



REGIONAL STRATEGIES FOR STRENGTHENING REGIONAL CONNECTIVITY

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Regional connectivity requires integrating different types of regional networks, ranging from infrastructure networks to those concerned with knowledge-sharing. As they evolve, these networks are becoming more complex and interdependent. Developing regional networks in a strategic and coordinated way will spread the benefits more evenly across Asia and the Pacific, particularly to the least developed countries, landlocked developing countries and small island developing States. Given the unique spatial contexts in which they are situated, these countries will require different approaches and modalities for strengthening regional connectivity.

One of the most important contributions to economic growth is extensive and efficient infrastructure – particularly systems for transport, energy and communications. Investment in physical infrastructure networks generally results in net income gains at both national and local levels.¹ This is especially true for countries that depend heavily on external trade. Linking national investments to regional priorities in an integrated manner can expand the benefits to a wider group of countries. Regional networks can thus be seen as a type of “regional public good”, whereby the collective benefit for the region exceeds the cost of the individual sections of the network.

Meanwhile, across Asia and the Pacific, countries are exploring new forms of people-to-people connectivity. With the extension of transportation links, people in the Asian and Pacific region are travelling more quickly to more places and at lower costs than ever before. Many are labour migrants travelling abroad to earn money to send home as remittances, providing income and employment in both countries of origin and countries of destination. Others are travelling as academics or students and are contributing to the development of the region’s knowledge economies. Meanwhile, regional business networks and tourist flows are growing rapidly, thanks largely to the expansion of aviation links.

The contribution of these various networks to economic and social development depends on the policy, legal, regulatory and institutional frameworks in which they are located. These frameworks can be considered as “soft” infrastructure and are as important in determining the effectiveness of networks as physical capacities.²

In the past, the development of “hard” and “soft” infrastructure was by and large delegated across authorities that used different parameters and methodologies to analyse and “cost” investments. However, it is evident that “hard” and “soft” infrastructures are fundamentally complementary, and that multifaceted approaches achieve better outcomes.

At the same time, it is becoming evident that connectivity is multisectoral, with the connectivity of one sector influencing the connectivity of others. This interdependence demands greater cross-sectoral coordination.

One final challenge is to extend these networks across borders. There are already examples of cooperative approaches that have enhanced regional connectivity, including both formal arrangements, such as intergovernmental agreements, and less formal approaches, such as the adoption of common principles or codes of practices. However, the benefits of either approach have yet to be fully realized due to weaknesses in institutional collaboration and in capacity for implementation.

The fact that countries in the region are at different stages of development is an opportunity for countries to configure new infrastructure that makes best use of the natural differences between countries and contributes to more sustainable and inclusive forms of development. The future of regional connectivity depends on how closely they can work together to strengthen networks in four critical areas: trade and transport connectivity; information and communications technology (ICT) connectivity; energy connectivity; and people-to-people connectivity.

TRADE AND TRANSPORT CONNECTIVITY

The status of trade and transport connectivity in the region

As noted in the previous chapter, the expansion of trade depends on having appropriate transport infrastructure and an enabling environment for private businesses to engage in trade. Trade connectivity and transport connectivity are thus two sides of the same coin, and both “hard” and “soft” infrastructures need to be improved to enhance access to global and regional markets.

From the perspective of physical transport infrastructure, some countries in the Asian and Pacific

region have made major strides in expanding their road networks, with an estimated 300,000 km of roads being added every year over the past decade.³ Furthermore, there has been tangible progress in the development of the region's railway networks. Australia, China, India, the Islamic Republic of Iran, Japan, the Republic of Korea, the Russian Federation and Turkey have expanded and upgraded their railway networks, while in Mongolia and Turkmenistan, new tracks are being laid to carry mineral exports to international markets.

However, there are still significant gaps in transport infrastructure connectivity. One study estimated that, by 2020, developing Asian countries could gain 6% of real income, or close to \$1 trillion, if the estimated transport investment needs in Asia were met and appropriate infrastructure were constructed.⁴ What is needed in particular are better linkages from landlocked developing countries and least developed countries to the region's maritime ports and airports, as well as the upgrading, integration and operationalization of regional transport networks.

Under the auspices of ESCAP, member States have formulated a number of regional strategies on trade and transport connectivity. The Regional Action Programme for Transport Development in Asia and the Pacific, phase II (2012-2016), for example, identifies 10 thematic areas for developing an integrated, intermodal, international transport and logistics system in the ESCAP region.⁵ Meanwhile, ESCAP is promoting trade facilitation through a variety of channels, including the United Nations Network of Experts for Paperless Trade in Asia and the Pacific (UNNExT).⁶ Within the framework of these initiatives, countries should prioritize the issues described below to strengthen trade and transport connectivity in the region.

Upgrading and integration of regional transport networks

Many of the principal regional approaches to infrastructure have been facilitated by ESCAP. In particular, these led to intergovernmental agreements

on the Asian Highway and Trans-Asian Railway networks – which today comprise 143,000 km of roads and highways, and 117,500 km of rail routes of international importance, including approximately 11,000 km of sections that have yet to be constructed, that is, the so-called “missing links”.⁷ Given that the road transport sector carries the majority of overland freight, the Asian Highway Network is especially important for carrying bilateral trade between contiguous countries.

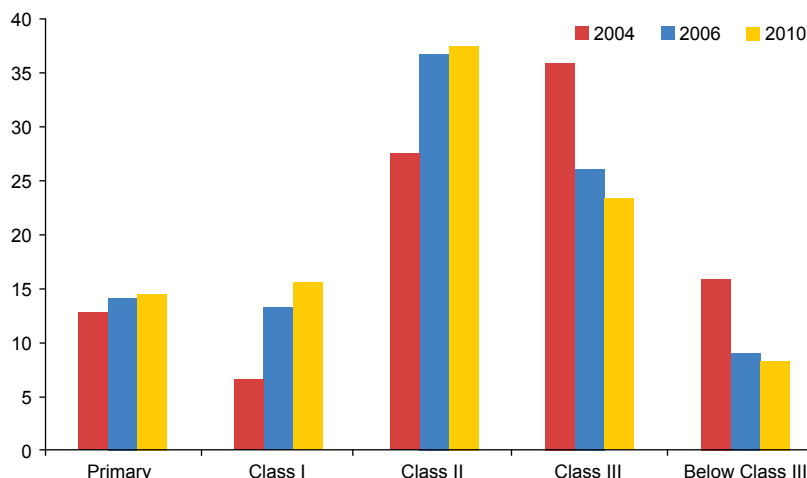
The establishment of minimum standards under the Intergovernmental Agreement on the Asian Highway Network has helped countries to raise progressively the quality of their major international highways (see figure 5.1). However, there is still scope for upgrading the quality of the network, particularly from below class III to class III. With almost two thirds of road sections under class III found in Afghanistan, Mongolia, Myanmar, Pakistan and Tajikistan, efforts to upgrade the Asian Highway Network should focus on these countries.⁸

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for freight transport would bring
substantial benefits*

Furthermore, all countries should look at ways to better manage and maintain their road networks. While ESCAP estimates that the cost of upgrading the Asian Highway Network is approximately \$36 billion in total, the cost of maintaining the existing network is also expected to become as costly as building new infrastructure.⁹ Although many countries have improved their maintenance regimes over the past decade, national budgets tend to under-allocate for road maintenance, increasing the long-run costs to Governments as well as vehicle operating costs for road users.

Meanwhile, there is an urgent need for countries in the region to increase the modal share of other modes of transport, particularly for freight. As figure 5.2 shows, the Trans-Asian Railway network connects most countries of continental Asia to Europe and

Figure 5.1. Progress in upgrading routes of the Asian Highway Network, 2004-2010



Source: United Nations Economic and Social Commission for Asia and the Pacific, *Review of Developments in Transport in Asia and the Pacific*. ST/ESCAP/2627.

the Middle East, with plans proceeding for the construction of some of the remaining 11,000 km of “missing links”. Despite progress, however, the region’s extensive railway network is still underutilized for international freight movements.

Increasing the share of railways in the region would bring substantial benefits in many respects. Freight railways have an operating cost advantage over road transport for long distances (typically greater than 500 km), while often being competitive for medium distances (300-500 km). This is particularly true for heavy industry and where annual transport volumes are high. It is also well documented that railways offer a more environmentally sustainable mode of transport for long distances – one estimate found that carbon dioxide emissions by rail are almost eight times less than they are for trucks and four times less than for inland waterways (barges).¹⁰

To realize the advantages of railways, countries in the region need to improve intermodal connectivity between the various networks. The lack of efficient and properly equipped facilities for transferring goods between the region’s road and railway networks is a major hindrance to promoting a modal shift to rail. Trucks can pick up a container at a factory warehouse and deliver it to the port, but if railways

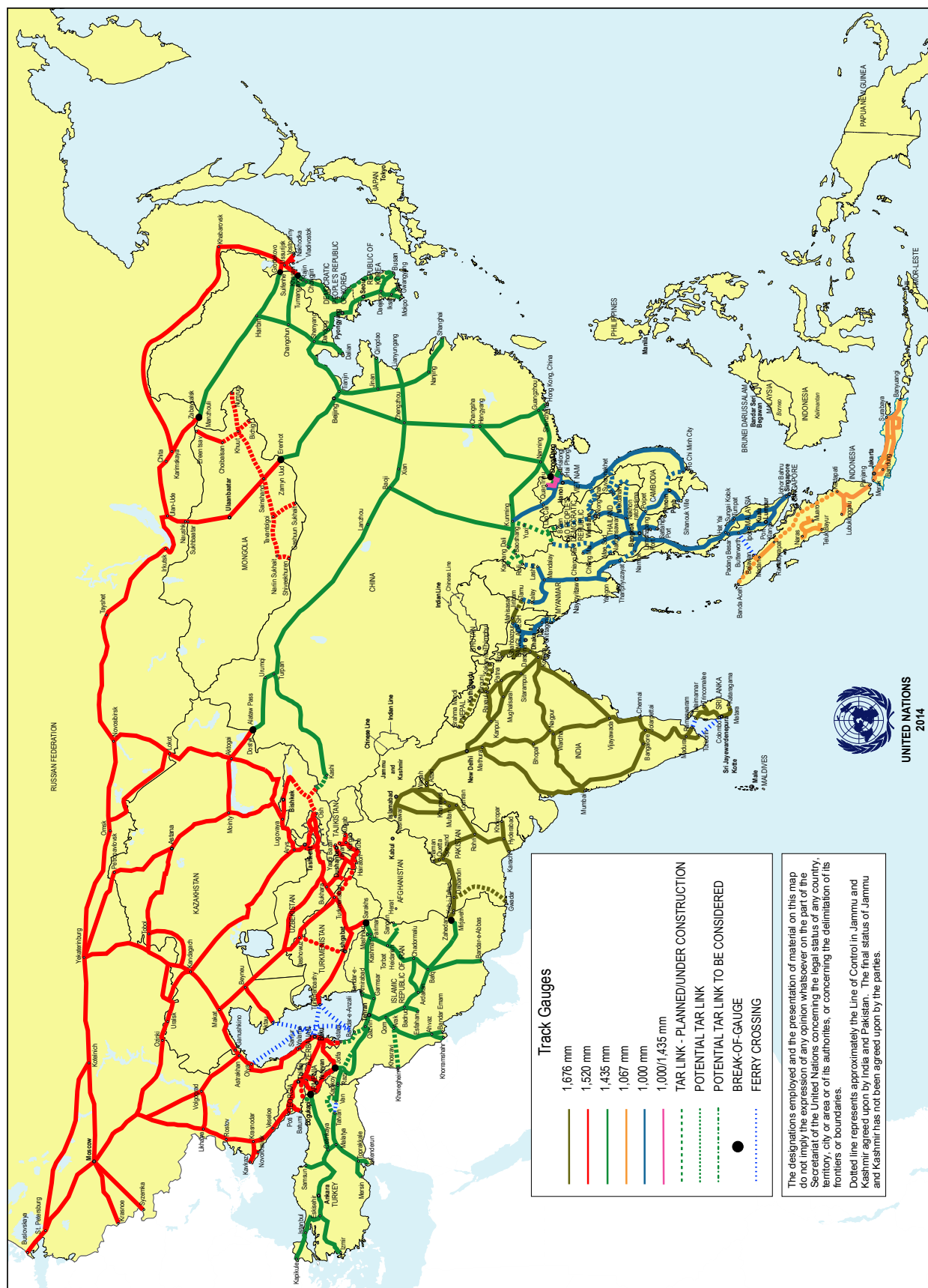
are to participate in container haulage, they must have physical access to an intermodal transfer terminal.

Thus, there is an urgent need for greater investment in intermodal facilities, such as dry ports or inland container depots – at strategic locations where freight can be switched from one form of transport to another without delay or damage.¹¹ With the appropriate control authorities present, dry ports can also act as “extended gates” for seaports, since they are better able to control and adjust transport flows.¹² In this regard, the Intergovernmental Agreement on Dry Ports, adopted in 2013, offers a useful framework for countries to develop dry ports in the region.¹³

Enhancing cooperation at border crossings

Another major impediment to trade and transport connectivity is the presence of multiple “choke points,” particularly at borders. Border agencies are required to maintain a fine balance: on one hand, they have to facilitate trade and transport; on the other, they have to assert regulatory controls. They have to combat, for example, the smuggling of illicit, counterfeit and environmentally sensitive goods, money laundering and human trafficking, and more recently, they have had to control

Figure 5.2. Current status of the Trans-Asian Railway network, 2014



Source: ESCAP secretariat.

health pandemics, such as that caused by avian influenza. This requires a large and diverse number of government authorities and agencies, including immigration, police, customs, quarantine, sanitary and phytosanitary inspection, and transport.

These controls are important, but they add to the cost, time and risk involved in moving freight by land. For example, the International Road Transport Union, through its New Eurasian Land Transport Initiative, found that border waiting times account for about 40% of time lost during transport, and that such a situation encourages corrupt practices that can account for 30% of transport costs.¹⁴ Such costs inhibit the expansion of trade in the region and undermine other important initiatives, such as tariff reductions.

Many countries in the region are already taking steps to enhance cooperation between their border

agencies, mostly on a bilateral basis. Kazakhstan and Kyrgyzstan, for example, began joint customs control and a single-stop inspection of vehicles, goods and passengers at border crossings in August 2012,¹⁵ while Georgia and Turkey also established joint customs control. In November 2011, China and Mongolia introduced the pilot implementation of a unified customs manifest. Within one year, the customs authorities processed 180,000 unified customs manifests, and the pilot was extended to other major border crossings between the two countries.¹⁶

The next step is to integrate check post facilities at all international border crossings, starting with those along the Asian Highway and Trans-Asian Railway networks. For example, India has begun implementing integrated check post (ICP) facilities with its neighbours starting with the Attari border check post with Pakistan (see box 5.1). Early reports

Box 5.1. Integrated check post at Attari, India-Pakistan border

In order to facilitate trade with neighbouring countries, the Government of India has launched an integrated check post (ICP) initiative. ICPs are expected to serve as single window facilities covering customs, immigration security and warehousing services. One ICP has been operational since 2012 at Attari on the India-Pakistan border.

Previously, cargo from Delhi to Lahore, Pakistan, was sent in four hops via the Nhava Sheva port in Maharashtra, India, by sea to Dubai, United Arab Emirates, where cargo was trans-shipped and transported to Karachi, Pakistan, and then from Karachi to Lahore over land. The shipment would thus take about 30 days to reach its destination. With the Attari-Wagah land route, the journey has been reduced to three days.

During 2012/13, the first year of operation of the ICP at Attari, imports grew by 81%, and exports registered an increase of 122% in value terms. Meanwhile, the number of trucks carrying export cargo from India through Attari increased from 3,882 to 41,248, while the number carrying import cargo increased from 19,087 to 33,599. This led to a 166% increase in customs revenue. In addition, it is reported that the incremental revenue during the post-project period recovered almost one third of the investment in one year, as taxes were also collected from services provided commercially. Land prices in the area have gone up substantially and a variety of organized commercial activities have sprung up on both sides of the border.

India is planning to open another 12 ICPs with various neighbours: 4 on the India-Nepal border, 1 on the India-Myanmar border and 7 on the India-Bangladesh border. Notably, the opening of the ICP at the border of Raxaul (India) and Birgunj (Nepal), which are linked by both road and rail, means that the ICP is integrated with both networks.

Source: ESCAP secretariat.

show that this has led to a significant increase in the number of vehicles and goods crossing the border and a corresponding increase in customs revenues. India's ICPs also demonstrate another opportunity for enhancing connectivity in the region – the use of ICT to facilitate trade and transport.

Harnessing ICT connectivity for trade and transport facilitation

The greater use of automated equipment and data collection systems is transforming the way border

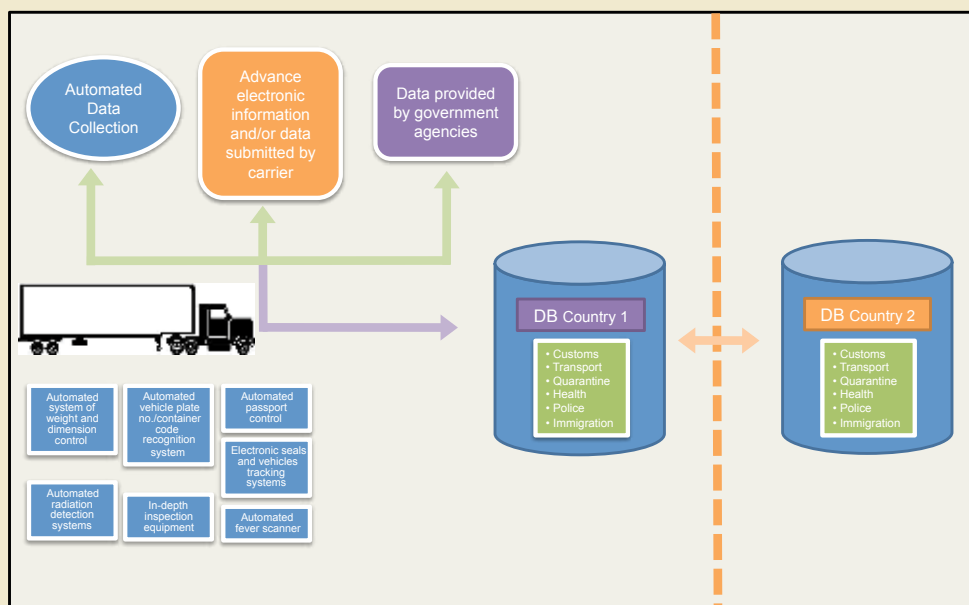
agencies operate. Automated data collection systems reduce overlaps when the same information is collected by more than one agency – and on both sides of the border. ESCAP has developed several models to demonstrate how automated equipment and new technologies such as radio frequency identification and global positioning system can help in managing cross-border movements of trade and transport more efficiently (see box 5.2).

However, the real breakthrough in Asia's overland trade and transport connectivity will come from

Box 5.2. ICT applications for smooth cross-border transport

As part of its efforts to promote efficient cross-border transport, ESCAP has developed several models demonstrating how ICT applications can be adapted and applied by countries to meet their specific requirements. For example, the Border Crossing Management Information System shows how information from automated equipment, advanced information from carriers and data provided by government agencies can be connected to the central border crossing database of a country, and how this information could then be fed to the various border agencies. Such a system could be used in conjunction with various automated equipment and integrated into single window initiatives. Importantly, as volumes of trade and traffic grow, the system could also be scaled up without large additional investments.

Model on integrated controls at border crossings

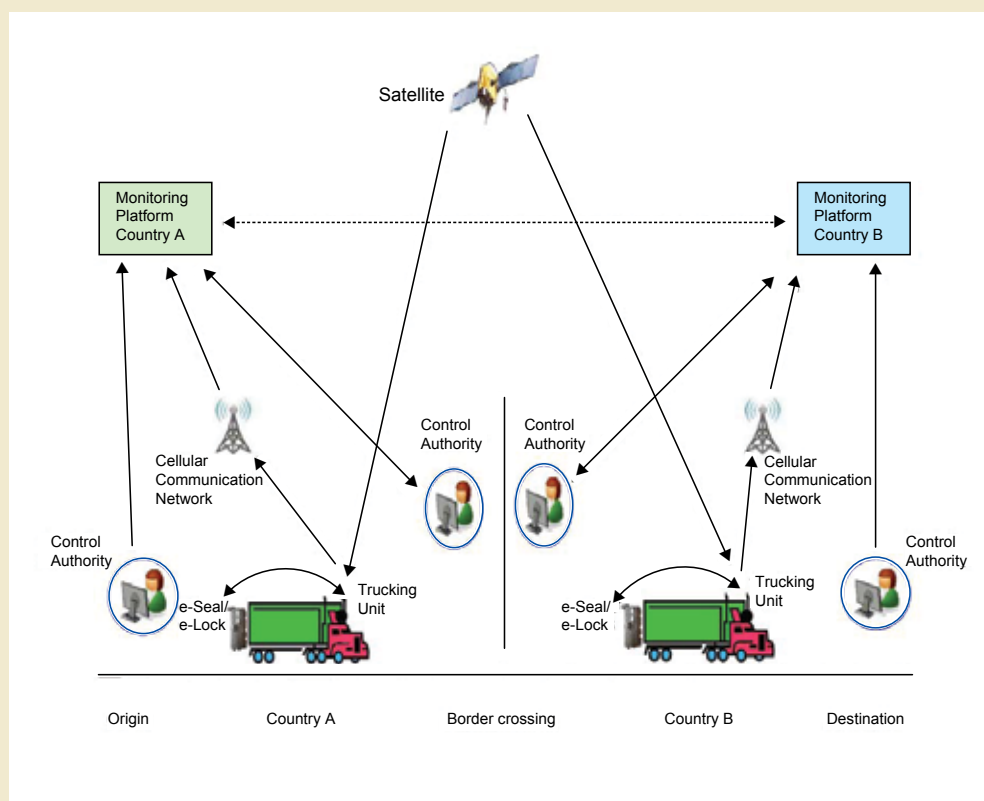


Source: Adapted from United Nations Economic and Social Commission for Asia and the Pacific, "Model on Integrated Controls at Border Crossings" (2012). Available from <http://www.unescap.org/resources/model-integrated-controls-border-crossings>.

Box 5.2. (continued)

Another type of model is the Secure Cross-border Transport Model, which provides a conceptual and standard basis for the design of a cross-border vehicle monitoring system using new technologies such as ICT, satellite positioning and electronic seals. The model prescribes standardized components, and their interaction and institutional requirements.

Secure Cross-border Transport Model



Source: ESCAP, Secure Cross Border Transport Model (2012). Available from www.unescap.org/resources/secure-cross-border-transport-model.

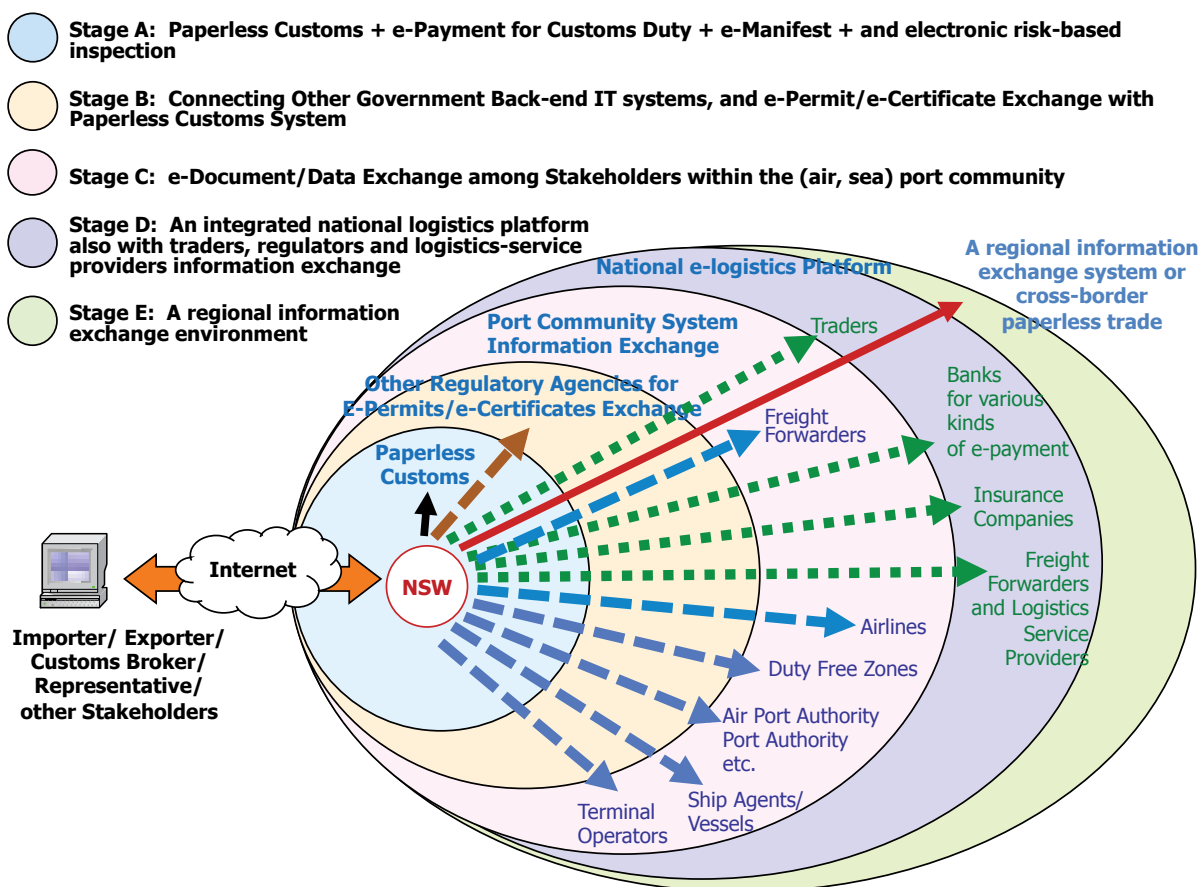
This model demonstrates that the integrated use ICT can secure and facilitate trade and transport, while taking care of the concerns of control authorities. A vehicle tracking system based on this model can give control authorities the confidence they need to open up more land routes for international trade and transport, while enabling transport operators to manage their operations efficiently.

Source: ESCAP secretariat. Further details of these and other models are available on the ESCAP website at www.unescap.org/our-work/transport/transport-facilitation-and-connecting-subregional-transport-networks/resources.

combining trade, transport and ICT applications along the whole trade process. As shown in the “single window roadmap,” developed by ESCAP and the Economic Commission for Europe in collaboration with UNNEXt (see figure 5.3), most countries have

begun developing their single windows by introducing electronic customs declaration systems. The next step is to integrate other government agencies and their associated document requirements into a national single window environment.¹⁷

Figure 5.3. A single window road map in five evolutionary stages



Source: ESCAP and United Nations Economic Commission for Europe, *Single Window Planning and Implementation Guide*. ECE/TRADE/404.

Today, nearly all countries in the region have some form of automated customs system in place at key border checkpoints, and more than half are developing single windows to enable traders to submit all required information to government agencies at one time and place in electronic form. Notably, the Association of Southeast Asian Nations (ASEAN) has taken steps to develop a regional ASEAN Single Window. The initiative, signed in December 2005, has made some progress: as of March 2013, the exchange of the intra-ASEAN certificate of origin and customs declaration document was tested in a scaled-down ASEAN Single-Window Pilot Project.

Because most ICT applications require some degree of standardization for data transfer, the introduction of

electronic platforms for trade and transport facilitation also brings with it new opportunities for countries to simplify and standardize trade documents, as well as processes. These measures will greatly boost connectivity by reducing the time for border clearance and enabling automatic risk analysis, which helps to prevent fraud and non-compliance, as well as to boost revenues for customs authorities.

The development of paperless trade also sets the stage for the transition to electronic logistics, or “e-logistics.” E-logistics comprises a set of communications, computing and collaborative technologies that enables the electronic exchange of data, knowledge and information between supply chain partners. The system eventually enables

traders and domestic logistics service providers to interact and to track the progress of applications and registrations with government agencies.¹⁸ The further integration of paperless trade and transport systems, such as regulatory single windows, port community systems, e-payment or banking systems and national e-logistics systems, can ultimately give rise to national integrated paperless supply-chain platforms – and eventually to integrated systems along an entire chain of import-export operations.¹⁹

This is the ultimate target for regional cross-border paperless trade initiatives, such as the regional arrangements for cross-border paperless trade facilitation of ESCAP (see box 5.3) and the ASEAN Single Window. Initiatives led by the private sector, such as the Pan Asian E-commerce Alliance, which bring together single window operators from several countries, also show promise.²⁰

Developing competitive regional transport and logistics services

The cost and quality of transport services are affected by the level of competition in the transport

sector. Research conducted in landlocked developing countries suggests that government regulations that protect domestic road-transport operators can contribute to rent-seeking monopolistic or oligopolistic behaviour, adding to the already high transport costs for traders in these countries.²¹

Experiences from the maritime and aviation sectors show that deregulating transport services can increase competition and reduce prices paid by customers. For example, the liberalization of the aviation sector in South-East Asia and the Pacific helped to lower airfares and provided a boost to tourism, a critical sector for many countries (see box 5.4).

The issue of deregulation is difficult to tackle, especially if it involves the opening of domestic markets to foreign operators. Currently, almost all countries in the ESCAP region restrict the entry of foreign transport service providers in their domestic markets. These barriers are partly responsible for the high transport costs in the region and they contribute to delays at land border crossings due to the time spent stuffing and unstuffing cargo between vehicles.

Box 5.3. Towards cross-border paperless trade in Asia and the Pacific

Recognizing the potential benefits from conducting trade transactions using electronic rather than paper-based data and documentation, a number of countries in the Asian and Pacific region began implementing paperless trade systems in the late 1990s and early 2000s. However, most of these initiatives focused on information exchange between stakeholders domestically, while facilitating international trade inherently requires trade information to flow across borders along international supply chains. As a result, the flow of electronic trade information generated domestically faces both technical and legal barriers beyond the border, turning traders to conventional paper-based trade practices and reducing the overall benefits from paperless trade systems.

To overcome these barriers, the Commission adopted resolution 68/3 on enabling paperless trade and the cross-border recognition of electronic data and documents for inclusive and sustainable intraregional trade facilitation. A study conducted by the secretariat in consultation with national focal points and experts from UNNExT recommended that an intergovernmental agreement be developed to provide willing countries with an effective and long-term framework to jointly develop and implement cross-border paperless trade facilitation. The draft text of this arrangement is under negotiation and will be further revised over the course of 2014.

Source: United Nations Economic and Social Commission for Asia and the Pacific, *Enhancing Regional Connectivity: Towards a Regional Arrangement for the Facilitation of Cross-border Paperless Trade*. ST/ESCAP/2684. Available from www.unescap.org/sites/default/files/0%20-%20Full%20Report_35.pdf

Box 5.4. Impact of deregulation on aviation in the Pacific

In Vanuatu and Samoa in the Pacific, the deregulation of the aviation sector has helped to improve regional transportation connectivity and to increase flows of tourists. In Vanuatu, Air Vanuatu was the national carrier, and in the late 1990s and early 2000s it suffered losses. Once the aviation sector in Vanuatu was deregulated in 2004, and low-budget carriers such as Pacific Blue were permitted to enter Vanuatu's skies, passenger traffic between Australia and Vanuatu grew by 19%. Deregulation has allowed fares to drop, increased visitor arrivals and increased airline choices for passengers. Vanuatu is now served by five international airlines.

In Samoa, the nationally controlled carrier – Polynesian Airlines – suffered heavy losses during 2001-2004, and was not financially viable. In response, the Government reformed the aviation sector. It restructured Polynesian Airlines for domestic routes and ventured into a partnership with Virgin Australia. Gains in the tourism sector in Samoa have been attributed to this joint venture.

In both countries, the reforms resulted in more flights to regional hubs such as Australia, Fiji and New Zealand, and more competitive fares. In addition, the restructured national airlines are in better financial positions, reducing the burden on public finances.

Source: Taumoepeau and Kissling, *Economic sustainability of airlines in the Pacific*. Presented at the 31st Australasian Transport Research Forum (2008). Available from www.atrf.info/papers/2008/2008_Taumoepeau_Kissling.pdf

However, countries have begun to take steps towards the development of a regional market for transport services and logistics by allowing foreign transport operators to enter or to transit their territories along selected routes. Several countries have established bilateral or trilateral arrangements to allow cross-border movements by road without the need for transport permits. There are such arrangements between Armenia, the Islamic Republic of Iran and the Russian Federation, and between the Lao People's Democratic Republic, Thailand and Viet Nam. China has also taken significant steps to open transport routes through major border crossings with Mongolia and Viet Nam.²²

Progress can also be seen among member States of the Shanghai Cooperation Organization, which are finalizing a draft agreement on facilitating international road transport.²³ Initially, about 15,500 km of roads are to be opened under this agreement, including a road from Lianyungang, China, to Saint Petersburg, Russian Federation. Also under the agreement, two seaports in China and the Russian Federation

will eventually be accessible for transit traffic from Central Asia.

In the case of railways, cross-border movements are often hampered by institutional differences in operating rules, tariff structures and licensing requirements for train drivers and crew. However, there are also examples of how countries can cooperate to provide regular and competitive international railway services. These include the long-running Trans-Siberian Railway linking the Russian Federation, Mongolia and China to the Far East and Europe; the Economic Cooperation Organization container block train between Istanbul (Turkey), Tehran and Islamabad; and the Chongqing-Xinjiang-Europe railway service between China and Germany via Kazakhstan, the Russian Federation, Belarus and Poland.²⁴ ESCAP is now developing a draft regional strategic framework for the facilitation of rail in the region, which will identify and address the current obstacles to cross-border rail freight movements.

INFORMATION AND COMMUNICATIONS TECHNOLOGY CONNECTIVITY

The evolution of the “digital divide” in Asia and the Pacific

Economies across the world have become increasingly reliant on ICT, including the Internet and mobile telecommunications. These inputs can increase the productivity of both labour and capital, and have become integral parts of international trade and logistics services – linking producers to consumers across borders and providing instant market information.

The ability to take advantage of this technology depends on bandwidth, which affects the speed of transmission – akin to the width of highways in road transport. This depends to a certain extent on physical infrastructure, particularly on cable and sometimes satellite services. Although the infrastructure has been expanding rapidly in Asia and the Pacific, bandwidth is still far lower than it is in North America or in Europe (see figure 5.4).

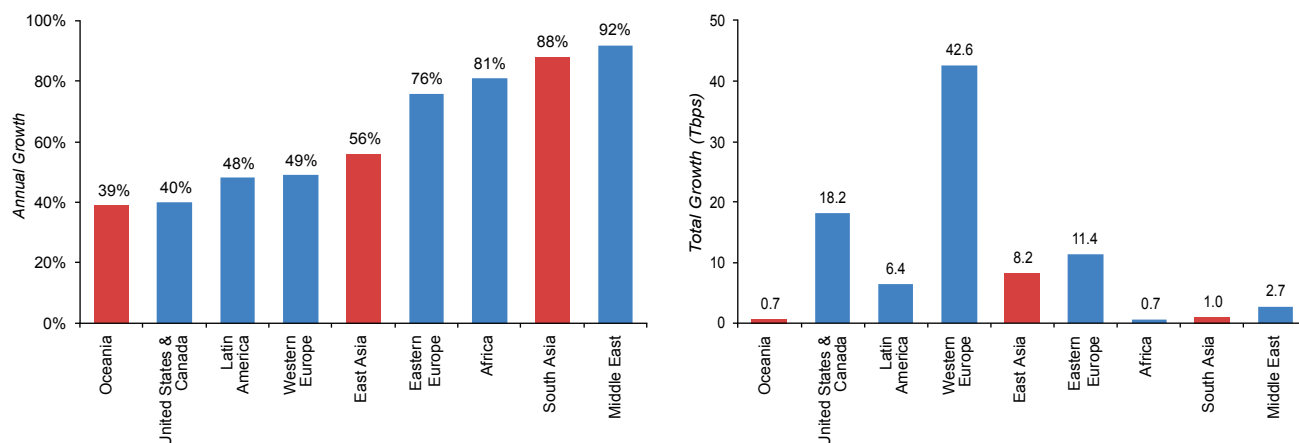
The majority of the region’s people who have little or no access to broadband live in lower-middle-income

countries with high income inequality, such as China and India, or in least developed countries or island developing economies. However, poorer communities in urban and rural areas remain underserved even in higher-income economies. This is because legacy telecommunication operators have typically invested primarily in commercially viable areas – mainly in major cities and urban centres. Moreover, incumbent operators often maintain exclusive access to submarine and terrestrial cable networks, limiting potential competition.

There are also significant inequalities between countries – in terms of physical infrastructure and the availability of, and access to, critical Internet exchange points. Moreover, prices tend to be higher where bandwidth is lower. Urban hub areas, such as Singapore and Hong Kong, China, enjoy levels of bandwidth that lead the world, while many developing economies, particularly the least developed countries, landlocked developing countries and Pacific island economies, lag far behind.

Many of these disparities arise from the current configuration of sea- and land-based fibre networks. These have evolved organically over two decades and are not serving to bring affordable ICT connectivity

Figure 5.4. Annual average growth in bandwidth vs. distribution of bandwidth added, by region (2008-2012)



Source: Telegeography, “2013 Telegeography landscape”, presentation at the Pacific Telecommunications Council Annual Conference, Honolulu, Hawaii, 20-23 January, 2013.

Note: The Y-axis shows terabits per second (Tbps). For example, a total of 8.2 Tbps of bandwidth capacity was added in East Asia during the period 2008-2012.

to all. There are, for example, insufficient land-based routes for international Internet traffic in Asia and the Pacific, so the region's traffic is exchanged through submarine cables, and routings that are based on hub-and-spoke configurations. In East Asia, for example, key hubs are Hong Kong, China; Singapore; and Tokyo, or further afield in the United States of America. Thus, international network traffic must pass through multiple Internet exchange points.

Since the Asian and Pacific region relies heavily on submarine cables, it is also vulnerable to natural disasters, marine vessel accidents and even sabotage. For example, in 2009, Typhoon Morakot and a subsequent undersea earthquake damaged at least eight submarine cables and adversely affected voice and data traffic across South-East Asia, as well as in China, India and Japan. The overreliance of the region on submarine cables makes it more vulnerable to extreme weather events and natural disasters, which have been increasing in frequency and potency over the past decade.

Towards an Asia-Pacific information superhighway

In this regard, ESCAP has recently begun promoting the concept of an Asia-Pacific information superhighway: a cohesive “meshed” terrestrial fibre optic network for the region that would provide cost-effective broadband access on both an intraregional and intercontinental basis. A continent-wide terrestrial fibre optic network would complement the existing submarine cable networks.

A meshed network would not only bridge Asia's vast landmass with competitive points of Internet access in Europe, it would also reduce the impact of outages from undersea cable accidents and natural disasters and open up opportunities for value added services. By linking Asia to Europe, the proposed Asia-Pacific information superhighway would enhance the physical ICT connectivity of landlocked countries that are located thousands of kilometres from undersea cables, while competition introduced by the network could lower the cost of

international bandwidth and provide Governments with incentives to liberalize international gateways.

The development of an Asia-Pacific information superhighway is a complex process requiring very close collaboration between member States, as well as with private sector partners and international organizations. While more work needs to be done to develop a concrete road map, ESCAP has identified the following principles that should underpin any regional strategy:

- *The network should be fully integrated and coherent.* It should provide robust cross-border connectivity across the continent, with a particular focus on reaching rural and less commercially profitable areas. A mesh configuration would allow for in-network healing in the event of physical cable outages or political instability that may affect network connectivity in individual countries.
- *The network should be of uniform quality.* Currently, some terrestrial networks are patchworks of domestic telecom networks, which provide variable quality and offer vastly different terms and service guarantees. A single uniform network with standard terms and quality of service would alleviate these problems.
- *The network should leverage existing infrastructure.* In order to remain cost effective, any pan-Asian terrestrial network would need to be based on the streamlined procurement of rights of way, as well as on uniform construction techniques and parameters. This could be realized through a partnership with existing long-distance infrastructure networks, such as the Asian Highway, the Trans-Asian Railway or power transmission networks. The proposed Asia-Pacific information superhighway could also build partnerships with ongoing and planned terrestrial links, such as the Trans-Eurasian Information Superhighway.
- *The network must be cost-effective.* If constructed on a proper scale in terms of both geographical

coverage and transmission capacity, a pan-Asian terrestrial network could effectively compete with submarine infrastructure at both regional and intercontinental levels. In particular, a terrestrial network dimensioned around 100 Gbps transmission technology would benefit from a “last-mover’s advantage” and the recent step changes in 10G and 40G technology.

- *The network should be open access and have non-discriminatory pricing.* For it to achieve development and policy goals, as well as to best serve the region’s consumers, all purchasers of capacity must be able to access the network on equal, non-discriminatory terms. In an effort to overcome the high price of bandwidth in least developed, landlocked and Pacific island markets, the concept of non-discrimination should also be carried over on a geographical basis so that countries can receive bandwidth at equal prices.

Governments and the private sector could combine their resources and expertise to adopt a lower-risk model. This would involve sharing the investment cost among multiple telecom operators and Governments, on condition that the network be operated on an open-access basis.

Harnessing cross-sectoral synergies for infrastructure development

Given the low level of broadband penetration in continental Asia, there is a tremendous opportunity for Governments to look at synergistic approaches to developing an Asia-Pacific information superhighway. In particular, examples from the national ICT infrastructure development strategies of India, the Republic of Korea and the United States suggest that the “cohabitation” of fibre-optic cables with road and railway infrastructure networks can save on high capital costs and facilitate access to the fibre-optic cable for maintenance and repair (see box 5.5).

Box 5.5. Laying broadband cable along highways and railways

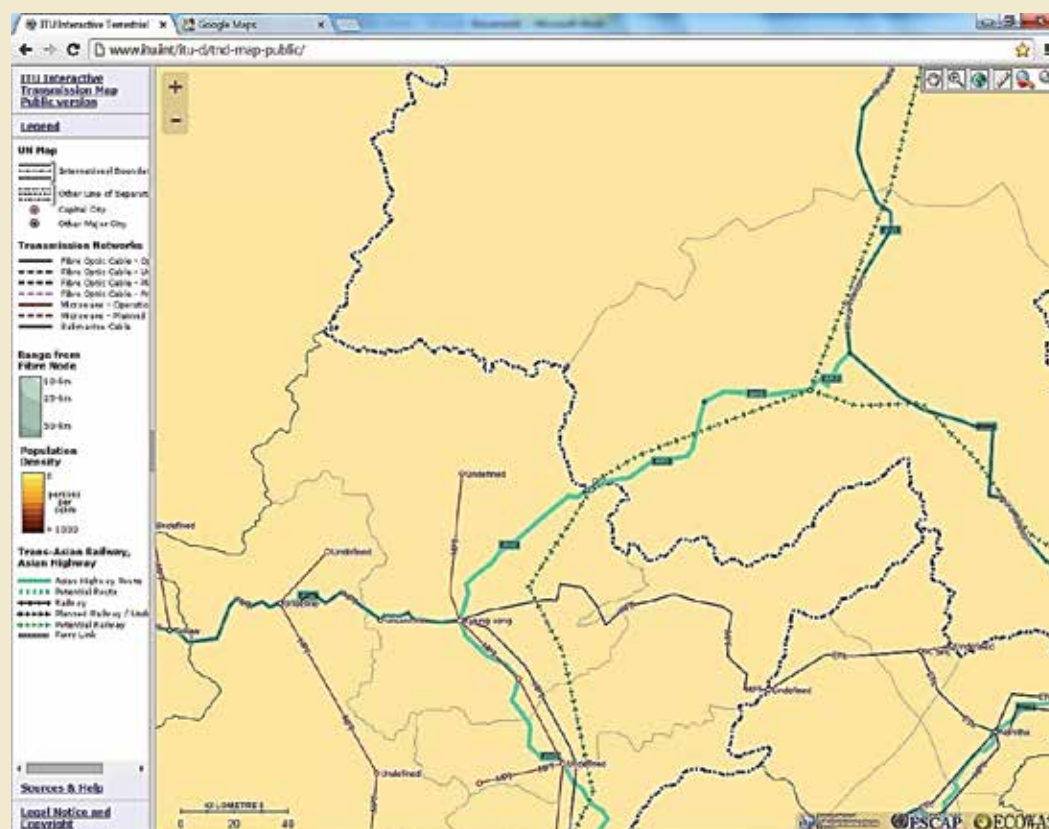
Globally, many countries have started to synchronize the deployment of broadband infrastructure with the new construction or maintenance of roads and railways. In the Republic of Korea, for example, fibre-optic cable infrastructure has been deployed along the highway backbone network. India has also been successful in deploying optical fibre beneath train tracks. As a result, RailTel Corporation of India Ltd. has become one of the region’s largest carrier-neutral telecom infrastructure providers and has deployed 45,000 km of fibre-optic cables, connecting more than 4,500 townships and several rural areas.

Together with the International Telecommunication Union, ESCAP has recently developed Asia-Pacific information superhighway maps, a set of online maps of transmission networks. These interactive maps enable the superimposition of Internet transmission infrastructure, such as fibre-optic cables, on the Asian Highway and the Trans-Asian Railway networks, which thus helps to identify where additional fibre-optic cable segments could be laid along highways and railways.

The figure shown is a screenshot from the International Telecommunication Union website, which currently hosts the online maps. The figures show the border areas between China and Myanmar. Given the probable increase in demand for international Internet Protocol by Myanmar, as well as the need to reinforce redundancy within the ASEAN region, a potentially interesting solution could be to lay optical fibre along planned Trans-Asian Railway tracks or Asian Highway route 3, which runs from Kunming, China, via Jinghong (Yunnan Province), into Mong La (Myanmar). From Mong La, the optical fibre could be linked up with the existing Myanmar network in Kengtung, where it meets existing terrestrial connections that run eastwards into the Lao People’s Democratic Republic and southward into Thailand (along Asian Highway route 2 and missing segments of the Trans-Asian Railway network route). This would create a regional crossroads for optical fibre to reinforce north-south and east-west redundancy in South-East Asia.

Box 5.5. (continued)

North-eastern Myanmar: a crossroads for connecting China, the Lao People's Democratic Republic and Thailand



Source: ITU Interactive Terrestrial Transmission/ESCAP Asia-Pacific Information Superhighway Maps, accessible at <http://www.unescap.org/idd/maps/asia-pacific-superhighway/>

Although it is preferable to install fibre-optic cables while roads and railways are being built, even installing just the necessary ducts and conduits without the fibre would provide significant cost benefits by avoiding multiple excavations. Between 70% and 90% of the costs of developing a terrestrial fibre-optic network are related to the excavation and installation of ducts and conduits through which cables are pulled.²⁵

Rail and power networks already have fibre networks for railway signalling and for their supervisory control and data acquisition systems. Allowing for additional fibre would not add significant costs. Furthermore,

as neither railway signalling nor supervisory control and data acquisition systems are bandwidth intensive, the rail and power entities inevitably end up with surplus capacity in their fibre networks. Such captive fibre capacity is attractive to telecom providers who are keen to avoid the costs of trenching fibre in remote locations and of securing new rights of way.

There are also opportunities to integrate power transmission and telecommunications. High-voltage transmission lines are often mounted with optic-fibre ground wire to maintain contacts among substations and dispatch centres. If there is spare capacity, transmission companies can lease out the

Figure 5.5. Fibre-optic ducts and conduits are placed alongside a highway in the Republic of Korea



Source: Korea Telecommunications

lines to telecommunications providers. The Power Grid Corporation of India Limited, for example, has a fibre-optic network covering 206 cities and towns with about 25,000 km of optical fibre. The network covers many remote areas, including the northeastern part of the country and Jammu and Kashmir, and offers a domestic leg for international long-distance carriers that wish to connect through India to Bangladesh, Bhutan or Nepal.

Similar synergies can be achieved when developing cross-country connections. In particular, under the intergovernmental agreements on the Asian Highway and Trans-Asian Railway networks, and on dry ports, countries have already agreed on a set of international border crossings along these regional networks. By linking the development of the proposed Asia-Pacific information superhighway with these existing intergovernmental agreements, countries may avoid lengthy rights-of-way negotiations, which often become a source of contention and delay for major cross-border infrastructure projects. From the perspective of the managers of this infrastructure, income from providing access to the fibre-optic cables along their networks can become a valuable source of revenue, which could be used to finance recurrent maintenance costs.

Given the complexity of these sectors, the benefits and risks of such cross-sectoral approaches require further research. In this regard, the secretariat is

planning to conduct further analytical work through the establishment of an expert working group on “seamless connectivity,” as proposed by the Ministerial Conference on Regional Economic Cooperation and Integration in Asia and the Pacific, which was held in Bangkok from 17 to 20 December 2013. This expert group could also work with United Nations system partners, notably the International Telecommunication Union, as well as tap into the expert analysis provided by research companies and regional institutions with similar objectives.

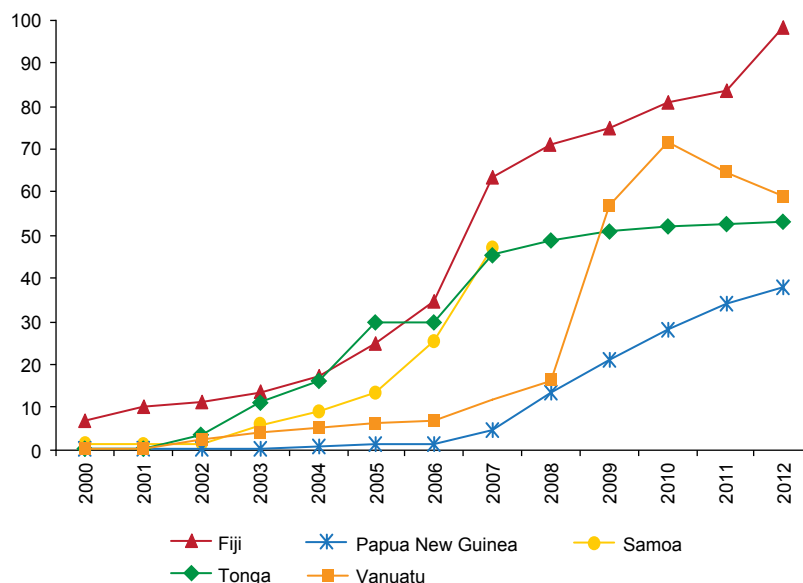
Strengthening the ICT connectivity of Pacific island economies

Pacific island economies offer many examples of how ICT connectivity is transforming economies and societies for the better. These include mobile telephone connectivity, access to financing and banking services and access to educational opportunities through distance learning. The spread of mobile telephones in the Pacific has been spurred by regulatory reforms over the last decade, particularly in Fiji, Papua New Guinea, Samoa, Tonga and Vanuatu. These Pacific island economies undertook specific reforms that led to introducing competition (at least one other private competitor) in domestic markets previously dominated by public enterprises. As a result, subscriptions (per 100 people) increased noticeably in these economies (see figure 5.6).

The benefits from expanding mobile communications to the population while lowering prices has been well documented. Surveys of both rural and urban respondents in Vanuatu, for example, showed that access to mobile telephones reduced business costs, increased sales of goods and services, improved transport and logistics, and enhanced interpersonal contacts.²⁶ Mobile communications are also stimulating innovations in financing services, which had remained out of reach for a large proportion of their populations.

However, broadband penetration in the Pacific remains very limited. Only 5 economies (Cook Islands, Fiji, Palau, Tonga and Tuvalu) have

Figure 5.6. Mobile subscriptions per 100 people in selected Pacific island economies, 2000-2012



Source: International Telecommunication Union, "Mobile cellular subscriptions per 100 people". Available from www.itu.int/en/ITU-D/Statistics/Documents/statistics/2013/Mobile_cellular_2000-2012.xls.

more than 1 fixed broadband subscription per 100 inhabitants. Broadband prices are also still prohibitively expensive: for example in 2012, fixed broadband costs approximately \$19.5 in Fiji and \$185.6 in Papua New Guinea, corresponding to 6.4% and 150.5% of Gross National Income per capita respectively.²⁷

A number of technological solutions can overcome the high costs and the lack of data connectivity and Internet bandwidth. For example, a next-generation medium Earth orbit satellite constellation, O3b Networks, was launched in 2013.²⁸ O3b is aimed at combining the ubiquitous reach of satellites with the speed of fibre to deliver satellite Internet services and mobile backhaul services to emerging markets in the Pacific. Another programme is the Pacific Regional Connectivity Program, financed by the World Bank, the Asian Development Bank, participating member countries and other private and public sector partners.²⁹ This programme is aimed at connecting Tonga, Samoa, Solomon Islands and Vanuatu by submarine fibre-optic cables to a global communications network and is designed to attract

private investment in ICT infrastructure development, based on open-access principles.

Technological solutions, such as the O3b satellite, will to a great extent still be reliant on international bandwidth from land- and sea-based optical fibre, so their success will depend on the wholesale Internet Protocol transit prices in such hubs as Singapore and Hong Kong, China. The proposed Asia-Pacific information superhighway could therefore help to expand competition, even for economies in the Pacific, thereby reinforcing the case for a regional approach to ICT connectivity. In the meantime, efforts should continue on ways to further develop economic opportunities offered by mobile connectivity.

The experiences from the Pacific highlight the importance of a conducive regulatory environment to attract both consumers and private investors. In particular, Governments need to establish credible and transparent rules for the sustainable development of ICT operations. For example, one study found that, at the early stages of reform in Fiji, Papua New Guinea and Samoa, the independence of

regulatory authorities was challenged by pressure from certain interest groups and Governments.³⁰ The study also highlighted the limited financial and technical capacities of these newly established regulatory authorities to handle effectively the full scope of regulation.

ENERGY CONNECTIVITY

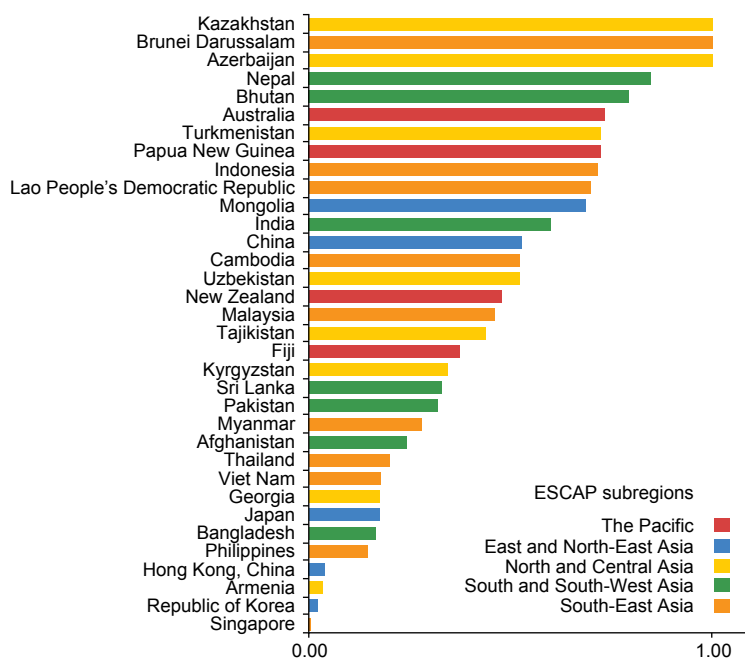
Current status of energy connectivity in the region

Sustainable human development depends on adequate, reliable and affordable supplies of energy – that is, energy security. However, the Asian and Pacific region remains heavily dependent on fossil fuels. In 2011, the region accounted for about 40% of global oil and gas consumption and more than 70% of global coal consumption.³¹

The region also relies heavily on traditional energy sources: despite recent progress, more than 1.8 billion people are still using biomass, and more than 628 million lack access to electricity.³² While several countries in the region are net energy exporters, only a few countries satisfy their energy needs from their own resources (see figure 5.7). The region as a whole is a net importer of primary energy.

There are numerous opportunities for oil, gas and electricity trade in Asia and the Pacific. They can be divided into three main groups – infrastructure projects of regional or subregional significance, infrastructure projects of bilateral significance and maritime energy trade projects. For hydrocarbon infrastructure, the region already has a number of existing and planned pipeline projects.³³ Meanwhile, a number of multi-country initiatives have focused on electricity and power grid integration (see figure 5.8).³⁴ These include the following:

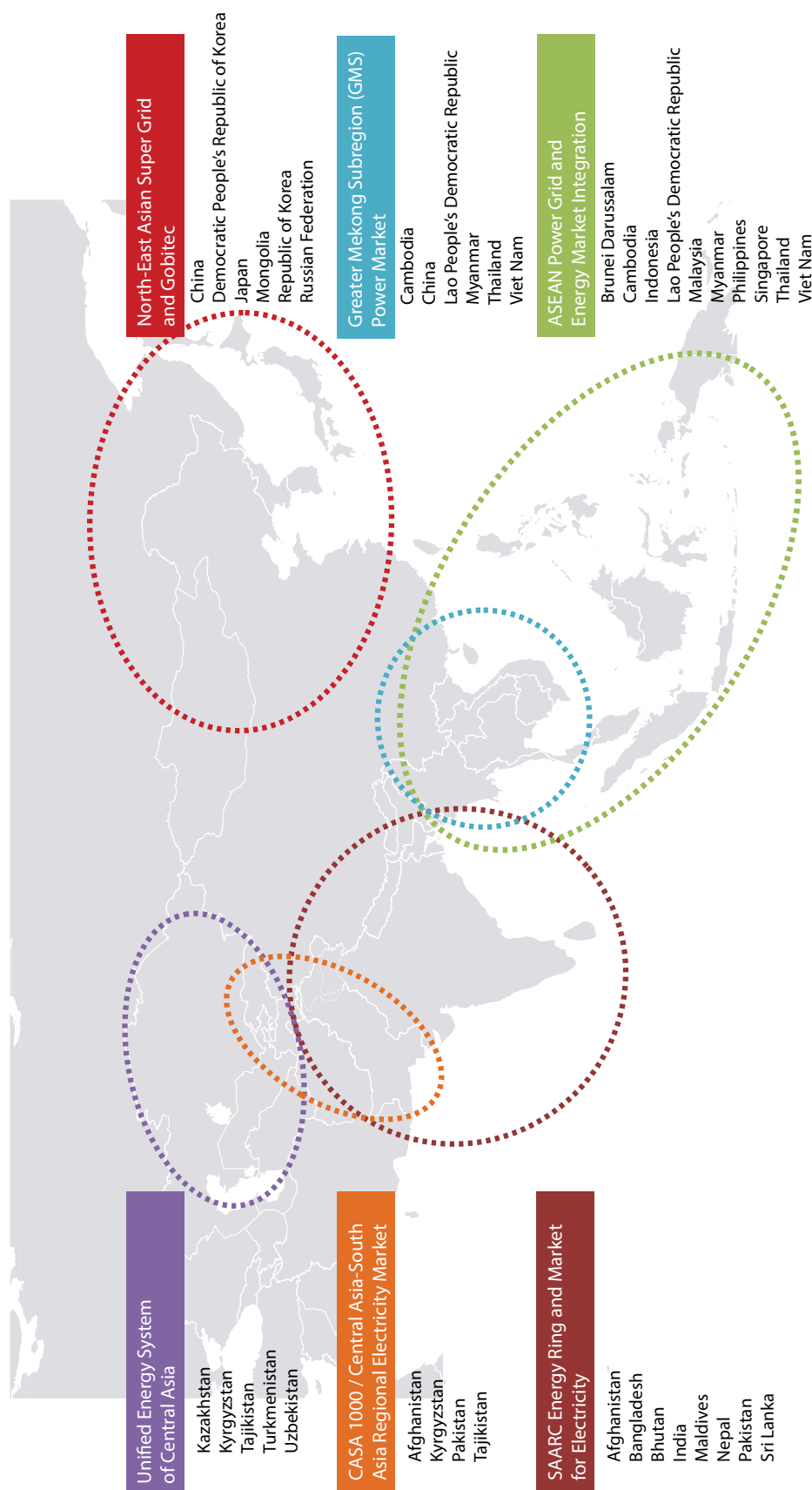
Figure 5.7. Energy self-sufficiency indices for selected ESCAP member States and associate members, as projected for 2035



Source: Adapted from ADB (2013) *Asian Development Outlook 2013: Asia's Energy Challenge*.

Note: The self-sufficiency index (a score of 1.0 equating to self-sufficiency) incorporates projected renewable resources availability with the projected net balance of conventional fuels using forecasted depletion rates.

Figure 5.8. Subregional initiatives on power grids and markets projected for 2035



Source: Adapted from ESCAP *Statistical Perspectives: Focus Areas for Realizing Enhanced Energy Security* (2013). Available from www.unescap.org/resources/statistical-perspectives-focus-areas-realizing-enhanced-energy-security.

- *ASEAN Power Grid* – An intergovernmental programme that has been optimizing energy trading opportunities within the region since the 1990s. Identified power interconnections are at various stages of progression.
- *CASA-1000* – This flagship project for the Central Asia-South Asia Regional Electricity Market will use surplus hydropower from Kyrgyzstan and Tajikistan to meet power deficits in Afghanistan and Pakistan.
- *Greater Mekong Subregion Power Market* – This programme has identified opportunities for an integrated regional electricity market to align available supplies with demand requirements.
- *SAARC Market for Electricity* – This is a main component of the South Asian Association for Regional Cooperation (SAARC) Energy Ring, an intergovernmental programme to reduce power supply disruptions and delivery.
- *Gobitec and an Asian super grid for renewable energies in North-East Asia* – In North-East Asia there are multiple initiatives to utilize super grids to align abundant renewable supplies in the Gobi desert with demand in East Asia (see also box 5.6).
- *Unified Energy System of Central Asia* – Built in the 1970s in the former Union of Soviet Socialist Republics, the Unified Energy System network is a synchronous grid extending across the Russian Federation and Central Asian countries.

Countries in the region are using these initiatives to address energy supply imbalances and to improve the reliability of electricity distribution. However, most are based on unilateral or bilateral trading arrangements. Countries have yet to realize the economies of scale that would come from linking these subregional initiatives through a regional energy cooperation framework.

Towards an Asian Energy Highway

The region's energy security could be enhanced by promoting cooperation between the region's energy importers and energy exporters – by harmonizing policies and by exchanging knowledge, particularly

in the areas of energy efficiency and renewable energy technologies. This would not only lead to better physical connectivity between countries but also promote institutional cooperation, including the development of financial energy markets.

A regional energy arrangement could also explore low-carbon paths that place more emphasis on efficiency and take greater advantage of renewable resources. In addition, it could develop deep, liquid and transparent markets for crude oil, petroleum products and gas – while giving a higher priority to pipeline security and safety.

*The region's energy security
could be enhanced by promoting
energy cooperation like
the Asian Energy Highway*

To move in this direction, in 2012 ESCAP member States accepted the concept of an integrated regional power grid, which could be termed the “Asian Energy Highway.”³⁵ The highway would involve an integrated electricity grid based on a range of primary energy sources, whether fossil fuels, nuclear sources or renewables. The following encouraging developments are making such an integrated grid more feasible:

- Several mutually beneficial power-trading arrangements are progressing at various levels of subregional integration.
- High-voltage transmission systems, in particular high-voltage direct current (HVDC) systems, are improving the economic range for interconnecting power grids and unlocking access to remote energy resources. HVDC transmission systems are becoming cost competitive with more conventional modes of energy resource transportation – by rail, road and pipelines.
- “Smart grid” communication and management technologies are providing opportunities for improved load balancing and enabling greater optimization of energy flows. These are also more capable of absorbing intermittent renewable energy resources, such as solar and wind.

An Asian Energy Highway would not only connect physical infrastructures but also involve integrated market mechanisms to dynamically and efficiently move power more sustainably and reliably across the region, as well as optimize the allocation between supply and demand centres. Such a regionally integrated market would enhance energy security since greater diversification of national energy supplies would reduce exposure to potentially volatile markets.

An Asian Energy Highway would also provide a platform for energy pooling and spot-market pricing. In a competitive environment, a transparent purchasing framework would limit the exposure of deficit countries to distorted pricing, and thus help to reduce the potential for geopolitical conflict.

From the perspective of sustainable energy production and use, an integrated grid would increase the opportunities for balancing peak loads in previously isolated systems using larger transmission grids across different time zones – with opportunities for reducing net energy investment. Furthermore, a regional grid would boost the opportunities for using energy from renewable resources generated at specific sites – such as geothermal, solar or wind sources – which could then be made available to a wider population.³⁶ This in turn would boost investor confidence in developing large-scale renewable energy projects in more remote areas far from centres of demand, which is the main driver behind Gobitec and the proposed Asian super grid for renewable energies in North-East Asia (see box 5.6).

Box 5.6. Gobitec and the Asian Super Grid

Gobitec refers to the proposal to produce energy in the Gobi desert. In Mongolia alone, wind and solar energy from the Gobi desert could produce about 2,600 GW – more than 7 times the amount of electricity generated globally from nuclear power. This energy could be transmitted through a proposed Asian super grid for renewable energies in North East Asia. By utilizing high-voltage direct current and smart grid technologies, it would form the backbone of the overall North-East Asian power grid and could thus transmit energy from the Gobi desert to electricity demand centres in North-East Asia, including China, Japan and the Republic of Korea.

To realize the Gobitec and Asian super grid concept, investments are needed for the full range of generation, transmission and distribution systems. A study conducted by a group of partners has estimated the total costs for solar and wind projects totalling 100 GW, over the period 2015-2030, at \$293 billion, with yearly maintenance costs of \$7.3 billion. The estimated benefits include 880,000 new jobs in Mongolia and 560,000 new jobs outside Mongolia. In addition, there would be \$17 billion per year in economic benefits from the cost advantages of electricity production – and a reduction in carbon dioxide emissions of 187 Gt per year.

Currently, there is no clear lead institution or intergovernmental framework for this promising concept. However, there is a strong foundation of partners that could work together with a common vision and bring in more key stakeholders. In addition to ESCAP, currently active stakeholders include:

- *Intergovernmental organizations* – Energy Charter Secretariat, International Renewable Energy Agency.
- *Civil society organizations, especially research institutions* – China Renewable Energy Society, DESERTEC Foundation (Grenatec also affiliate), Energy Systems Institute (Russian Federation), Japan Council for Renewable Energy, Japan Renewable Energy Foundation, Korea Energy Economics Institute (Republic of Korea) Korea Photovoltaic Society (Republic of Korea), Mongolia Energy Development Association.
- *Private companies* – Newcom Group (Mongolia), SoftBank Corp (Japan).
- *Government* – Ministry of Energy (Mongolia).

Source: ESCAP Secretariat; Energy Charter secretariat and others, *Gobitec and Asian Super Grid for Renewable Energies in North-East Asia* (2014).

The need for a strong institutional framework

An Asian Energy Highway is now more technically feasible as a result of advances in energy generation and transmission technologies.³⁷ However, its success will depend upon institutional and technical harmonization among electricity industries. One concern is that member States may wish to maintain energy independence. Therefore, it would be important to overcome such hesitations by developing an institutional framework for intergovernmental cooperation in a progressive manner.

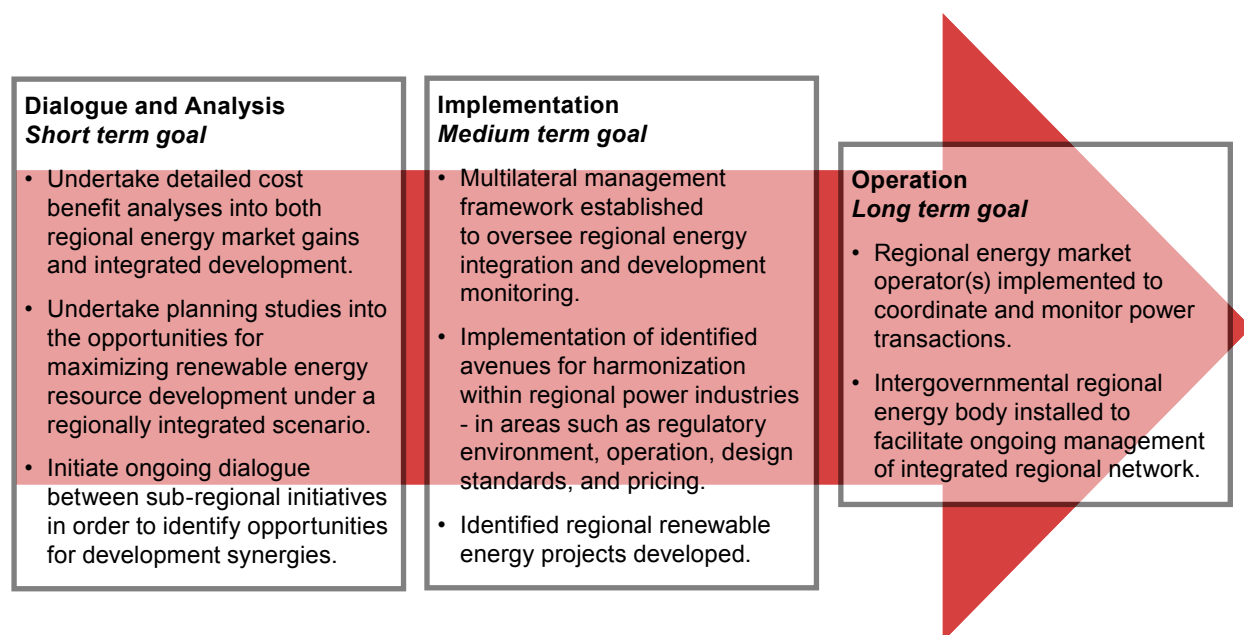
Furthermore, the most immediate benefits of regional energy connectivity are likely to be captured by those industries that have greater access to stable and inexpensive electricity. It is therefore necessary to ensure that the benefits from enhanced energy connectivity are equally shared. Participating countries should agree from the outset on mechanisms to levy user charges on the grid, with the possibility of ring-fencing some revenues to finance community development, particularly rural electrification projects. For example, the CASA-1000 project, which is aimed at building the Central Asia-South Asia

Regional Electricity Market by exporting power from Kyrgyzstan and Tajikistan to Afghanistan and Pakistan, incorporates benefit-sharing by imposing a surcharge on energy generation to finance priority development projects identified by local communities along the route of the transmission line.

There are also concerns about capacity. National and subregional capacities are limited and there are incompatibilities between countries. A number of countries have weak systems for national power generation and management and face chronic power shortages. If existing national power generation and distribution systems are chronically loss-making with unrealistically low tariffs, there is little prospect for participating in regional schemes.

For these reasons, the vision of a regional energy network should be tempered with realism. The pragmatic solution is to consider this not as a regional super-infrastructure proposal but rather as an ongoing and phased process of capacity-building and development. The Asian Energy Highway may thus be achieved through a twin-track approach of supporting reforms at the national level, in conjunction with improvements in regional power connectivity (see figure 5.9).

Figure 5.9. Road map for an Asian Energy Highway



Nevertheless, it is important to ensure that near-term investments are compatible with a longer-term agenda of integration. Countries can reduce development costs and improve environmental performance by identifying at an early stage the opportunities for harmonization – in areas such as the regulatory environment, operation and design standards, energy pricing and ultimately development planning.

PEOPLE-TO-PEOPLE CONNECTIVITY

Increasing mobility in the ESCAP region

One of the most evident signs of connectivity in the ESCAP region is the movement of people across national borders. Whether it be for work, study, business or other purposes, international migration is an issue of concern for both countries of origin and countries of destination because it involves people's lives and welfare. In many countries in the ESCAP region, migrants are not officially recognized. Existing national governance structures do not have well-defined spaces that delineate the relationship between government responsibilities and the rights and obligations of public citizenship.

*International labour migration
brings many benefits
but also new risks*

However, with increasing regional connectivity, it can be expected that the movement of people across national borders will increase. Furthermore, the region is undergoing a dramatic demographic transition, with some countries ageing so rapidly that their populations are expected to shrink, while others have a large youth population concentrated in prime employment ages.

Given that inclusive and sustainable human development is ultimately about widening people's capabilities and opportunities, increased and better-managed international migration is an opportunity for the people of the ESCAP region to take advantage

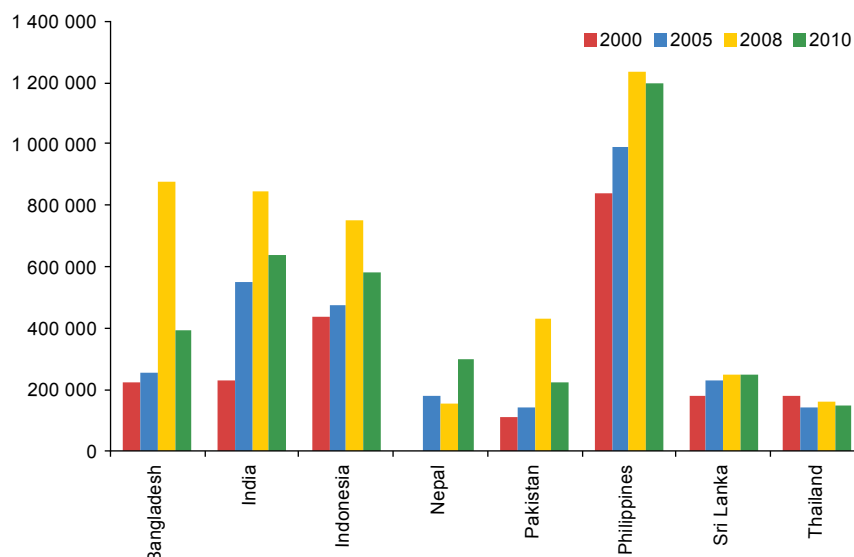
of the region's economic growth and to enhance their skills, training and knowledge. In this regard, it is necessary to consider a broad range of policy options for facilitating the movement of people, while also minimizing the potential negative impacts. Some frameworks for facilitating and managing the flow of people already exist. For example, under the ASEAN people-to-people connectivity framework, member States are planning ways to enhance tourism, education and cultural exchanges.³⁸

Benefits and challenges of international labour migration

Increased regional mobility through managed, and sometimes temporary, labour migration can lead to shared prosperity in the region by addressing labour market needs, improving skills acquisition and serving as a risk mitigation strategy for households. A large part of the quantitative evidence on the benefits of shared prosperity that both countries of origin and countries of destination gain through migration is focused squarely on labour migration. This section therefore centres on international migration for the purpose of employment, as migration flows primarily driven by other factors may lie outside the scope of the present publication.

In Asia and the Pacific, international migration flows in recent years have predominately comprised temporary labour migrants. Figure 5.10 shows the number of temporary migrant workers deployed from the region's main countries of origin, namely Bangladesh, India, Indonesia, Nepal, Pakistan, the Philippines, Sri Lanka and Thailand. If maritime workers are included, the Philippines deployed 1.2 million migrant workers in 2010. India and Indonesia have regularly deployed more than half a million workers annually in recent years. Large proportions of these deployments are directed to countries of the Gulf Cooperation Council, Jordan and Lebanon. However, many countries in the region, such as Thailand, are simultaneously origin, destination and transit countries for migrants. The volume of temporary labour migration flows indicates that the recruitment and placement of Asian and Pacific migrant workers is a large industry in itself.

Figure 5.10. Migrant workers deployed from selected Asian countries (2000, 2005, 2008 and 2010)



Sources: Organisation for Economic Co-operation and Development, *International Migration Outlook 2012* (OECD, 2012), p. 169; and ESCAP Labour Migration Database (accessed 14 February 2014)

Note: 2008 data for Nepal and Thailand are from 2007; 2010 data for Nepal, the Philippines and Thailand are from 2009; 2000 data for Nepal are not available.

One of the principal benefits of labour migration for both households and the countries of origin is the flow of remittances. In 2013, India, China, the Philippines, Bangladesh, Pakistan and Viet Nam were in the world's top 10 remittance-receiving countries in value terms, with India ranking first. Meanwhile, as a proportion of GDP, 5 Asian and Pacific countries were among the world's top 10 remittance-receiving countries in 2012: Tajikistan (48% of GDP – the highest percentage in the world); Kyrgyzstan (31% of GDP); Nepal (25% of GDP); Armenia (21% of GDP); and Samoa (21% of GDP).³⁹

Remittances generate a number of benefits for the receiving households. Recent analysis confirms that, in several countries in the region, remittances from migrants are associated with better economic performance and a reduction in poverty.⁴⁰ For example, many Pacific island economies send workers to New Zealand through its Recognised Seasonal Employer programme.⁴¹ One study found that, over a two-year period from 2007, households with workers hired through the programme saw their per capita incomes increase by between 34%

and 38% in Tonga, and between 35% and 43% in Vanuatu. As a result, households were able to raise standards of living, accumulate more assets, and in Tonga, improve school attendance for older children.⁴²

A country's nationals who have worked overseas can contribute to development in their home country not only by sending remittances but also by investing in or using their expertise to establish businesses. Some countries have engaged their diaspora in community development projects. Experts working overseas can also contribute to their country through academic exchanges and consultancies.

However, migration can have negative impacts on sending countries. For example, countries can suffer from a "brain drain" if they lose workers whose skills would have been valuable at home. There is also the danger of "brain waste" if those skills and qualifications are not recognized by destination countries. Meanwhile, having one or both parents in a family migrate overseas clearly puts many pressures on the family and the roles of individuals

in it. High-quality research on these impacts is limited, however, and has yielded mixed results.⁴³

At the receiving end, destination countries generally benefit significantly from labour migration. At various points in time, high-income countries in the region, such as Australia, Brunei Darussalam, Japan, New Zealand, the Republic of Korea and Singapore, have filled gaps in their labour markets with migrant workers. Several studies document the key role of labour migration in GDP growth in Singapore, suggesting that this growth would not have been possible in the absence of migrants because employment growth outstripped the national labour supply.⁴⁴

*As migrant flows increase,
social protection for migrants
is becoming an urgent issue*

Middle-income countries have also seen an increasing demand for foreign workers. In Malaysia, Maldives and Thailand, for example, the construction, manufacturing, tourism and several other sectors depend heavily on foreign labour. In certain industries, increasing the supply of labour through the employment of migrant workers can also help to keep wages relatively low, thus maintaining a country's competitiveness.

The rapid growth of labour migration flows in the region has raised the issue of social protection, including access to health care and reproductive health services, and income security. Social protection schemes are often limited to the formal sector and the non-migrant population, while those workers who are covered by social protection schemes in their countries of origin may lose their entitlements once they take up residence in a new country. A particular challenge to women migrants is the lack of recognition of domestic work as an occupation. The recent extension of weekly rest to migrant domestic workers in Singapore and Thailand might be an indication of future efforts, stimulated by the Domestic Workers Convention, 2011 (No. 189), to improve legal protection.

Cooperative approaches to managing international labour migrant flows

ESCAP has identified migration as an “emerging opportunity for development,” but one that needs to be managed through both national action and multilateral dialogue and cooperation.⁴⁵ Given that migration entails both benefits and risks for countries of origin and countries of destination, the responsibility for managing migration lies with both parties.

There are currently several examples of bilateral agreements between source and destination countries. Malaysia, the Republic of Korea and Thailand, for example, have bilateral agreements with many migrant-origin countries in the region. These may be formal agreements, which set out each side's commitments and may provide for quotas, or they may be less formal agreements, such as memorandums of understanding, between countries of origin and countries of destination. Most destination countries prefer memorandums of understanding, probably because as non-binding agreements they are easier to negotiate and implement.

As the region's economies become more integrated, there will be pressure on Governments to develop a geographically broader framework for managing migration. Such frameworks can begin at the subregional level and be expanded. For example, ASEAN has adopted the ASEAN Economic Community Blueprint, which is aimed at allowing for managed mobility or facilitated entry for the movement of natural persons engaged in trade in goods, services, and investments. Its member States are pursuing this goal through the progressive relaxation of visa requirements and institutional harmonization of categories of workers, although to date mutual recognition agreements have been negotiated for only a few priority professions – accountants, architects, dentists, doctors, nurses, surveyors and those of the tourism industry.

Furthermore, there is an urgent need for regional cooperation to establish common standards to protect the rights of migrants, as well as to prevent the

trafficking of persons, which is increasingly taking place under the guise of consensual migration. At the global level, the principal instrument is the International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families.⁴⁶ That convention, which entered into force in 2003, establishes minimum standards that States parties should apply to migrant workers and members of their families, irrespective of their migratory status. To date, however, the convention has been ratified by only eight countries in the ESCAP region (Azerbaijan, Bangladesh, Indonesia, Kyrgyzstan, the Philippines, Sri Lanka, Tajikistan and Turkey), while Armenia, Cambodia and Palau have signed but not yet ratified it.

There is a growing trend towards regional and subregional efforts to formalize the rights of migrant workers. For example, in 2007 ASEAN member States adopted the ASEAN Socio-Cultural Blueprint, which proposes several detailed actions towards the protection and promotion of the rights of migrant workers.⁴⁷ Additionally, in 2009 ASEAN established the ASEAN Intergovernmental Commission on Human Rights, which includes as one of its mandates the protection of human rights of migrant workers.⁴⁸ Meanwhile, to discuss coherent approaches to migration management, SAARC member States established the South Asia Migration Commission, involving civil society, academics, government officials, policy institutes, non-governmental organizations and human rights organizations.

Strengthening knowledge networks of people and institutions

As noted in the previous chapter, there is growing interest among countries in the region to transition towards knowledge-based economies. It has previously been shown in ESCAP studies that the countries with the highest sustained growth are those that have managed to diversify their exports. While producing a broad spectrum of goods, they have also entered exclusive production segments in which few others produce or export, typically in knowledge-based sectors.⁴⁹

Achieving this transition required increased global and regional connectivity, and with it the smoother flow of knowledge and people. Successful innovation needs skilled workers who are familiar with both local cultural characteristics and international business practices and who are well connected through real-time communications and access to information.

Promoting student and academic exchanges can strengthen regional knowledge networks

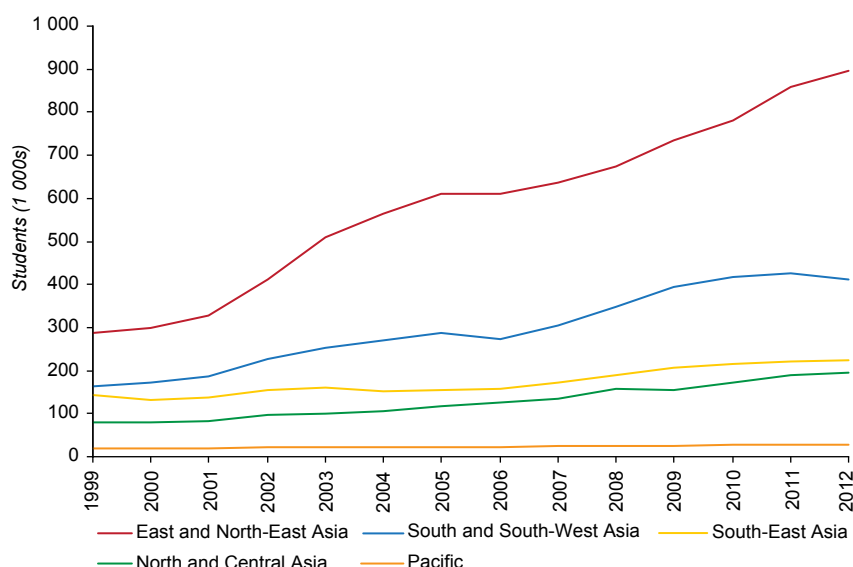
With education becoming more and more globalized, an increasing number of students are seeking tertiary education abroad. Many are going to countries in the Asian and Pacific region, which is home to numerous leading research institutions and universities. In 2012, Australia was the fourth largest host for international students globally, with 6% of mobile students, the Russian Federation was sixth with 4%, Japan seventh also with 4% and China ninth with 2%.⁵⁰

Moreover, the region is a major source of students. As can be seen in figure 5.11, the region's number of outbound international students has been steadily increasing over the last 15 years, and it is currently the source of approximately 50% of internationally mobile students. This has been mostly due to the rapid rise of students from China: with almost 700,000 students going abroad, China supplies more internationally mobile students than the next 7 countries combined.⁵¹

Tertiary education offers significant opportunities for cross-border linkages, knowledge generation and knowledge-sharing. The ESCAP region has numerous associations and organizations that promote such linkages, including the Asia-Pacific Association for International Education, the Association of Pacific Rim Universities and the South Asia Foundation.

ESCAP also actively promotes regional research networks. It contributed to the establishment of

Figure 5.11. Number of outbound internationally mobile students, 1999-2012



Source: UNESCO Institute of Statistics, data on international student mobility in tertiary education downloaded from UIS.stat on 1 April 2014. Available from <http://data.uis.unesco.org/>.

ARTNeT, the Asia-Pacific Research and Training Network on Trade, a network of leading trade research institutions and think tanks from the region that attempts to increase the quality and amount of relevant trade research and to share lessons on knowledge creation and knowledge management.⁵² Another recent initiative launched under the auspices of ESCAP's Centre for Alleviation of Poverty through Sustainable Agriculture is SATNET Asia, or the Network for Knowledge Transfer on Sustainable Agricultural Technologies and Improved Market Linkages in South and South-East Asia.⁵³ With members ranging from national and international research organizations, representatives of the private sector, agricultural foundations, farmers' organizations and non-governmental organizations, SATNET Asia facilitates the transfer of knowledge on sustainable agricultural practices and intraregional trade for the benefit of poor and marginalized farmers.

In addition, new doors are opening via the Internet for knowledge generation and sharing. This includes distance-learning courses, which have the advantage of scalability and can be accessed by those who previously had limited educational opportunities. The

Pacific subregion has demonstrated what can be achieved. The University of the South Pacific is widely regarded as a success story for delivering higher education through distance education (see box 5.7). In this regard, ICT connectivity is expected to expand the reach and effectiveness of the region's knowledge networks. Universities are increasingly regional in their operations and outlooks and are also important sources of innovation. Taking advantage of the Internet, these networks can contribute to "knowledge clusters" – networks of individuals in academia, the private sector and Governments, for project planning, joint research and the exchange of ideas. Knowledge clusters initially emerged in lower-cost countries with good availability of skills and expertise – serving a growing global demand for standardized, less firm-specific knowledge services, such as software development, engineering support and analytical services. The best-known examples include Bangalore in India and Shanghai in China.

More recently, high-tech industries have also benefited from knowledge clusters. Building on the "Silicon Valley" model, many are linked to renowned universities and research institutes. To encourage

Box 5.7. ICT connectivity enhances educational opportunities in the Pacific

The University of the South Pacific is a multi-country university with a membership of 12 Pacific island economies: Cook Islands, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Samoa, Solomon Islands, Tonga, Tokelau, Tuvalu and Vanuatu. In its early years, some courses were conducted via USPNet, a satellite communications network set up in 1973 as a means of distance education for students who could not study at the main campus in Suva.

In 2006, the Suva hub was upgraded to create an Internet Protocol platform. USPNet is now a stand-alone network with interactive video conferencing between all campuses. It provides an efficient means of delivering academic programmes through seminars, discussion groups, debates, lectures and tutorials. These forms of communication can be delivered simultaneously to students located in the network of campuses. The audio and video lectures are now loaded onto servers at the campuses and can be viewed by students at a time convenient to them. The availability of the Internet has made it possible to deliver online courses using course management software, which provides lecturers and tutors with online access and allows for the sending and receiving of assignments, and for participation in student discussion groups.

Thanks to continuous advances in ICT, the number of students enrolled in distance education increased from 90 students enrolled in 16 courses in 1976, to 5,400 students enrolled in 1996, to more than 10,000 students enrolled in over 200 courses in 2008. To reach an even larger number of students, the University is currently redesigning USPNet and introducing new mobile technologies to facilitate online learning.

Source: R. Duncan and J. McMaster, "The role of USPNet in capacity development in the South Pacific region", Capacity Development Series (Mandaluyong City, Philippines, Asian Development Bank, 2008). Available from http://lencd.com/data/docs/25-USPNet_web.pdf; also University of South Pacific, "2013 Annual Report", available from http://www.usp.ac.fj/fileadmin/scripts/AnnualReport/USPAnnualReport_2013/index.html#/Chapter_1

such clusters, many countries in the region have established science parks and are encouraging the development of networks of researchers and business people living in different countries, sometimes drawing on their diasporas abroad (see box 5.8). Firms in the science parks generally conduct more research and development than firms not located in such parks, perhaps because the close interaction with local universities enables firms to build on their knowledge.

In the future, there will likely be more cross-border collaboration between these types of knowledge clusters. Some countries in the region, including China, Japan, the Republic of Korea and the Russian Federation, are among the world's leaders in terms of expenditure on research and development as a share of GDP, while almost 40% of all researchers in the world are located in Asia and the Pacific.⁵⁴ With such a rich resource base, Governments, academic

institutions and the private sector can work together to develop knowledge industries. Countries in the region may gain from the experiences of Japan, Malaysia and the Republic of Korea, which have actively promoted this type of cooperation.

Strengthening business networks and associations

Business networks and associations constitute another important type of people-to-people network. Business networks and associations are usually composed of private enterprises within an industry or sector, or from various industries and sectors. While originally they were a means of bringing together domestic private enterprises, many international networks and associations have been established over the past few decades. Among the best known are the International Chamber of Commerce, the World Chambers Federation, the ASEAN Chambers

Box 5.8. The “global Argonauts” of Hsinchu, Taiwan Province of China

In the early 1960s, the GDP of Taiwan Province of China was similar to that of Zaire. Despite having a highly educated population, high-skill jobs were scarce, and the economy’s engineers were leaving to work abroad rather than at home. In particular, the number of Taiwanese people living in the United States grew rapidly, with many of them joining companies in Silicon Valley in the early years of the ICT revolution.

Helped by the expansion of the economy’s shipping sector, Taiwan Province of China got a foothold in the production networks of Japanese and United States electronics companies. This started as simple manufacturing activities, based on equipment specifications sent from overseas firms. However, as the traffic of engineers and business representatives between Silicon Valley and Taiwan Province of China built up, manufacturing companies moved into higher value added areas such as design.

This was supplemented by official policies, whereby the companies were supplied with lists of qualified Taiwanese people living in the United States; their flights to return home to the island economy were paid from official sources. These people, dubbed “the new Argonauts,” came with valuable connections and know-how. Their efforts were supplemented by creating institutions for technology transfer, venture capital and a fruitful environment for investment. The combination of these policies helped to create a vibrant cluster of technological innovation in Hsinchu, Taiwan Province of China, which later gave birth to highly successful high-tech companies, such as Acer Inc., and helped the economy to transition into a knowledge-based one.

Source: A. Saxenian, *The New Argonauts: Regional Advantage in a Global Economy* (Cambridge, Massachusetts, Harvard University Press, 2006).

of Commerce and Industry, the Confederation of Asia-Pacific Chambers of Commerce and Industry, and the SAARC Chamber of Commerce and Industry.

Such chambers advocate for and foster private sector development, as well as facilitate trade. The World Chambers Federation, for example, administers the ATA Carnet globally and also works with national chambers of commerce in issuing and attesting certificates of origin, which are required documents for international trade.⁵⁵ Meanwhile, the SAARC Chamber of Commerce and Industry has worked with the SAARC secretariat to promote trade facilitation.

In the context of regional connectivity, business associations and networks help businesses in less developed countries to connect to businesses in other countries. Within the transport and logistics sector there are, for example, the International Road Transport Union, the International Air Transport Association, the International Federation of Freight Forwarders Associations and the International Chamber of Shipping.

In every sector, these associations raise the level of professional standards. In particular, business associations support the development of small and medium-sized enterprises, which by some estimates account for nearly 50% of all value addition within Asia and the Pacific.⁵⁶ Networking among small and medium-sized enterprises in different countries helps them to identify common barriers to participation in regional and global production networks and markets.

Putting individuals at the heart of people-to-people connectivity

The various networks described above require different sets of policy responses, but ultimately they are all linked by the individuals within them. Within people-to-people connectivity there are therefore areas of similar or overlapping concern, where stakeholders can cooperate with each other and with other interested parties to discuss and design appropriate policies.

With regard to international labour migration, a comprehensive regional framework for managing

labour migration for shared prosperity should include: protecting and promoting the rights of all migrants; more legal channels for labour migration; increased skills-recognition schemes; and further regional norm-setting and cooperation on managing migration. At the same time, regional approaches are not a substitute for structural reforms at the national level, or for the ratification of international conventions and instruments to protect the rights of migrants. Countries of origin can protect their workers by regulating recruitment agencies, ensuring that skills are properly assessed, requiring standard contracts, setting minimum wages and deploying more labour attachés abroad. Host countries can also provide migrant workers with greater protection through, inter alia, in-country orientation programmes and more effective labour inspection and by allowing greater flexibility in access to the labour market.

Meanwhile, Governments should support the efforts of the region's universities and research institutions to build new knowledge networks and to promote student exchange programmes. For example, the Network of East Asian Think-tanks Working Group on Enhancing People to People Connectivity – Education, Tourism and Cultural Exchange recommends the systematization of regional quality assurance and credit transfer systems of higher education in ASEAN Plus Three.⁵⁷ Another interesting proposal is the establishment of transnational collaborative higher education and research institutions, such as the ASEAN Cyber University, initiated by the Ministry of Education of the Republic of Korea in 2009, which links universities in Cambodia, Lao People's Democratic Republic, Myanmar and Viet Nam with students in the region through a virtual learning platform.⁵⁸

The future direction of people-to-people connectivity in the ESCAP region will also depend on better information about actual movements of people. At the national level, there is an urgent need for better data and analysis to underpin coherent policies, for example on the numbers of students studying abroad and the impact of labour migration on the development of countries of origin and countries of destination. International organizations, subregional

organizations, business associations and academic networks also need to share information and discuss optimum approaches to promoting the mobility of people while mitigating negative effects, including human trafficking. In this regard, ICT connectivity, with its potential to link networks of different stakeholders, presents tremendous opportunities for strengthening people-to-people connectivity.

Endnotes

- ¹ For a survey of the literature evaluating impacts of infrastructure development, see A. Estache, "A survey of impact evaluation of infrastructure projects, programs and policies", ECORE Discussion Paper No. 2010/16 (Brussels, ECORE, 2010). Available from www.ecore.be/DPs/dp_1270557731.pdf.
- ² Asian Development Bank, *Asian Economic Integration Monitor July 2012*. (Mandaluyong City, Philippines, ADB, 2012). Available from http://aric.adb.org/pdf/aeim/AEIM_2012July_FullReport.pdf.
- ³ United Nations Economic and Social Commission for Asia and the Pacific, *Review of Developments in Transport in Asia and the Pacific*. ST/ESCAP/2627.
- ⁴ The Asian Development Bank Institute has developed a computable general equilibrium model to simulate the quantitative gains to countries from investing in regional transport infrastructure. Available from www.adbi.org/files/2010.06.30.wp223.regional.infrastructure.investment.asia.pdf.
- ⁵ United Nations Economic and Social Commission for Asia and the Pacific, *The Regional Action Programme for Transport Development in Asia and the Pacific, Phase II (2012-2016)*, Ministerial Declaration on Transport Development in Asia and the Pacific (Bangkok, 12-16 March 2012). Available from www.unescap.org/sites/default/files/Booklet_B_RAP2012-2016.pdf.
- ⁶ UNNExT is a regional community of experts that conduct research and provide support on paperless trade and the single window. For further information, see www.unescap.org/tid/unnext/default.asp.
- ⁷ A "missing link" is (a) the absence of physical linkages between the railway networks of neighbouring countries or (b) the absence of continuous railway infrastructure within one country, often due, in this latter case, to local geography, for example Lake Van in eastern Turkey. Such missing links between networks of neighbouring

- countries arise because the link was never there in the first place or because they ceased to exist due to political events. For an update on the status of missing links in the trans Asian railway network, see chapter 1 of United Nations Economic and Social Commission for Asia and the Pacific, *Review of Developments in Transport in Asia and the Pacific*. ST/ESCAP/2627.
- ⁸ The road classes under the Asian Highway classification and design standards define class III as the minimum desired standard, being a narrow two-lane road with double bituminous surface treatment. For full specifications, see annex III of the Intergovernmental Agreement on the Asian Highway Network (United Nations, *Treaty Series*, vol. 2323, No. 41607). Available from https://treaties.un.org/doc/source/RecentTexts/XI_B_34_E.pdf.
- ⁹ According to ESCAP estimates and country reports: upgrading 12,000 km of roads from below class III to class III standards would require \$3.5 billion; strengthening the pavement of 31,500 km of class III roads to asphalt concrete (class II) without widening and geometrical improvements would require \$7 billion; and upgrading 45,500 km (excluding roads in mountainous and hilly terrain) of class II roads to four lanes (class I) would require \$25.5 billion.
- ¹⁰ International Union of Railways and Community of European Railway and Infrastructure Companies, *Rail Transport and Environment: Facts and Figures* (Paris and Brussels, UIC and CER, 2008). Available from www.uic.org/homepage/railways&environment_facts&figures.pdf.
- ¹¹ According to the Intergovernmental Agreement on Dry Ports, “a dry port of international importance (‘dry port’) shall refer to an inland location as a logistics centre connected to one or more modes of transport for the handling, storage and regulatory inspection of goods moving in international trade and the execution of applicable customs control and formalities”. It may be distinguished from an inland container depot (ICD) in that it can accommodate all types of cargo, whereas an ICD specializes in the handling of containers and containerized cargo.
- ¹² J. Woxenius, V. Roso and K. Lumsden, “The dry port concept: connecting seaports with their hinterland by rail”, ICLSP Conference Proceedings, Dalian, China (Goteborg, Sweden, Department of Transportation and Logistics, Chalmers University of Technology, 2004), pp. 305-319. Available from www.pol.gu.se/digitalAssets/1344/1344857_2004_iclsp_dalian_woxros-lum.pdf.
- ¹³ ESCAP, together with its member States, worked for several years on the development of the Intergovernmental Agreement on Dry Ports. Under this agreement, countries nominated important nodal points between the Asian Highway and Trans-Asian Railway networks to develop into dry ports.
- ¹⁴ NEA Transport Research Institute and International Road Transport Union, *New Eurasian Land Transport Initiative: Final Report – Analysis of Monitoring Data Collected on NELTI Project Routes in 2008-2009* (2009). Available from www.iru.org/cms-filesystem-action?file=events_2009_almaty/NELTI-report-EN.pdf.
- ¹⁵ The opening of the joint customs control was the result of the Agreement between the Government of the Republic of Kazakhstan and the Government of the Kyrgyz Republic on Joint Control at the Kyrgyz-Kazakhstan Borders, signed in 2006.
- ¹⁶ United Nations Economic and Social Commission for Asia and the Pacific, *Review of Developments in Transport in Asia and the Pacific*. ST/ESCAP/2627. Chapter 2.
- ¹⁷ See United Nations Centre for Trade Facilitation and Electronic Business, *Recommendation and Guidelines on Establishing a Single Window to Enhance the Efficient Exchange of Information between Trade and Government – Recommendation No. 33* (United Nations publication, Sales No. 05.II.E.9).
- ¹⁸ United Nations Economic and Social Commission for Asia and the Pacific and United Nations Economic Commission for Europe, *Single Window Planning and Implementation Guide*. ECE/TRADE/404.
- ¹⁹ The development of integrated systems was the focus of the joint United Nations Regional Commissions’ Global Trade Facilitation Forum, held in Bangkok on 18 and 19 November 2013. See <http://unnex.unescap.org/gtfc13.asp> for details.
- ²⁰ See www.paa.net/.
- ²¹ J.F. Arvis and others, *Connecting Landlocked Developing Countries to Markets: Trade Corridors in the 21st Century* (Washington, D.C., World Bank, 2011). Available from <https://openknowledge.worldbank.org/handle/10986/2286>.
- ²² China and Mongolia renewed their agreement on international road transport, together with its protocol, in June 2011, opening 36 transport routes through 13 border crossings; the agreement also introduced long-term multiple-entry permits for the carriage of goods, in

addition to short-term, single-entry permits. Meanwhile, China and Viet Nam amended their bilateral agreement on road transport in October 2011 and signed a new protocol for the implementation of the agreement in May 2012, allowing Chinese vehicles to travel to Hanoi and the seaport of Hai Phong in Viet Nam, and allowing Vietnamese vehicles access to important economic centres in China, such as Guangzhou, Shenzhen, Kunming and Nanning.

- ²³ United Nations Economic and Social Commission for Asia and the Pacific, "Creating the silk super-highway in Central Asia", Press Release, News Number G/73/2013, 29 November 2013. Available from www.unescap.org/news/creating-silk-super-highway-central-asia.
- ²⁴ ESCAP has proposed extending this corridor to other parts of South Asia beginning with Delhi-Kolkata-Dhaka. It has been argued that the Istanbul-Tehran-Islamabad – Delhi-Kolkata-Dhaka container trade corridor could become an important trade route for intraregional trade, as well as help to make the subregion a hub of East-West trade.
- ²⁵ Industry estimate; see for example the website of the United States of America, Office of Science and Technology Policy, which estimated that timing "broadband deployment activities to periods when streets are already under construction...can reduce network deployment costs along Federal roadways by up to 90 percent". Available from www.whitehouse.gov/blog/2013/09/16/accelerating-broadband-infrastructure-deployment-across-united-states.
- ²⁶ More than 1,000 households, representatives of Government, businesses, non-governmental organizations and youth were surveyed by the Pacific Institute of Public Policy. See S. O'Connor, A. Naemon and B. Sijapati-Basnett, *Net Effects: Social and Economic Impacts of Telecommunications and Internet in Vanuatu – Research Findings Report 2011-2012* (Port Vila, Pacific Institute of Public Policy, 2012). Available from www.pacificpolicy.org/wp-content/uploads/2012/05/PIPP-Net-Effects-2011-Vanuatu-Telecomms-report1.pdf.
- ²⁷ International Telecommunications Union, *Measuring the Information Society* 2013.
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- ³² International Energy Agency, *World Energy Outlook 2012* (Paris, OECD/IEA, 2012). Available from www.iea.org/publications/freepublications/publication/WEO2012_free.pdf.
- ³³ These include the East Siberia-Pacific Ocean oil pipeline, the Central Asia-China gas pipeline, the Turkmenistan-Afghanistan-Pakistan-India pipeline, the Islamic Republic of Iran-Pakistan-India pipeline and the Trans-ASEAN gas pipeline. There are also such projects as the Bangladesh-India/India-Bangladesh pipeline; the Indonesia-Philippines gas pipeline trade; Myanmar-India, Myanmar-Bangladesh, Myanmar-China pipeline gas; and the Malaysia-Thailand pipeline gas trade. In addition, there are opportunities for the maritime trading of liquefied natural gas. These include Malaysia to Bangladesh, India and China; Brunei Darussalam to China, India and Hong Kong, China; and maritime liquefied natural gas supplies of Pacific island countries.
- ³⁴ Further examples of subregional energy cooperation initiatives can be found in United Nations Economic and Social Commission for Asia and the Pacific, *Growing Together: Economic Integration for an Inclusive and Sustainable Asia-Pacific Century*. ST/ESCAP/2629.
- ³⁵ In Commission resolution 68/11 on connectivity for energy security, the Executive Secretary was requested to "identify options, in consultation with member States, that member States may choose on regional energy connectivity, including an intergovernmental framework that could be developed for an integrated regional power grid, which could be termed as the "Asian Energy Highway", to analyse the socioeconomic and environmental benefits of each option as well as the challenges and opportunities towards the realization of each option". See United Nations Economic and Social Commission for Asia and the Pacific, *Official Records of the Economic and Social Council, Supplement No. 19* (E/2012/39-E/ESCAP/68/24).
- ³⁶ World Energy Council, *Regional Energy Integration in Africa* (London, World Energy Council, 2005). Available from www.worldenergy.org/documents/integrationii.pdf.

- ³⁷ Most notably, related to the high-voltage direct current transmission, such as: (a) improvements in their efficient ranges; (b) reduced footprint through reduced right-of-way requirements; (c) opportunities to interconnect grids by either land or sea (using cables); (d) the development of hybrid high-voltage direct current breakers that can respond to power interruptions and emergency situations, also providing an increased opportunity for network augmentation; (e) opportunity for asynchronous interconnections; and (f) developments in smart grid technology (with high capacity converter feeder transformers) that enhance opportunities for improvements in the geographical scale of grid interconnectivity, including improved renewable energy management through load smoothing. United Nations Economic and Social Commission for Asia and the Pacific, "Meeting report: Expert Group Meeting on Conceptualizing the Asian Energy Highway, 3-5 September 2013, Urumqi, China". Available from www.unescap.org/sites/default/files/EGM-AEH-meeting-report_0.pdf.
- ³⁸ Association of Southeast Asian Nations, *Master Plan on ASEAN Connectivity*. (Jakarta, Indonesia, 2010) Available from www.asean.org/archive/documents/MPAC.pdf.
- ³⁹ World Bank, *Migration and Remittance Flows: Recent Trends and Outlook, 2013-2016*. Migration and Development Brief No. 21. (Washington D.C., 2013). These data refer to remittances sent through official channels. However, there are also large flows of remittances sent through informal channels. Money can be sent through informal carriers, or carried by travelling friends or the migrants themselves. For instance, 44% of respondents in Afghanistan, Bangladesh, India, Indonesia, Pakistan and Sri Lanka who reported sending international remittances did so through informal channels, while 15% of those respondents receiving international remittances did so through informal channels. See J. Kendall and others, *Remittances, Payments, and Money Transfers: Behaviors of South Asians and Indonesians* (Gallup Inc., 2013). Available from www.gallup.com/file/poll/161675/Remittances%20Payments%20and%20Money%20Transfers%20Behaviors%20of%20South%20Asians%20and%20Indonesians.pdf.
- ⁴⁰ K. Imai and others, "Remittances, growth and poverty: new evidence from Asian countries", Occasional Paper No. 15 (Rome, International Fund for Agricultural Development, 2012). Available from www.ifad.org/operations/projects/regions/pi/paper/15.pdf.
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- ⁴³ B. Yeoh and T. Lam, "The costs of (im)mobility: children left behind and children who migrate with a parent", in *Perspectives on Gender and Migration* (Bangkok, ESCAP, 2007).
- ⁴⁴ For an overview of such studies, see M. Rahman, "Foreign manpower in Singapore: classes, policies and management", Asia Research Institute Working Paper No. 57 (Singapore, Asia Research Institute, 2006). Available from www.ari.nus.edu.sg/showfile.asp?pubid=509&type=2.
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⁵¹ Ibid.

⁵² More information on ARTNeT is available from <http://artnet.unescap.org>.

⁵³ More information on SATNET Asia is available from www.uncapsa.org/theme2.asp.

⁵⁴ United Nations Economic and Social Commission for Asia and the Pacific, *Statistical Yearbook for Asia and the Pacific 2013*. (United Nations Publication, Sales No. E.13.II.F.1.)

⁵⁵ ATA Carnet is an international customs document that permits the duty- and tax-free temporary import of goods for up to one year, which is useful for commercial samples, professional equipment, and goods for use at trade fairs, shows and exhibitions. In the ESCAP region, China; Hong Kong, China; India; the Islamic Republic of Iran; Japan; Macao, China; Malaysia; Mongolia; Pakistan; the Republic of Korea; the Russian Federation; Singapore; Sri Lanka; Thailand; and Turkey accept and use ATA Carnets.

⁵⁶ United Nations Economic and Social Commission for Asia and the Pacific, *Policy Guidebook for SME Development in Asia and the Pacific*, (United Nations publication, Sales No. E.12.II.F.2).

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