transport and communications systems are guided by the Coordinating Transport Conference. In 1998, a protocol on international roads of CIS was adopted, which lists CIS international roads and prescribes classification and design standards.

Economic Cooperation Organization (ECO) since 1985: The Economic Cooperation Organization (ECO) is an intergovernmental regional organization\textsuperscript{168} established in 1985 as the successor organization of Regional Cooperation for Development (RCD) which was active between 1964 and 1979. The organization has been active in the transport sector, signing a Transport Transit Framework Agreement in 1998, which includes a list of prescribed road, rail and inland waterway transit routes\textsuperscript{169}.

A guiding framework for the organization’s work is the ECO Vision 2015 which was adopted in 2005. Inter alia, it includes commitments to remove physical and non-physical barriers in transport (including reconstruction of missing links), to operationalize container and passenger train initiatives, and to support APA, the Asian Highway and TRACECA.

South Asian Association for Regional Cooperation (SAARC) since 1985: The South Asian Association for Regional Cooperation (SAARC)\textsuperscript{170} was established in 1985. A Technical Committee on Transport was set up to work on land, sea and air transport. Its activities have included seminars, workshops, training, exchange of data and information, preparation of status papers (including on transit facilities), compilation of database and directories of consultancy centres for transport sector.

\textsuperscript{167} At present CIS members include: Azerbaijan, Armenia, Belarus, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Uzbekistan and Ukraine.

\textsuperscript{168} Current members are: Islamic Republic of Iran, Pakistan, Turkey, Afghanistan, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

\textsuperscript{169} The formal adoption of the network has yet to be approved.

\textsuperscript{170} Members: Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.
Recent areas of cooperation also include transport safety, rural transport, environmental aspects, and energy conservation. However, until recently, SAARC has not made significant progress in re-establishing its transport network. Prospects have improved since the SAARC Summit of 2004. Also since 2004, the Asian Development Bank and SAARC, formalized through an MOU, work on a SAARC Regional Multimodal Transport Study.

(b) Other arrangements

Besides the dominant work of subregional, intergovernmental organizations mentioned above, there is an increasing number of other programmes, projects and initiatives with elements of subregional cooperation in land transport. Noteworthy examples include, inter alia:

- the Brunei, Indonesia, Malaysia, Philippines East ASEAN Growth Area (BIMP-EAGA);
- Indonesia, Malaysia, Thailand-Growth Triangle (IMT-GT);
- Indonesia, Malaysia, Singapore-Growth Triangle (IMS-GT);
- ASEAN Mekong Basin Development Cooperation (AMBDC);
- Greater Mekong Sub-region (GMS); and
- Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy (ACMECS).
- ESCAP-OSJD cooperation on container demonstration runs and the operationalization of Euro-Asian rail routes to landlocked countries in Asia and the Caucasus.
- Various projects and programmes of UNCTAD, IRU, IRF, OSJD and ASEAN+4.

Most of these organizations and programmes aim to complement each other and the Asian Highway and the Trans-Asian Railway.

Regional cooperation in maritime transport development

Regional cooperation in maritime transport takes significantly different forms in the case of the coastal regions of the Asian continent and its major economies, than in the case of small island developing states (SIDS) in the Pacific. There are big differences in terms of driving forces, issues, goals and nature of such cooperation. These are discussed subsequently in this Section.
Shipping along coastal areas of major Asian economies

Arguably, the system of container ports and shipping has been the most important backbone network of the current phase of globalization. Furthermore, the evolution of international production and distribution networks has been shaped by global changes in liner shipping due to changes in technology, such as the advent of the container and increasing container ship sizes and speeds. In fact, the size of container ships has increased several-fold since the 1960s, in order to make use of the available economies of scale. This has emphasized even further the “hubs-and-spokes” character of the global shipping and ports system. In essence, large ships service hubs, whereas smaller second-generation vessels are deployed on feeder routes.

Consequently, in the last fifteen years, we have seen significant changes in container shipping route structures. There has been a trend away from the provision of direct liner services and towards the establishment of networks centred on regional hub ports. Carriers that previously only serviced major routes have joined networks servicing secondary routes.\textsuperscript{171} As direct calls by mainline vessels tend to make economic sense for any major market that is only a short deviation from the main shipping routes, we see on average two to four port calls of mainline vessels in each main world region today.

In line with rapid increases in trade from and to Asia, the region has seen large investments in seaports, including investments by state owned or controlled ports, such as Singapore; Hong Kong, China; and others. Shanghai port alone has grown by more than 3 million TEU in 2004, which was larger than the total throughput of Felixstowe at the time. Yet, major infrastructure bottlenecks and issues remain even in North-East Asia.\textsuperscript{172}

As ship sizes continue to increase, faster container handling is necessary just to keep up. Otherwise, extended port time would destroy the rationale for having bigger ships. Port congestion has become a problem, even for developed countries, with the possibility of congestion surcharges becoming more common. Furthermore, it appears that almost every port wants to be a “mega hub”. Yet, in reality only few will be able to become a hub, otherwise there will be “more hubs than spokes”.

Concentration of ownership has increased appreciably in the market for international liner shipping over the past twenty years, yet it is still lower than in


\textsuperscript{172} ESCAP (2004). Development of Shipping and Ports in North-East Asia, ST/ESCAP/2354.
some other transport industries. Profitability appears not to be that high, even though investment in new capacity continues to be high. This is despite the existing agreements between shipping lines, where “conferences” have been the traditional form of cooperation designed to fix freight rates. Conferences have somewhat declined in importance, whereas discussion agreements have become more important as a mechanism for influencing freight rates on most major trade routes\textsuperscript{173}.

The market trends outlined above have led to further consolidation, concentration, and increasing importance of co-operation and strategic alliances in shipping. In particular, the emergence of powerful, “global” port operating companies with increasing market power should be noted. For example, P\&O Ports operates 27 container terminals and logistics operations in over 100 ports in 18 countries\textsuperscript{174}. In fact, earlier this year, Drewry Shipping Consultants Ltd. summed up the changing market situation as follows\textsuperscript{175}: “Ten years ago: Shipping lines could take the view that whatever their demands were (e.g. bigger ships, more volumes, more port calls), ports would and could respond. When shipping lines said ‘jump’… ports said ‘how high?’ Today: The pendulum is swinging the other way. Ports (and inland infrastructure) are influencing shipping lines more. When shipping lines say ‘jump’… ports say ‘we’d like to, we want to, we will if we can……but it’s not quite as simple as that anymore…….”

In the past, the case for exemption from competition law for the shipping liner market was made based on the theoretical possibility of “destructive competition”, due to its natural monopoly character. But there continues to be a lack of empirical evidence in support of this concern. In contrast, examples of other less collusive market arrangements have emerged with no indication of “destructive competition” in the market-place. Also, there are close parallels between the international liner shipping market and other sectors which are natural monopolies, such as airline travel, which also shows a similar hubs-and-spokes system. For example, liberalized airline travel in the USA has led to large benefits for the consumer as well as for the economy as a whole\textsuperscript{176}.

\textsuperscript{173} but they do not occur on European trade routes
\textsuperscript{174} http://portal.pohub.com/portal/page?_pageid=36,1,36_31151:36_32101&_dad=pogprt & _schema= POGRTL
\textsuperscript{176} In this context, it should be noted that the US example allows operational agreements relating to marketing and service rationalisation which are extensively used.
The one type of “destructive competition” that has occurred is between some governments which got involved in pushing “their” ports and connections over those of neighbouring countries, beyond any economic rationale. In fact, this situation has emerged due to insufficient competition in the market-place rather than too much competition. It appears to be due to a fundamental imbalance between global networks of shipping lines and port operators and the national confines of governments. It appears that governments will only be able to redress this imbalance through promoting competition between these businesses at the international level, through regional and international cooperation initiatives.

**Small island developing states in the Pacific**

Regional and subregional cooperation in transport of small island developing states (SIDS) is promoted mainly by the UNESCAP Pacific Operations Centre (EPOC) and the Pacific Island Forum which are discussed in this Section. In addition, since 1994, the Global Action Plan for small island developing states has been a guiding framework for regional cooperation in the Pacific and beyond.

(a) **Global Plan of Action for Small Island Developing States**

Small Island Developing States around the globe share a set of common challenges related to transport and communications issues that are somewhat specific to these economies. In fact, in the case of the Pacific the severity of these issues is even greater than elsewhere due to extremely long distances. The UN Global Conference on the Sustainable Development of Small Island Developing States, at Bridgetown, Barbados, in 1994, highlighted those issues and adopted a long-term Plan of Action. This Plan forms the basis of much of regional cooperation activities in the field of transport and communications in the Pacific.

Transport and communications are the lifelines linking small island developing states with the outside world, with each other and within their own countries, and are an important means of achieving sustainable development. However, distance and isolation have resulted in relatively high transport costs, including high transport insurance costs, for many small island developing states. The quality and frequency of international shipping and air services are largely beyond the control of island states. Domestic markets are too small to provide economies of scale and the remoteness of many rural and outer-island communities constrains options and increases costs. While national airlines are necessary to serve the local market, especially in archipelagic states, they tend to fragment the regional market. The constraining influence of factors on the sustainable development of island countries cannot be underestimated.
In order to overcome these problems, the Action Plan of the Barbados Conference held in 1994 recommends the following focus areas for interventions in the transport and communications sectors: (a) addressing the environmental uses associated with transport development, including quarantine and land transport; (b) devising innovative approaches to resolving transport problems, such as low-cost methods for moving cargo; (c) infrastructure asset management; and (d) infrastructure investments.

While confirming the Global Plan of Action of 1994, the Mauritius Strategy for the Further Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States\textsuperscript{177} adopted in 2005 puts greater emphasis on communications and ICT aspects, in addition to transport, as well as on regional cooperation mechanisms in air, land and sea transport.

(b) **ESCAP Pacific Operations Centre (EPOC)**

The objective of the ESCAP Pacific Operations Centre (EPOC) in Fiji, which was established in Vanuatu in 1984 is to provide technical assistance to Pacific island countries at the specific request of their respective governments (19 ESCAP members and associate members) in a wide range of economic and social fields. Regional advisory services were provided in (a) the preparation and review of port master plans; (b) evaluation of port rehabilitation projects; (c) environmental and socio-cultural impact of port development; planning, development, operation and maintenance of shipping facilities to outer islands; (d) review of port regulations and tariffs; and (e) capacity building of engineers, management and operations personnel.

(c) **Pacific Island Countries Forum**

The Pacific Island Countries Forum\textsuperscript{178} represents the Heads of Governments of all the independent and self-governing Pacific Island countries, Australia and New Zealand. Since 1971, it has provided member nations with the opportunity to express their joint political views and to cooperate in areas of political and economic concern. The Forum meets each year at the Heads of Governments level. Immediately after this, the post-Forum dialogue is conducted at the Ministerial level with Forum dialogue partners from outside the region. The Secretariat of the Pacific Island Countries Forum and nine other organizations have joined to form the Council of the Regional Organizations in the Pacific (CROP).

\textsuperscript{177} See the attachment to the report of the meeting.

\textsuperscript{178} Current members: Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Republic of the Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu.
Recent FORUM work in the transport sector includes a Pacific Regional Transport Study in 2004 which identified major impediments to efficient transport in the Pacific region that are within the control of governments and made recommendations for the aviation and maritime sectors, including suggestions for new investments, more efficient use of current assets, and institutional issues. In response to the study, FORUM Leaders declared the *FORUM Principles on Regional Transport Services* (FPRTS) in 2004 which emphasized, inter alia, (a) principles of good governance; (b) commercial viability; (c) regulatory systems; (d) regional solutions; (e) international aviation and maritime security standards. In order to strengthen regional cooperation and integration, a Pacific Plan was prepared by the FORUM secretariat for consideration in October 2005 which also defines the role of private sector mechanisms in the transport sector.

**Regional Cooperation in Intermodal Transport Development**

International production networks require a highly sophisticated level of supply chain and, more specifically, logistics. As a result, the need for efficient, integrated, intermodal international transport has become ever more apparent, and services providers have emerged that offer optimal combinations of transport modes (road, rail, IWT, sea, air) depending on customer preferences in terms of delivery time, reliability and cost.

**Regional initiatives**

Governments in the region have been increasingly aware of the strategic competitive importance of the need to promote institutional changes and seamless physical interconnection between the various transport modes. While the private-sector driven maritime and civil aviation networks have developed into their characteristic hubs-and-spokes systems, thereby making maximum use of economies of scale, governments have tried to promote scale and interconnection through the promotion of inland container depots (ICDs) and even freight villages, the latter integrating many related services and intermodal connections in one place, in order to cut costs and promote traffic.

It should be noted, however, that these government efforts in Asia have been national initiatives, almost without exception. On the other hand, the hubs-and-spokes development in the maritime and air transport sectors has been driven by the private sector, essentially leading to companies owning or running regional and even global networks of their own. Clearly, the strongest case for regional cooperation initiatives to promote intermodal transport is, therefore, in the land linkages to these networks.
The ALTID project of ESCAP is an obvious example of a regional programme that incorporates principles of intermodal connectivity. In particular, since the Ministerial “Seoul Declaration on Infrastructure Development in Asia and the Pacific” in 2001, the concept has been firmly on the agenda and it has become an integral part of ALTID. In fact, one of the outcomes of the Declaration was the agreement by Ministers that they considered it essential that “governments take a leading role in more effectively integrating the different forms of transport in order to develop sustainable intermodal transport systems that deliver efficient domestic transport services and at the same time provide access to international markets and wider hinterlands”.

The two-pronged approach followed by the ESCAP Secretariat for promoting this process on a truly regional, continental scale, is:

– on the one hand, to promote subregional cooperation on integrating national intermodal transport systems (“bottom-up” approach, see next section), and

– on the other hand, to ensure interoperability, compatibility and consistency both in terms of standards and policy analysis methodology (“top-down approach”).

This document is the first in a series of planned contributions of the Secretariat for the latter “top-down” approach. It is expected to serve as a basis for high-level policy making and promote consistency of the many national and subregional initiatives.

**Subregional initiatives**

(a) **ESCAP projects on subregional integrated transport networks**

As a first step to support and promote regional cooperation in the development of an Asian integrated transport network, the ESCAP Secretariat has started to carry out subregional studies on the issues that follow the ESCAP methodological approach mentioned above. The first such study focused on North-East Asia, the second one which is in preparation focuses on Central Asia.

ESCAP and the UNDP Tumen Secretariat have been jointly carrying out a project on an integrated international transport and logistics system for North-East Asia. A policy-level expert group meeting in Ulaanbaatar in 2004 adopted an integrated international transport and logistics network for North-East Asia with a mix of major routes and corridors (appropriate roads, railways and water transport),
including connections to major seaports\textsuperscript{179}. These were based on the Trans-Asian Railway and Asian Highway. Intermodal interfaces, such as inland container depots, freight terminals and distribution centres and border crossings were identified as important nodes along the routes. The meeting adopted actions required to develop the integrated network.

\textit{(b) ADB programmes on subregional cooperation}

ESCAP has also been working closely with ADB, supporting its comprehensive subregional cooperation programmes in Asia and the Pacific, all of which include components related to integrated transport.

In fact, ADB has been supporting regional cooperation programmes in the Asia and Pacific Region, namely, the Greater Mekong Subregion (GMS); the South Asia Subregional Economic Cooperation (SASEC)\textsuperscript{180}; the Central Asia Regional Economic Cooperation (CAREC); the Brunei, Indonesia, Malaysia, Philippines-East ASEAN Growth Area (BIMP-EAGA); the Subregional Economic Cooperation in South and Central Asia (SECSCA); and the Pacific Plan for the small island states in the Pacific Ocean.

\textsuperscript{180} Based on the earlier South Asian Growth Quadrangle (SAGQ).
Annex 2

Membership of Regional and Subregional Organisations,
Agreements and programmes

This annex lists (in the form of tables) selected regional programmes, intergovernmental agreements and organizations in Asia and the Pacific.
<table>
<thead>
<tr>
<th>Organisations</th>
<th>Year founded</th>
<th>Members</th>
<th>Full name</th>
<th>Member countries and associate members</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESCAP</td>
<td>1947</td>
<td>62</td>
<td>United Nations Economic and Social Commission for Asia and the Pacific</td>
<td>Afghanistan, Armenia, Australia, Azerbaijan, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Fiji, France, Georgia, India, Indonesia, Islamic Republic of Iran, Japan, Kazakhstan, Kiribati, Korea (Democratic People's Republic of), Korea (the Republic of), Kyrgyzstan, Lao People's Democratic Republic, Malaysia, Maldives, Marshall Islands, Micronesia (Federated States of), Mongolia, Myanmar, Nauru, Nepal, Netherlands, New Zealand, Pakistan, Palau, Papua New Guinea, Philippines, Russian Federation, Samoa, Singapore, Solomon Islands, Sri Lanka, Tajikistan, Thailand, Timor-Leste, Tonga, Turkey, Turkmenistan, Tuvalu, United Kingdom of Great Britain and Northern Ireland, United States of America, Uzbekistan, Vanuatu, Viet Nam, American Samoa, Cook Islands, French Polynesia, Guam, Hong Kong, China; Macao, China; New Caledonia, Niue, Northern Mariana Islands</td>
</tr>
<tr>
<td>APEC</td>
<td>1989</td>
<td>16</td>
<td>5</td>
<td>21</td>
</tr>
<tr>
<td>BSEC</td>
<td>1992</td>
<td>5</td>
<td>6</td>
<td>11</td>
</tr>
<tr>
<td>CIS</td>
<td>1991</td>
<td>8</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>ASEAN</td>
<td>1967</td>
<td>10</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>ECO</td>
<td>1964</td>
<td>10</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>BIMSTEC</td>
<td>1997</td>
<td>7</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>SAARC</td>
<td>1985</td>
<td>7</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>SCO</td>
<td>2001</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>Pacific Island Forum</td>
<td>1971</td>
<td>16</td>
<td>0</td>
<td>16</td>
</tr>
</tbody>
</table>
Table 5: Overview of major intergovernmental organizations for regional and subregional cooperation in a specific sector (transport or ICT)

<table>
<thead>
<tr>
<th>Organisations</th>
<th>Year founded</th>
<th>Members</th>
<th>Full name</th>
<th>Member countries and associate members</th>
</tr>
</thead>
<tbody>
<tr>
<td>APT</td>
<td>1979</td>
<td>ESCAP 36 Outside ESCAP 0</td>
<td>Asia Pacific Telecommunity</td>
<td>Afghanistan, Australia, Bangladesh, Bhutan, Brunei Darussalam, China, Fiji, India, Indonesia, Islamic Republic of Iran, Japan, Democratic People’s Republic of Korea, Republic of Korea, Lao People’s Democratic Republic, Malaysia, Maldives, Micronesia, Mongolia, Myanmar, Nauru, Nepal, New Zealand, Pakistan, Palau, Papua New Guinea, Philippines, Samoa, Singapore, Sri Lanka, Thailand, Tonga, Viet Nam. Associate Members: Cook Islands, Hong Kong, China; Macao, China; Niue.</td>
</tr>
<tr>
<td>IGC-TRACECA</td>
<td>1993</td>
<td>ESCAP 10 Outside ESCAP 4</td>
<td>Intergovernmental Commission Transport Corridor Europe Caucasus Asia</td>
<td>Armenia, Azerbaijan, Bulgaria, Georgia, Kazakhstan, Kyrgyzstan, Republic of Moldova, Mongolia, Romania, Tajikistan, Turkmenistan, Turkey, Ukraine, Uzbekistan (Afghanistan in the process of joining)</td>
</tr>
<tr>
<td>INSTC</td>
<td>2000</td>
<td>ESCAP 5 Outside ESCAP 2</td>
<td>International North-South Transport Corridor</td>
<td>Belarus, India, Islamic Republic of Iran, Kazakhstan, Oman, Russian Federation, Tajikistan</td>
</tr>
<tr>
<td>Asian Highway (AH)</td>
<td>2004 (previously project since 1956)</td>
<td>ESCAP 26 (33 members of the AH project)</td>
<td>Intergovernmental Agreement on the Asian Highway (initiated by ESCAP)</td>
<td>Signatories (as of May 2004): Afghanistan, Armenia, Azerbaijan, Bhutan, Cambodia, China, Georgia, India, Indonesia, Islamic Republic of Iran, Japan, Kazakhstan, Kyrgyzstan, Lao People’s Democratic Republic, Mongolia, Myanmar, Nepal, Pakistan, Republic of Korea, Russian Federation, Sri Lanka, Tajikistan, Thailand, Turkey, Uzbekistan, Viet Nam</td>
</tr>
<tr>
<td>ICC-RESAP</td>
<td>1995</td>
<td>ESCAP 26 Outside ESCAP 0</td>
<td>Intergovernmental Consultative Committee (ICC) on the Regional Space Applications Programme for Sustainable Development in Asia and the Pacific (RESAP)</td>
<td>Australia, Azerbaijan, Bangladesh, Bhutan, Cambodia, China, Fiji, Hong Kong, China, India, Islamic Republic of Iran, Japan, Lao People’s Democratic Republic, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, the Philippines, Republic of Korea, Russian Federation, Singapore, Sri Lanka, Thailand, Vanuatu, Viet Nam.</td>
</tr>
</tbody>
</table>
Table 6: Overview of selected regional or subregional programmes on cooperation of a general nature

<table>
<thead>
<tr>
<th>Programme</th>
<th>Year founded</th>
<th>Members</th>
<th>Full name</th>
<th>Participating countries, provinces and economies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>ESCAP</td>
<td>Outside ESCAP</td>
<td>Total</td>
</tr>
<tr>
<td>CIS-7</td>
<td>2002</td>
<td>6</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>CAREC</td>
<td>1997</td>
<td>7</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>GMS</td>
<td>1992</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>CSATTF</td>
<td>2003</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Tumen River</td>
<td>1991</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>SASEC</td>
<td>2001</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>SPECIA</td>
<td>1998</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>MGC</td>
<td>2000</td>
<td>6</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>
Table 7: Overview of selected regional or subregional programmes on either transport or ICT in Asia and the Pacific

<table>
<thead>
<tr>
<th>Programme</th>
<th>Year founded</th>
<th>Members Total</th>
<th>Full name</th>
<th>Participating countries, provinces and economies</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRADP</td>
<td>1999</td>
<td>4, 0, 4</td>
<td>United Nations Development Programme / Silk Road Area Development Program</td>
<td>China, Kazakhstan, Kyrgyzstan, Tajikistan. Uzbekistan and Turkmenistan have been invited to join.</td>
</tr>
<tr>
<td>Trans-Asian Railway Project (TAR)</td>
<td>25</td>
<td>0, 25</td>
<td>Trans-Asian Railway Project</td>
<td>Armenia, Azerbaijan, Bangladesh, Cambodia, China, Democratic People's Republic of Korea, Georgia, India, Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Malaysia, Mongolia, Myanmar, Pakistan, Republic of Korea, Russian Federation, Sri Lanka, Singapore, Tajikistan, Thailand, Turkey, Turkmenistan, Uzbekistan, Vietnam.</td>
</tr>
<tr>
<td>AP* (APNG)</td>
<td>1993</td>
<td>19, 2, 21</td>
<td>Asia-Pacific Networking Group</td>
<td>Current participating economies: Australia; Brunei; Cambodia; Canada; China; Fiji; Hawaii; Hong Kong, China; India; Indonesia; Republic of Korea; Japan; Macau, China; Malaysia; New Zealand; Pakistan; the Philippines; Singapore; Sri Lanka; Taiwan, China; Thailand; the United States of America; Vietnam.</td>
</tr>
<tr>
<td>AI3</td>
<td>1995</td>
<td>9, 0, 9</td>
<td>Asian Internet Interconnection Initiatives</td>
<td>Japan, Indonesia, Hong Kong Province of China, Singapore, Thailand, Viet Nam, Malaysia, Sri Lanka, Philippines</td>
</tr>
<tr>
<td>TER</td>
<td>1990</td>
<td>3, 19, 22</td>
<td>UNECE Trans-European Railway Project</td>
<td>Austria, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Georgia, Greece, Hungary, Italy, Lithuania, Poland, Romania, Russian Federation, Slovak Republic, Slovenia and Turkey. In addition a number of 6 observer countries participate in certain activities of the project: Belarus, FYROM, FR Yugoslavia, Latvia, Moldova and Ukraine.</td>
</tr>
<tr>
<td>TEM</td>
<td>1977</td>
<td>2, 15, 17</td>
<td>UNECE Trans-European North-South Motorway Project</td>
<td>Bosnia and Herzegovina; Bulgaria; Croatia, Czech Republic; Georgia; Greece; Hungary; Italy; Lithuania; Poland; Romania; Slovakia; Turkey (Associate member country: Austria; Observer Countries: Serbia and Montenegro; Sweden; Ukraine)</td>
</tr>
<tr>
<td>TEIN</td>
<td>2001</td>
<td></td>
<td>Trans-Eurasia Information Network (TEIN) under the ASEM process</td>
<td>ASEM member: Thailand, Malaysia, Philippines, Indonesia, Brunei, Singapore, Vietnam, China, Japan, the Republic of Korea, Italy, Germany, France, the Netherlands, Belgium, Luxembourg, Denmark, Ireland, Greece, Spain, Portugal, Austria, Finland, Sweden, the United Kingdom, the European Commission. Enlargement expected for 2004.</td>
</tr>
</tbody>
</table>