Towards multimodal transport and logistics services for rising Asia: preparedness and action

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Abstract

This study has analyzed and discussed the state of affairs related to the preparedness and actions of the multimodal transport and logistics services required for the rising Asia. Motivated to achieve competitiveness, efficiency and economy thereby to achieve very high economic growth, international trade and tourism, countries are vigorously working to improve their domestic and international transport network linkages, liberal operational legislation, simplified and streamlined communications and documents, improve services, and remove both physical and non-physical barriers for seamless movement of goods and enhance domestic and international trade. Despites, daunting tasks of construction, maintenance and management of physical infrastructure and interfacing them with production and distribution delivery systems, which are required to achieve the conditions conducive of the rising Asia, countries are far behind of developed conditions. Even the relatively simple non-physical infrastructure for transport operation and logistics services, particularly institutional framework, legal regimes and regulations, operational provisions and procedures, application of new technologies and knowledgeable human resources are much sluggish than expected. The role of regional and international initiatives is well directed in preparedness, but overtly propagated and poorly successful in action where they are most needed, particularly to bridge the gaps in infrastructure among and between countries.

Key Words: transport, multimodal, logistics, transport infrastructure, Asia

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1. Introduction

The market economy and globalization have become the unavoidable economic paths for every country in the foreseeable future. The world economic order has largely become complex by the powerful processes of globalization and international trade, which have already been in their rapid process, to be followed by a free movement of financial and human resources, facilitated by the advanced technologies in the key areas of information and communication, innovation, production, and distribution. These phenomena have created both better opportunities and serious challenges to all countries in the world. As countries have hardly any alternative to moving along with globalization and market economy, the success of a country in this regard depends on how fast and how smoothly it manages the globalization and the market. For a successful management, a country must achieve three results: competitiveness, efficiency and economy in its production, distribution and service systems. That means, how much and how fast a country is prepared for managing its relationship with the market economy and the globalization, and the level of actions taken in this direction.

In the globally influenced production, distribution and service delivery systems, transport and logistics are the intertwined means and process of moving goods/commodities and merchandise as well as people within and outside a national territory. Their performance hinges on: (i) transport – integrated transport and terminal infrastructure network or connectivity and functioning multimodal transport system; and (ii) logistics services – or inventory distribution channel or the physical movement of goods and commodities; the communication-documentation channel and the transaction-payment channel facilitated by liberal transport operational legal regimes, intact liability regimes, simplified and streamlined document processing preferably through electronic data interchange, information and communication technology, modern commercial and banking services, and responsible professionals. These two means and process make a country not only competitive, but also enable to sustainably manage globalization or to secure the benefits from opportunities created by the globalization sooner than later.

2. Context of justification

2.1. The state of Asian affairs

The world total gross domestic product in 2005 has reached to US$45 trillion and the total gross domestic product of Asia reached to US$10 trillion (World Bank, 2007). The value of Asian international trade, export and import, has exceeded to US$6 trillion, and Asia shared more than 26% of it (UNCTAD 2007). The gross domestic product of Asian developing countries grew by 8.3% in 2006 (Asian Development Bank, 2007a). China and India, which are the first and second largest countries by population size and fourth and tenth largest economies, have led these growth phenomena. Though in Asia itself, Japan, the Republic of Korea, and the East Asian Tigers had ever gone through hyper growth (over 10%) during various time periods in the second half of the 20th Century, the present growths in GDP, trade and tourism have galvanized the region more than ever and it has a huge impact on the overall world trade system, including the distribution of goods and commodities.

The world international trade and tourism has been growing at a rate of 13% and 7% per year, respectively; and in Asia, they are increasing at the rates of over 15% and 10% per annum, respectively. In 2005, Asia exported more than half of the world merchandise and 29.3% if China, Japan, Australia and New Zealand excluded (World Trade Organization,

2006).

The transport infrastructure to support the Asian trade, tourism and overall development affairs are improving and logistics services are being strengthened to partake in and manage of the globalization competitively, efficiently and economically. The present state of transport and logistics service costs constitute about 20% of the total sales, and the transport costs alone constitutes 13% of it (UNESCAP, 2006a). The development of transport infrastructure in Asia is picking up strongly and some countries have achieved remarkable success in developing road and rail network, inland waterway, marine transport, world class airports and seaports, dry-ports and inland container depots. Some of the major achievements in Asian infrastructure development are estimated as follows.

- The total highway network has reached to 8.5 million km with over 4.2 million km paved roads, of which 141 000 km of international importance has been designated as the Asian Highway (UNESCAP 2006b).
- The total railway network is over 250 000 km, out of which over 81 000 km is recognized as the Trans-Asian Railway of international importance (UNESCAP 2006b).
- A total length of over 330 000 km of waterway has been developed.
- The total number of major ports in the region (five countries having no ports) has reached to 119, including 14 of the world's 20 largest container ports.
- The total number of paved airports, both civil and military, has reached to 2533, including seven of the world's 20 busiest airports.
- The total number of dry-ports in the developing and transition economy of Asian region is 103 (UNESCAP 2006b).
- The total number of container berths is estimated to be 500, including 389 in East and Northeast and Southeast Asian sub-regions.
- The total number of truck terminals is estimated to be 300.
- The total number of warehouses with some basic facilities is estimated to be 10 000.

The motion of multimodal transport has principally been accepted by all countries, following the UN Convention on International Multimodal Transport of Goods 1980 (United Nations, 2007) and the countries are working since last 10 years on transport and logistics services, aiming at the development of multimodal transport Act, development of e-document system, single document, single-window and single-stop inspection system, customs simplification and human resources development (UNESCAP, 2006c).

To build a functioning transport infrastructure network and its maintenance, developing countries of the Asian region are spending about $220 billion a year which have largely been financed by the governments themselves under their regular development budget, supplemented by international and regional financial institutions like the World Bank, ADB, Islamic Bank and multilateral and bilateral donor agencies.

The trade is growing and so is the international competition. As transport is the means to bring the trade happen in physical term it is being complex, and there is the apparent need to be simple, cheaper, faster and safer transport. In this process, countries are developing logistics system for transporting goods and commodities, meaning managing and controlling the flow of goods and commodities, information, resources (finance), services from the source of production to the marketplace and ultimately to the individual consumer through the integration of information, transport, inventory, warehousing, material handling, and packaging. Thus, logistics in business environment has become the name of the game in recent years for competitiveness, efficiency and economy (de Castro, 1993; Feng, and Chia, 2000; UNESCAP, 2006d; Hesse and Rodrigue 2004).

2.2. Problems (Inherited and emerging) and Issues

Despite various efforts put by the national governments along with the participation of the private sector and the international community, developing countries of Asian region have a huge inadequacy and incompatibility of transport infrastructure and the available infrastructure provisions (roadways, railways, airways, waterways and shipping, telecommunications, ports, airports, dry ports, inland container depots (ICDs), truck terminals and warehouses, are inefficient. Developing functional and integrated transport linkages and commodity flows between ports and their heartlands and hinterlands is much difficult than said due to a lack of threshold population, basic economic activities and production in the hinterlands. Similar are the border crossing problems in remote inland regions, though governments reach to good understanding and firm agreements on the issues of cross-border trade and transport facilitation.

To remove the deficiency, the major actions to be taken are the extension, expansion, rehabilitation and maintenance of the transport infrastructure provisions. Safety, economy and environment are to be seriously considered through overhauling the old infrastructure provisions and in new provisions, constructing the new ones and integrating, both the old and new into a single functional transport and terminal system, a functioning multimodal transport system. There is insufficient financial resource for the construction and maintenance of transport infrastructure. It requires huge investment. The latest prediction is made that a total of $195 billion per year is required for the developing Asia-Pacific countries to be invested in transport sector for the period of 2005-2010, and $253 billion per year for the period of 2010-2015, and there is a shortfall of $82 billion per year for the developing countries in the Asian and Pacific region (UNESCAP, 2006d), constituting 20% to 80% of the required investment, particularly higher among the most needy ones.

In the meantime, the governments are trying to play a regulatory role and gradually pulling their hands off the transport operation, as well instead they are trying to promote engagement of the private sector for the development of transport infrastructure. In this context, the comprehensive and integrated planning and huge investment required for modal shift and integration of transport infrastructure particularly for extension of excess limit linkages, construction of railway tracks; development of new ports and expansion and modernization of existing ports; expansion of airports, connection of missing links, construction and or improvement of new platforms and terminals for modal integration; and rehabilitation and expansion of existing infrastructure along with counterbalancing other interests of development manoeuvring, particularly minimizing environmental damages and specific interests of communities, policy issues related to contribution and benefit sharing are such areas where the governments cannot run away from intensive engagement. On the other hand the private sector has neither the interest nor the capability to do all the things at a national-level so that an integrated network of transport modes can be developed. International financial institutions have been showing interest in investment in infrastructure sector, yet the daunting cost incurred by international standard of construction and conditions imposed by the investing agencies have irritated not only the people in the developing countries, but also the national economic system.

In terms of non-physical barriers, smooth and seamless movement of goods particularly across national borders are hindered by inadequate legal regimes, liability regimes, customs regulations including the real practice of single-window and single-stop inspections, e-document among small and medium enterprises (SMEs), and knowledgeable human resources.

Transport network is one of the fundamental prerequisites for the business operation of the time, and the names of the transport games at present are modal shift from the conventional/traditional mode of road to rail and water transport facilitated by multimodal

system with modal integration as transport and logistics services for the transport of goods and commodities. However, the irony is the overwhelming expenses in road transport and grossly under investment in railway system. Moreover, port development is a less discussed matter in the government and the private sector. It has left the notion of integrated transport and terminal system and multimodal transport development in more talks than achievements in foreseeable future. Similarly, in deficiency of comprehensive research and in-depth analysis, there is still a need for convincing explanations of today's logistics buzz-wording towards its scope to improving flow of goods and commodities by cheaper, faster and safer standards through putting in proper order the communications-documents, physical distribution of goods and commodities and transaction-payment channels rather than just being the business as usual and a globalization myth.

3. Objectives and the study method

In the above highlighted contexts, this paper has analyzed and discussed the complex facets of transport infrastructure development and operation in the context of developing efficient, safe and economical transport system, with a view to facilitate the rapidly growing national and international trade in Asia. This paper has tried to bring the issues dominating the development of multimodal transport and logistics services and discussed the preparedness of the countries and actions taken in this direction. The paper has particularly analyzed avenues in moving ahead in the direction of modal shift towards multimodal transport infrastructure development and operation with a question on whether there is the scope for action in the foreseeable future to attain the seamless movement of goods for production and distribution with efficient logistics services system for the rising Asia.

The study has included otherwise stated, countries from East and North-East Asia, South-East Asia, South Asia and Central and West Asia, comprising 36 countries and territories, extending from Russia to Japan and Turkey to Indonesia, but excluding the countries and territories of the Pacific region (see table 1 for the sub-regional grouping of countries).

Data and information for this study is derived from published sources and particularly from the international organizations like the Asian Development Bank (ADB), the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP), United Nations Commission on Trade and Development (UNCTAD), World Trade Organization (WTO), International Trade Statistics, The World Bank, and the CIA World Factbook. However, some facts and figures of specific countries are taken from respective country's official websites or publications. Relevant data is standardized and processed using SPSS.

This study has established a minimum threshold to quantitatively assess the state of each mode of transport. It has used the mean density of roadway and railway; existence of a port serving every 500 km of coastline; one paved airport in an area of 10 000 sq km; and one deadweight ton of merchant fleet per $1000 import-export value, to find out the current stage of transport infrastructure of the countries. In case of major terminals, this study, for a dry port location, has taken a radius of 150 km and a population of 10 million, or a dry port in each functional region of all countries, including those regions with a port but also with large hinterland. For truck terminal the threshold is established in a radius of 100 km and a population of 2.5 million. Similarly, one border-crossing point in every 100 km of land border of a country at this stage and in every 50 km by 2020 as most nations enter regional free trade agreements are taken as a threshold.

At present, literature is hardly available to indicate national benchmarks on the sufficiency of each mode of transport infrastructure development. This study, therefore, has taken a pragmatic approach and established a methodology to identify the status of each

country in the area of transport modes based on the status of each mode of transport in Asian countries. For discussion, countries are classified under four categories, based on their status: poorly developed, average, moderately developed and highly developed stages. The criteria of the categorization are presented in table 2.

4. Preparedness and action at national level

4.1. Transport infrastructure development

Countries have already given very high priority to infrastructure development in different phases of their national development. At present a second wave of high investment in infrastructure development, particularly transport and communications has come among developing countries, least developed countries and countries in transition. However, given present stages of various modes of transport infrastructure development of the 36 countries, it is clear that most countries are not at the developed stage of transport infrastructure. The status of all countries is presented table 3 and discussed below.

The state of road development in Asia for which the paved road has been taken as the indicator since unpaved road would not be significantly contributing to the cause of speed, efficiency and economy, 14 countries including Russia appear to be poorly developed. Unexpectedly, China, Iran, Georgia, Indonesia, Vietnam and Bangladesh are in average; Malaysia, Sri Lanka, Pakistan, Uzbekistan, Thailand and Turkey are moderately developed, and the remaining countries, namely, Armenia, Azerbaijan, Brunei Darussalam, India, Republic of Korea, Taiwan, Hong Kong, Japan and Singapore are developed (see table 3). Russia and China are at the less developed level, their area sizes are too large, including a vast unpopulated and minimally populated areas, which make their density very low. If the populated areas are considered they fall under average and moderately developed stage, respectively. Moreover, the quality of their roads is relatively high. Furthermore, China is expanding its road network vigorously, i.e. as the United States during 1948-1960 and Japan during 1953-1970 periods. For example, China has constructed 150 000 km of road, including 46 000 km of high standard highway in the year 2004 alone (UNESCAP 2006a). Similarly, Iran, most members of ASEAN, India, and Mongolia are expanding and upgrading their road networks focusing on the Asian Highway network including its standard (UNESCAP 2006b).

When seen regionally, the road network is not integrated to a level of facilitating seamless transport as there are numerous missing links, including 16 800 km of the Asian Highway network of international importance, which does not meet the minimum standard, and another 24 000 km requires upgrading (UNESCAP 2006a). The countries in the poorly developed stage are mainly landlocked, least developed countries and countries in transition (see table 3). They do not have large projects for transport improvement though they need to simplify their road networks covering entire countries as Japan, Taiwan and Republic of Korea.

Similarly, the countries which are investing heavily in transport mainly focus on the dynamic regions, and rural and remote regions are not only far behind in securing significant amount of investment in quality road, but also behind access by all weather road. For example, 50% of Indian villages and 57% of Thai villages are still not connected by all weather roads (UNESCAP 2006b), though large number of villages in India and almost all villages in Thailand are accessible by road during dry season. Such situation has brought them to the mainstream of the national development including market access. However, it does not help much to the people living in those villages for their assimilation with

globalization and market competition of their petty products. Such areas by default must depend on low primary production with incompetent technologies.

The countries at a stage of average or above development on railway are even less than road. Out of 36 countries and territories, five do not have any railway system and additional 18 are poorly developed (see table 3). Only four countries fall under average, two moderately developed and six developed. At the regional level, there are 13 missing links to be completed, constituting 7060 km in the Trans-Asian Railway network (UNESCAP 2006a). Furthermore, there is a daunting task of standardization of the varied railway gauges. The cost of per km railway construction is not only double or triple compared to road, it requires a much larger threshold population and range of goods as its operational breakthrough and a regular frequency, constituting extremely high operational cost even at minimum level. The relevance of railway is very high for long haul intercity transport, but its relevance is less significant for extensive rural areas where the need of the goods and passenger transport is basically point to area and area to point in reverse flow. The dilemma of railway network development is easier said than done, when the choice of road transport both for passenger and goods and commodities transport services has increased over the last 60 years. Furthermore, based on the theory of convenience, road has already established its dominance over railway as it can satisfy various kinds of demands, railway would be demanded only after the completion of a primary network of road, particularly at the national level in smaller size developing countries and at local and sub-national level in large countries.

Port so far is considered as the gateway of a country. A formula for deciding how many ports a country requires is perhaps not available. This study proposes a port be established at the middle of 500 km coastline. When calculated using this criterion, countries with long coastline like Indonesia, the Philippines, Russia, Japan, China and Vietnam are found poorly developed. On the other hand countries like Republic of Korea, Taiwan and Bangladesh are in a stage of moderately developed, and DPR Korea, Singapore and Brunei Darussalam in developed (see table 3). Actually, these countries are rather small in area size with shorter coastlines which made their stage developed though the numbers of ports in these countries are not many. Though port development in the region seems well developed in general, 735 new container berths, i.e. 147% increase is required by 2015 to meet the future container port traffic demand (UNESCAP 2006b). It certainly required not only the expansion of existing ports, but also additional port construction. Port construction is expensive, the short-haul operation of shipping is not cost effective as the handling and terminal costs are higher than land transport, the operation of ships in coastal areas in many countries is not safe due to the coastal geography, frequently changing weather conditions, and natural and human threatening. Instead, governments construct trunk railway routes (or roadway if railway is not feasible) bisecting and intersecting countries appropriately so that land bridges would be more efficient and cost effective.

Airports in Asia are better developed compared to roads, railways and ports. Ten countries including Russia and China appear poorly developed in relation to the respective countries' area sizes based on serving 10 000 sq km of area by one airport. Others are basically landlocked countries and countries in transition. On the developed level, in addition to the Republic of Korea and Japan, countries in transition – Georgia, DPR Korea, Armenia and Azerbaijan as well as island countries and territories like the Philippines, Maldives, Taiwan, Hong Kong and Singapore are at developed stage (see table 3).

When considered the overall status, taking their ranking in individual infrastructure and calculating average, four countries were found poorly developed, 14 average, 12 moderately

developed and six developed (see table 3). Thus 50% of the countries are less developed, which reveal the fact that many countries would certainly hampered by the poorly developed infrastructure to move ahead with the rising Asia.

4.2. Terminal infrastructure development

Terminals other than ports and airports, namely, dry ports and/or inland container deport, truck terminals, container freight stations, container yards, warehouses, cold storages and silos, are equally crucial infrastructure provisions for modal interfacing and transhipment of goods and people. A reliable database is not available on the state of terminals. This study therefore has taken expected establishments and tried to relate with the actual establishments of such terminals and assess their availability and sufficiency.

When a dry port is expected in a radius of 150 km and a population of 10 million, or in each functional region of all countries, including those regions with a port but also with large hinterland, a total number of 433 dry ports are required for the region. This estimation does not include any dry port in Brunei Darussalam, Hong Kong, Maldives and Singapore, where a dry port may not be required; one dry port each in seven countries at the minimum as well as 78 in India and 133 in China at the maximum (see table 4). Based on this estimation, additional 330 dry ports are required to be built as there are only 103 existing dry ports in operation in the Asian region (UNESCAP 2006b). This infrastructure has a significant role in landlocked countries, where dry ports are expected serve even smaller area and population size than estimated above. Though not so expensive to construct and manage, governments are not well prepared for the development of these crucial interfacing and transhipment terminals.

Based on the criterion established by this study, i.e. a truck terminal in a radius of 100 km and a population of 2.5 million, there should be at least 1,502 truck terminals in the region, without any such a terminal in Maldives, one in Singapore at the minimum, and 414 in China at the maximum (see table 5). When examples of actual number of truck terminals is taken from Nepal and Thailand, despite they are expected to serve a localized hub-and-spoke logistics services, they are grossly insufficient as they have one and three truck terminals exist at present against eight and 21 expected terminals, respectively.

Other terminals of high significance for logistics services, namely, inland container deports (if separately considered than dry ports), container freight stations, container yards, warehouses, and cold storages are, firstly much less than expected. Despite a well placed objective of moving ahead with multimodal transport and intermodal operation system, countries have not paid sufficient attention towards the development of all terminals of high significance for logistics services. Though in most countries these terminals are developed and managed by the private sector, they are concentrated and centralized in and around capital cities and in large cities and bustling coastal areas where export processing zones are already developed. Each government was supposed to fulfil the need-gap by constructing and placing such terminals where the private sector does not develop, but most governments have not paid their attention in this direction. Thus, these terminals are far behind of a desirable numbers and locations which were expected to efficiently facilitating sort-range hub-and-spoke type of inventory.

4.3. Border-crossing and regional infrastructure and interfacing

Road and railway border crossing and interfacing infrastructure as well as dry ports,

container freight stations, container yards, warehouses and cold storages are the requirements of the present day border trade and international transport and logistics facilitation. Europe, since the end of World War II was gradually observing easier border crossing. After the creation of European Union and the fall of the Berlin Wall, borders in Europe have much less obstruction and the border areas are more developed as international border regions, i.e. functionally integrated. In Asia, there are still several politically impermeable borders, like the two Koreas, India-Pakistan, China-India and so on, due to enmity between bordering countries. Many borders are difficult and even impermeable due to rivers, difficult terrains, and mountain ranges, like the Himalayas, Karakoram, Pamir among others. Even some others are culturally and linguistically not in harmony thereby border trade and transport are at the minimum.

Based on the adopted criterion by this study to establish a border-crossing point, a total of 1582 border-crossing points are expected to be existed to smoothly facilitate border trade. Island countries would have no land border-crossing points, and related infrastructure including ports has already been discussed above. The minimum numbers of such border-crossing points are estimated excluding island countries at two for the Republic of Korea at the minimum and 221 for China at the maximum (see table 6).

Though the exact number of border-crossing points and existing facilities at present are not clear to this study, about half of the expected numbers are estimated existing at present. For example, out of the two border-crossing points expected from the South Korea to North Korea, there exists none[1]. Similarly, there are no actual border-crossing facilities between India and Pakistan, Bangladesh and Myanmar among others. Such facilities between India and China are not more than a few, which are recently opened. Similar is the case for many neighbouring countries. Countries like Bangladesh, Nepal, and Thailand, which are relatively open in this issue, the actual number of border-crossing facilities are observed at 17, 21 and 23 respectively, which are also far less than expected for each country. These observations lead to a conclusion that the actual number of border-crossing points and facilities are far less than expected, if excluded the operational five border-crossing points between the mainland China (Shenzhen) and Hong Kong, and two border-crossing points between Singapore and Malaysia, which is actually a water border. Moreover, large numbers of the existing ones are not developed to the level of smoothly facilitating expected border trade, i.e. along with terminals and transhipment facilities, due to various reasons including the remoteness and lacking basic industries/activities in such border regions, trying to control cross-border movement for security reasons, technical difficulties, deficiency or mismatch in infrastructure interfacing, border trade hurdles, and bureaucratic inefficiencies.

Beyond border-crossing, for trade and tourism across countries through land transport modes (rail and road) with expected efficient transport and logistics, countries are actively preparing and taking necessary actions along with two undergoing important initiatives of UNESCAP: (i) Asian Highway; and (ii) Trans-Asian Railway. Both these initiatives were initiated in 1959 and 1960 respectively, with the objective of enhancing trade and travel in Asia through efficient movement of goods and people. Nothing substantial progress was made in plan and action till 1992 due to active or cold war between most countries of Asia, border conflicts, technical difficulties and bureaucratic hurdles and inefficiencies. They were, however, revitalized in 1992 as ESCAP endorsed the Asian Land Transport Infrastructure Development (ALTID) project comprising the Asian Highway, the Trans-Asian Railway and

[1] A first railway has crossed the Korean border on 17 May 2007 in 56 years. It was further materialized after the Summit of the two Korean presidents on 2 October 2007 and the first rail service started on 10 December 2007.

transport facilitation (UNESCAP, 2007a).

What is important to note here that despite having such importance of the two initiatives, progress both in preparedness and action are sluggish as it took over 12 and 14 years to finalize the Asian Highway and Trans-Asian Railway technicalities of network identification and their formalization through intergovernmental agreements, respectively. To operate Asia-wise road and railway transport smoothly is a daunting task as completion of missing links, standardization, upgrading, and interfacing of both highways and railways, spending over US$200 billion per year is necessary. Despite the standard Asian Highways and Trans-Asian Railways that can facilitate seamless, efficient safe and economical transport, if the present pace of development and improvement is continued, it may take decades to complete the Asian Highway network, whereas a fully functioning Trans-Asian Railway network may not be complete in several decades. Moreover, functional infrastructure interfacing, industrial and production complexes and establishment of all types of terminals are required to be completed to turn most of the existing sluggish peripheral border regions into bustling central ones. If excluded China, India, Malaysia and Thailand, countries with significant initiatives have talked more than taken action and whatever actions are taken they are hardly comprehensive to multimodal transport infrastructure.

4.4. Non-physical infrastructure development and transport logistics services

It is estimated that the transport and logistics services costs constitute up to 20% of the total sales and the logistics cost constitutes about 7% of it (UNESCAP 2006a). Logistics has been considered as one of the major areas where there is good scope for competitiveness, efficiency and economy in the system of movement of people and goods. Recently, The World Bank commissioned a study which has studied the performance of logistics and come up with an index called 'Logistics Performance Index (LPI)'. It has taken in addition to infrastructure, Customs, international shipments, logistics competence, tracking and tracing, domestic logistics costs and timeliness to calculate the logistics performance index (Arvis, et al., 2007). When derived an index for 150 countries, Singapore and Afghanistan, both from Asian region and both are incorporated in this study as well perform the best and worst, respectively. Taking data from the LPI, when calculated the mean values against each indicator by grouping countries into Asian, developed and rest it has been clear that Asian group is just in average and clearly behind the developed countries though this region is above the rest group which constitute the developing and least developed countries from Africa, Europe and Americas (see table 7 & table 8 for a comparison).

4.4.1. Institutional framework

Despite stringent advice from The World Bank as well as good wish from the United Nations and other international development partners for transport deregulation and privatization of transport operation, termination of state monopoly and elimination of high-level of subsidy in transport, countries over the last 20 years have remained utterly indecisive on these contentious issues. Policy makers, planners and professionals talk about modal integration, modal split and multimodal transport operation on the one hand, departments of transport and other concerned ministries are continuing with the same sectoral structure like water, air, road and rail without any comprehensive coordination on the other hand. In most countries competition in the domestic market for transport services is limited by decades old restrictive government regulations or by the monopoly of state-owned enterprises, which are overtly interfered by the government and badly managed. Governments have not done a careful consideration of necessary institutional development for the promotion of multimodal

transport and efficient use of physical infrastructure, nor decided to what extent the public sector should uphold transport operation, nor established a clear-cut functional division between the public sector and the private sector, particularly in the international transport of goods though a lot of talking on public-private participation in transport infrastructure development and operation. Consequently, too much government intervention in transport financing, including subsidies and a deficiency on the management freedom to choose a transport and ancillary services in international transport operation has hampered international competitiveness of national exports and substantially limited the significant advantage of logistics services. In most countries, there is little or no functional contact between the public and private sectors, as the view in bureaucracy still persists that their role is to control and govern the state, private sector and general public rather than to regulate and facilitate, and the private sector too takes informal approaches, like establishing relations, cronyism, benefit sharing, favouritism and bribe rather than an institutional one to make their things done.

4.4.2 Legal regimes and transport regulations

National transport regulations deal with the competitiveness and complementarity of available transport modes and interface points in order to balance various interests on the area of national transport. In some countries new approaches to national transport regulations which allow market mechanism to generate competition between modes have been adopted. In others, in absence of such regulations, the governments are not able to control and regulate transport activities like liability regime of a particular transport mode or tariff. Consequently, the existing infrastructure is underutilized and the use of new technologies is restricted or underutilized.

Countries in the region with some exception are found preferring bilateral or trilateral agreement on trade and international transport that means narrow sphere of agreement instead of coherent national legislation and regulation, complemented by regional and international conventions and agreements. It is because, most transport operations are governed by sectoral regulations and no proactive efforts are made towards integrated transport management at the national level. Similarly, the implementation of the long awaited multimodal transport law and regulations for international transport and logistics services has not taken place in most countries. None of the Asian countries has bothered to place its signature, ratification, acceptance, approval and accession of the United Nations Convention on International Multimodal Transport of Goods 1980. Even a national multimodal transport law with the spirit of the convention, which was expected to be an instrumental in the direction of the integrated multimodal/intermodal transport and logistics development particularly in strengthening international transport and logistics, a full-fledged legal provision is developed only in India, China and Thailand. Though they have completed the legislation part, yet China has placed it under an umbrella Act, known as “Contract Law of the People’s Republic of China” whereas Thailand has promulgated the Act in 2005, but has not brought into force yet, as the respective regulations are not prepared.

4.4.3 Operational provisions national facilitation coordinating mechanism

In absence of an institutional framework, countries do not have the long expected national facilitation coordination mechanism. Consequently, work is moving with the old operational system. The deficiency of clear legislative and regulatory system has basically obstructed even some loose coordination mechanism. On the one hand government officials are not so much keen to work with related associations or include representatives of the

private sector in their plan preparation and implementation process, and on the other hand the private sector industrial and services associations and their federations, though recently have developed more democratically, their status of an equal partner with the government has not been established, neither they consider themselves as much responsible in the field of facilitation.

4.4.4. Operational procedures and administrative provisions

Operational procedures and administrative provisions are basically concerned with route permit for vehicles, their loading permit, measures to satisfy safety standards, security provisions and customs. They are particularly important for international transport as the efficiency is based on the simplified operational procedures including customs procedures for import and export services. An efficient operation of transport modes depends upon what types and how many documents (like export license, packing list, commercial invoice, customs invoice, letter of credit, shipper's export declaration, certificate of origin, and bill of lading/air waybill) are required for goods transport, and how efficiently they are processed through various (administrative and customs) stops and windows, including the acceptance of electronic data interchange and other modern communications technologies.

Many countries in the region are not well prepared in these areas (see table 8 for the state of development). Those which are prepared and started actions, the acceptance by participating agencies is significantly lower than Europe, North America, Japan, Australia and New Zealand. Still most countries require a big heap of documents. For example, in South Asia, an export or import of consignment requires 15, 29 and 83 documents in Pakistan, India and Nepal respectively. Similarly, a two hour customs clearing procedure takes days and even week, depending upon the country and customs point. For example, transit clearance in Kolkotta for Nepal takes two to five days (Rajkarnikar et. al, 2006). Moreover, the efficiency in the region can be reflected in the statement of UNESCAP (2006e, p.2) that reads "If only the administrative processes at borders are considered, it is possible to identify a list of up to 20 separate procedures required by up to eight separate government authorities which must be completed before cargo-carrying vehicles and transport-operating staff may move across national frontiers." Thus, the provisions of one window customs clearance and one stop cargo checking have not put into practice though most governments have clearly announced of such services.

For landlocked countries it is obvious that they face more problems on transit though the transit countries time and again declare generous facilities on the name of the transit right of a landlocked country. The Almaty Programme of Action, which has addressed the needs of landlocked developing countries for transit transport cooperation (UNESCAP 2007a). However, this and including the present day buzzword of developing a landlocked country into a land-linked country has yet to be proved by actions with the cooperation of transit and transport facilitation by concerned countries under a wider universal system rather than period agreements.

4.4.5 Application of New Technology

The use of computers and information technologies have become the basic applications followed by email and internet facilities in trade and transport operation. Now, the electronic data interchanges (EDI) are introduced in all developed countries and many countries in the region have declared that they have not only prepared for the use of EDI, but also actually started using it. However, most countries do not use or do not accept internet and email facilities for administrative and customs facilitation and the use of EDI is

substantially low. In countries where EDI is officially accepted, basically its use is limited to big transport companies. The movement of goods, both domestic and international, is run in a more informal-method transactions and payments, use of such transparent technologies would take sometime to put in practice even if it could be financially affordable and technologically feasible for the business parties. Unlike these, technologies like specialized transport vehicles including containerization, radio frequency identification (RFID) and global positioning system (GPS) and other tracking system of transport means and cargos are not significantly increasing across countries (see table 8 for the status).

4.4.6 Enabling human resources

A well trained human resources is extremely limited with the knowledge of the present day transport and logistics, with special focus on trade and industrial development at home and abroad, the knowledge and analytical skill of comparative advantages, transport modes and terminals, means and their operation domestically and internationally, transport regulations, transport operational issues and transport and transport services technologies. What has been observed that the limited human resources is clearly divided into several areas like, legal and institutional, planning, financial, operational and management and technical. Most government policies, regulations and operational technicalities are vague and ambiguous, which create either confusion among officials or provide the safe heaven to delay with unwanted or unwarranted reasons and may include the interest of bribery and corruption. Moreover, as explained above the public and private sector human resources are also not complementary to each other due to assorted reasons, like working environment differ in two sectors; areas of responsibilities and authorities are different and people consider them mutually exclusive; national transport operators limit their services to long-established and recurrent operations; local transport users still have limited knowledge on the significance of the concept of multimodal transport; the freight forwarders and non-vehicle operator or multimodal transport operators are not considered as reliable professionals; and there are more conflicting roles rather than complementary ones among and between the public and private sector human resources along with their professional, business, and personal interests.

5. Preparedness and action at international level

A country cannot progress without fully engaging itself in the mainstream of globalization and market economy and their efficient management. The preparedness and action at international level require partake in the international system. It will create environment conducive to harmonize legal regimes, manage the domestic institutional, legal, infrastructure, operational and management effectively as well as confidently.

5.1. International initiatives

5.1.1. Global initiatives

As of now, the United Nations Convention on International Multimodal Transport of Goods 1980 is probably the most promising convention which is based on 10 international conventions/agreements on transport operation and logistics (United Nations, 1980). This integrated convention includes additional important provisions, which were not incorporated in the 10 conventions. This would simplify international transport operation and logistics. Actually, the Asian nations are not the signatories of those conventions/agreements. There are

56 depository international transport agreements and/or conventions of global significance (UNECE, 2007), only seven conventions/agreements on an average have been signed, ratified or accessed by 27 Asian countries. However, signature, ratification and accession from CIS countries is much higher, ranging from four and 31 (Russia) whereas from South, South-East and East Asian sub-regions non of the countries has signed more than eight conventions/agreements. In Europe the average number of signature by a country is 30 with the highest of 46 (Luxemburg).

Moreover, out of the 56 conventions and/or agreements, UNESCAP under a Commission Resolution 48/11 in 1992 selected only seven conventions, which would be instrumental in the facilitation with its Asian land transport infrastructure development project for the accession (UNESCAP, 2006d). A total of 259 signatures should be put by 35 countries and territories, excluding Taiwan, to be the process fully complete at the first level, only 84 signatures have been put so far, i.e. only 32% signature process has been completed in 15 years. Only one country, Uzbekistan has signed and acceded all the conventions and countries like Bangladesh, Bhutan, and Nepal signed none whereas China and India have singed one each, which were actually signed before 1992. Only the newly born countries after 1992, which are close to Europe, have signed most of the conventions whereas non but Mongolia and Turkey which existed before 1992 acceded four and three conventions respectively after the adoption of the Commission resolution 48/11(ESCAP, 2006d).

5.1.2. Regional initiatives

In regional initiatives, the Asian Highway and the Trans-Asian Railway are the two most promising regional initiatives as discussed above. Particularly UNESCAP has tried to enter the land transport infrastructure development and operation as well as tourism development through these initiatives. However, the network agreements of these highly propagated initiatives took very long time to be materialized. The Asian Highway agreement though has been signed by most countries it has yet to ratify by important countries like, Bangladesh, China, DPR Korea, Iran, Kazakhstan, Laos, Malaysia, Myanmar, Russia, Turkey, Turkmenistan and Uzbekistan (UNESCAP, 2007b). The Trans-Asian Railway agreement which was formalized in November 2006, more than one third of the 28 countries where the Trans-Asian Railway exists, including Bangladesh, Malaysia, Myanmar, and Pakistan have not entered the agreement (UNESCAP 2007c). This inaction has virtually obstructed the sub-regional connectivity. Moreover, after ratifying the agreements the countries require to facilitate the provisions in the agreements with easily functioning regulations. In absence of a much awaited multimodal transport legislation and entering into various international conventions and agreements related to road traffic and road safety, vehicles, border crossing facilitation, transport of dangerous goods and special cargoes, and other land transport related conventions and/or agreements, the operation of both the Asian Highway and the Trans-Asian Railway for international transport are still bumpy. UNESCAP, since early 1990s worked in these areas and in an informal discussion the responsible officer has clearly mentioned that the software part particularly the introduction of issues, information dissemination, harmonization of laws, rules and regulations concerning multimodal transport is completed and they are moving ahead with advanced stage of advisory services. However, at country level, there are hardly any issues resolved and reached to the level of fully operation.

5.1.3 Sub-regional initiatives

There are numerous sub-regions in the Asian region (see table 1). Most of them are

formed for economic cooperation, focused on sub-regional trade promotion including a strong component of transport. Countries in the region have been observed somehow preferring working at sub-regional cooperation level than in regional and global forums for transport issues. However, a reflection of differences is observed at sub-regional level as some sub-regions have taken initiative in one or several areas of transport and transit facilitation and multimodal transport development and some are still behind.

Sub-regions in the Southeast Asia, namely ASEAN and GMS as well as in the Central and West Asian sub-region, namely ECO and the Transport Corridor Europe-Caucasus-Asia (TRACECA) have already entered into agreements on multimodal transport, border-crossing facilities and/or transport of goods among others (UNESCAP 2006d). The actions of ASEAN are more solid in this direction as it has since the early 1990s gradually built up a set of functioning frameworks for the sub-regional transport infrastructure development and transport facilitation environment. They include the Agreement on the Recognition of Domestic Driving Licenses issued by ASEAN Countries, 1985; the ASEAN Framework Agreement on the Facilitation of Goods in Transit, 1998; the draft ASEAN Framework Agreement on the Facilitation of Inter-State Transport; the Agreement on the Recognition of Commercial Vehicle Inspection Certificates for Goods Vehicles and Public Service Vehicles issued by ASEAN Member Countries, 1998; and the ASEAN Framework Agreement on the Facilitation on Multimodal Transport, 2005 (ASEAN, 2007). Member countries have harmonized their national legislations accordingly or are in the process of doing so.

The GMS action of GMS transport cooperation also has substantially moved from a transport master plan concluded in 1995, through an economic corridor concept added up in 1998 to the Cross-Border Transport Agreement in 2003 (Asian Development Bank, 2007b). These actions have provided two basic frameworks on infrastructure investment and on transport operation, particularly the agreement opens up actions to be pursued for simplified inspection procedures, simplified visa formalities, exemption from inspection of goods in transit exchange of traffic rights and infrastructure standards. This would strengthen the multimodal transport and logistics services, particularly land transport based cross-border movement of goods and people in the sub-region.

In the Central and West Asia, the Basic Multilateral Agreement on International Transport for Development of TRACECA and the Transit Transport Framework Agreement of ECO have been signed in 1998 (UNESCAP 2006d). Some preparatory actions in the direction of multimodal transport and logistics have been expedited in the BIMSTEC and SAARC sub-regions as well with the technical assistance of the Asian Development Bank. A BIMSTEC transport logistics study has been completed with an objective of providing a medium-term and long-term framework to promote economic cooperation in facilitating trade amongst BIMSTEC countries through the development transport infrastructure and logistics (Asian Development Bank, 2007d). Similarly, the SAARC Regional Multimodal Transport Study has been completed with a focus on a road map to improve regional connectivity through major modes of transport to facilitate the movement of goods and people. The SAARC Summit in April 2007 has recognized the full benefit of an integrated multimodal transport system and it is in the process of prioritizing recommendations, developing appropriate agreements, and their phase-wise implementation (SAARC, 2007).

5.2 Complementarities and Confusions among and within the Roles of Governments and International Organizations and Associations

Transport is a vast area of infrastructure and services operation and logistics services which depend upon the integrated modes and service operations in conjunction with

communication, business and trade, and tourism as well as overall mobility of people and things. In most countries, various modes of transport are highly segregated not at lower level, but also at the policy and decision making level. For example, in India, there are three ministries (Ministry of Shipping, Road Transport and Highways; Ministry of Railway; and Ministry of Civil Aviation) responsible for overall transport. Even in a small country like Nepal, where rail and water transport functionally do not exist, there are three ministries, which are responsible for road transport, air transport and transport management. Most governments do not have any coordinating agency for physical and functional interfacing of the infrastructure and operation among and between ministries and departments. As explained above, in most countries transport service operators' associations and federations are not well developed, some are divided by interest groups, neither their works are complementing the government plans and actions.

Similar is the situation in the United Nations system, where there are three units responsible for civil aviation, maritime shipping and general transport. Transport and logistics constitute an important part of the WTO, UNCTAD as well as transport divisions of The World Bank and the ADB followed by specialized international federations or associations of each sector. The role of the international organizations should be proactively assisting the governments which are lagging behind in preparing institutional framework, legal provisions and their harmonization, technical assistance in establishing basic technologies and creating a platform to bring together the tripartite actors—government, the private sector and the international community—to put their concerted efforts rather than dealing with them in fragmented and segmented platform. In the meantime, most international organizations, especially the United Nations secretariat which could have the strongest say and should have played a coordinating role is highly hindered by not only financial constraints, but also by program constraint, shortage in human resources, and the tendency of advisory service approach and exclusively consultancy driven technical expertise rather than proactively compelling them by creating a conducive environment.

6. Conclusion

The analysis and discussion in this study has brought a conclusion that things are moving towards the need of the time. What are lacking on the preparedness and actions that there is no sign of the establishing critical benchmarks in all modes of transport and operational provisions. What have been overtly propagated are the success stories by national actors and international partners but not with the total coverage of networks, platforms and functional environment. Actually, in most countries single modal infrastructure projects are seen easier to be completed than their interfacing with complementing modes. Moreover, regulatory measures are far behind incomplete. It is well reflected fro the examples cited above that there is a tendency of neglecting the software parts of the system. The time taken to get through all the agreements at regional and sub-regional levels and their preparation for action at national level is well over 10 years for each case. It is not a proactive approach. Moreover, the international organizations also cannot go proactively under the specific regulations, they can only provide technical advice and recommendations to the member nations. Furthermore, for various reasons, no international organization would strongly urge the countries to expedite the preparedness and actions in development activities.

Thus it needs a timeframe of preparedness and action of all critical components functioning integrated multimodal transport system and logistics. The particular actions, namely a comprehensive national multimodal transport and logistics plan, the institutional setup to overtake the need, the legislation, transport and terminal infrastructure and the

organization of related physical set up, administrative and operational regulations, technology and human resources, should be prepared, incorporated in the critical components, and actions in all fronts should be started immediately.

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Table 1
Countries and territories incorporated in the study by their affiliation to sub-regions

Sub-region	South Asia (*also SAARC – South Asian Association for Regional Cooperation*)	South-East Asia *(also ASEAN – Association of Southeast Asian Nations*)	East and North-East Asia	North and Central Asia (*also CIS – Commonwealth of Independent States*)	West Asia
Primary grouping	Afghanistan Bangladesh Bhutan India Maldives Nepal Pakistan Sri Lanka	Brunei Darussalam Cambodia Indonesia Lao PDR Malaysia Myanmar Philippines Singapore Thailand Vietnam	China DPR Korea Hong Kong Japan Mongolia Republic of Korea Taiwan	Armenia, Azerbaijan Georgia Kazakhstan Kyrgyzstan Russia Tajikistan Turkmenistan Uzbekistan	Iran Turkey

Other grouping[a]	BIMSTEC – Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation	Mekong sub-region	Greater Tumen Region (*also North-East Asian Economic Cooperation*)	ECO – Economic Cooperation Organization
	Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka, Thailand	Cambodia China Lao PDR Myanmar Thailand Vietnam	China DPR Korea Mongolia Republic of Korea Russia	Afghanistan Azerbaijan, Iran Kazakhstan Kyrgyzstan, Pakistan Tajikistan, Turkey Turkmenistan Uzbekistan

[a] These groupings are functional and do not cover all the countries and territories in the Asian region.

Table 2
Indicators of performance of various modes of transport and terminals

Density of each mode	Poorly developed	Average	Moderately developed	Developed
Paved road density (per sq km)	< 0.10	0.11 – 0.15	0.16 – 0.20	> 0.20
Railway density (per sq km)	< 0.01	0.01 – 0.019	0.02 – 0.029	> 0.03
Port density (per 500 km of coastline)	< 0.50	0.51 – 1.00	1.01 – 2.00	> 2.01
Airport density (1 airport/10,000 sq km)	< 0.50	0.51 – 1.00	1.01 – 2.00	> 2.01

Table 3
Development stage of various modes of transport[#]

Mode	Poorly developed	Average	Moderately developed	Developed
Paved road[a]	Afghanistan, Bhutan, Tajikistan, Cambodia, Mongolia, Myanmar, Russia, DPR Korea, Kazakhstan, Nepal, Lao PDR, Turkmenistan, Philippines, Kyrgyzstan	China, Iran, Georgia, Indonesia, Vietnam, Bangladesh	Malaysia, Sri Lanka, Uzbekistan, Pakistan, Thailand, Turkey	Armenia, Azerbaijan, Brunei Darussalam, India, Republic of Korea, Taiwan, Hong Kong Japan, Singapore
Railway[b]	Nepal, Russia, Mongolia, Kyrgyzstan, Cambodia, Indonesia, Philippines Tajikistan, Iran, Kazakhstan, Turkmenistan, Malaysia, Myanmar, Philippines, China, Thailand, Vietnam Uzbekistan	Turkey, Pakistan, Bangladesh, India	Sri Lanka, Georgia	Armenia, Azerbaijan, Republic of Korea, DPR Korea, Japan, Taiwan
Port[c]	Indonesia, Philippines, Russia, Japan, China, Turkmenistan, Vietnam, Cambodia, Iran	Turkey, India, Azerbaijan, Thailand, Hong Kong, Sri Lanka, Maldives, Myanmar, Pakistan, Malaysia	Republic of Korea Bangladesh Taiwan	DPR Korea Singapore Brunei Darussalam
Airport[d]	Mongolia, Myanmar, Afghanistan, Bhutan, Kazakhstan, Cambodia, Russia, Lao PDR, China, Turkmenistan	Nepal, Uzbekistan, Vietnam, India, Kyrgyzstan, Indonesia	Bangladesh Iran, Turkey, Malaysia Pakistan, Tajikistan Thailand Brunei Darussalam Sri Lanka	Philippines, Georgia, DPR Korea, Armenia, Japan, Azerbaijan, Republic of Korea, Taiwan, Hong Kong, Maldives, Singapore
Overall status[e]	Afghanistan, Bhutan, Mongolia, Lao PDR	Russia, Cambodia, Kazakhstan, Nepal, Indonesia, Tajikistan, Uzbekistan, Maldives, Myanmar, China, Kyrgyzstan, Turkmenistan, Iran, Vietnam	Philippines, Brunei Darussalam, Turkey, Georgia, India, DPR Korea, Pakistan, Bangladesh Malaysia, Thailand Armenia, Sri Lanka	Azerbaijan, Japan, Republic of Korea, Hong Kong, Taiwan, Singapore

[a] The countries are presented in lowest to highest order of relative development for each mode.
[b] Maldives is not included in the calculation, because of its extreme density figures.
[c] Afghanistan, Bhutan, Brunei Darussalam, Hong Kong, Lao PDR, Maldives, and Singapore are not included in the calculation as they do not have any interstate railway system.
[d] Afghanistan, Armenia, Bhutan, Georgia, Kazakhstan, Kyrgyzstan, Lao PDR, Mongolia, Nepal, Tajikistan, and Uzbekistan do not have any port and they are not included in the calculation.
[e] Overall status was calculated deriving ranking in each sector then combined to a total score which was further calculated to a mean value and levels are derived using 2-level of standard deviation, deviating below and above from the mean value.

Table 4
Expected dry ports in countries of the Asian region

No. of dry ports	Country
0	Brunei Darussalam, Hong Kong, Maldives, Singapore
1	Armenia, Azerbaijan, Bhutan, Georgia, Sri Lanka, Tajikistan, Taiwan
2	Cambodia, DPR Korea, Kyrgyzstan, Lao PDR, Nepal,
3 – 5	Republic of Korea (3), Malaysia (4), Turkmenistan (4), Uzbekistan (5)
6 – 10	Afghanistan (6), Philippines (6), Vietnam (6), Myanmar (7), Thailand (7), Bangladesh (8), Japan (9), Turkey (9), Mongolia (10)
11 – 50	Pakistan (13), Iran (15), Kazakhstan (20), Indonesia (25), Russia (45)
Above 50	India (78), China (133)

Table 5
Expected truck terminals in countries of the Asian region

No. of truck terminal	Country
0	Maldives
1	Singapore, Bhutan, Brunei Darussalam
2	Georgia, Hong Kong
3 – 5	Kyrgyzstan (4), Tajikistan (4), Lao PDR (5), Sri Lanka (5), Taiwan (5)
6 – 10	Cambodia (6), DPR Korea (6), Nepal (8), Turkmenistan (9), Malaysia (10)
11 – 50	Republic of Korea (11), Uzbekistan (13), Myanmar (21), Philippines (21), Thailand (21), Vietnam (22), Mongolia (25), Turkmenistan (27), Bangladesh (31), Japan (32), Iran (40), Pakistan (44), Kazakhstan (46)
Above 50	Indonesia (75), India (217), Russia (301), China (414)

Table 6
Expected land border-crossing points in countries of the Asian region

No. of border-crossing points	Country
0	Japan, Maldives, Philippines, Sri Lanka, Taiwan
1 – 10	Singapore (1), Hong Kong (2), Republic of Korea (2), Brunei Darussalam (4)
11 – 50	Bhutan (11), Armenia (13), Georgia (15), DPR Korea (17), Azerbaijan (20), Cambodia (26), Turkey (26), Malaysia (27), Indonesia (28), Nepal (29), Tajikistan (37), Turkmenistan (37), Kyrgyzstan (39), Bangladesh (42), Vietnam (46), Thailand (49)
50 – 100	Laos (51), Iran (54), Afghanistan (55), Myanmar (59), Uzbekistan (62), Pakistan (68), Mongolia (82)
Above 100	Kazakhstan (120), India (141), Russia (200), China (221)

Table 7
Comparison of mean value of logistics performance indicators by group of countries

Indicators	Overall	Developed countries	Asian countries	Rest of the countries
Infrastructure	2.58	3.85	2.53	2.34
Customs	2.56	3.64	2.52	2.35
International shipment	2.72	3.66	2.70	2.54
Logistics competence	2.71	3.83	2.70	2.48
Tracking & tracing	2.73	3.89	2.68	2.51
Domestic logistics costs	2.90	2.47	2.91	2.98
Timeliness	3.17	4.16	3.11	2.99
LPI index value	2.74	3.83	2.70	2.53

Source: Values to calculate the mean were taken from Arvis, et al., 2007, pp. 26-33.

Table 8
Comparison of the status of individual Asian countries

Status	Infrastructure	Customs	International shipment	Logistics competence	Tracking & tracing	Timeliness	Domestic logistics costs	LPI index value
Poorly developed	Afghanistan Myanmar	Afghanistan Nepal Tajikistan	Afghanistan Myanmar Tajikistan Armenia Bhutan	Afghanistan Mongolia Tajikistan	Afghanistan Myanmar Tajikistan Mongolia	Afghanistan Myanmar Tajikistan Lao PDR	Armenia Bhutan Vietnam Philippines Nepal	Afghanistan Myanmar Tajikistan
Average	Nepal Armenia Kazakhstan Mongolia Bhutan Tajikistan Uzbekistan Lao PDR Azerbaijan Kyrgyzstan Sri Lanka Russia Philippines Bangladesh Cambodia Pakistan Iran Vietnam	Kazakhstan Uzbekistan Russia Bhutan Mongolia Bangladesh Myanmar Lao PDR Armenia Cambodia Kyrgyzstan Azerbaijan Sri Lanka Pakistan Iran	Uzbekistan Nepal Kazakhstan Sri Lanka Kyrgyzstan Bangladesh Lao PDR Cambodia Russia Mongolia Azerbaijan Iran	Myanmar Azerbaijan Kazakhstan Nepal Armenia Uzbekistan Bhutan Lao PDR Bangladesh Kyrgyzstan Sri Lanka Russia Cambodia Philippines Iran	Mongolia Iran Uzbekistan Russia Kazakhstan Armenia Bhutan Nepal Azerbaijan Kyrgyzstan Bangladesh Cambodia Pakistan Sri Lanka Philippines	Bhutan Armenia Azerbaijan Kazakhstan Sri Lanka Uzbekistan Nepal Kyrgyzstan Iran Lao PDR Pakistan Russia Cambodia	Cambodia Thailand Afghanistan Malaysia Taiwan Sri Lanka Bangladesh India Mongolia China Iran Myanmar Uzbekistan	Mongolia Kazakhstan Armenia Nepal Bhutan Uzbekistan Lao PDR Azerbaijan Kyrgyzstan Russia Sri Lanka Bangladesh Cambodia Iran Pakistan Philippines
Moderately developed	Indonesia India Turkey Thailand China	Philippines India Indonesia Vietnam China Turkey Thailand	Pakistan Philippines Vietnam Indonesia Turkey India Thailand China Malaysia	Pakistan Vietnam Indonesia Turkey India Thailand China Malaysia	Vietnam India Thailand Turkey Indonesia China	Philippines Vietnam Indonesia Bangladesh Turkey India China	Azerbaijan Pakistan Indonesia Kazakhstan Kyrgyzstan South Korea Turkey Singapore Hong Kong	Vietnam Indonesia India Turkey Thailand China
Developed	Malaysia South Korea Taiwan Hong Kong Japan Singapore	South Korea Taiwan Malaysia Japan Hong Kong Singapore	South Korea Taiwan Japan Hong Kong Singapore	Taiwan South Korea Hong Kong Japan Singapore	Malaysia South Korea Taiwan Hong Kong Japan Singapore	South Korea Thailand Malaysia Taiwan Hong Kong Japan Singapore	Russia Tajikistan Lao PDR Japan	Malaysia South Korea Taiwan Hong Kong Japan Singapore

Source: Values to derive the status were taken from Arvis, et al., 2007, pp. 26-33.
Note: Status of each country was calculated using the mean value of each indicator among Asian countries. Two levels of standard deviation were taken to determine the four levels of development, i.e., first and second standard deviation values below the mean determined poorly developed and average levels whereas two levels of higher standard deviation values determined moderately developed and developed levels of the countries.