Sustainable Development Goal 9

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

9.1 Safe and sustainable transport infrastructure

9.2 Research and science, technology and innovation

9.3 Access to information and communications technology

9.4 Data and monitoring issues

Sustainable Development Goal 9 is focused on building resilient infrastructure, sustainable industrialization and fostering innovation. As such, the targets in place to monitor the progress made in these areas cover the following: resilient and upgraded infrastructure; inclusive and sustainable industrialization; financial support for small-scale enterprises; enhanced scientific research; development of domestic technology; and increased access to information and communications technology.

Three areas will be highlighted in the present analysis. First issues concerning reliable infrastructure with respect to the movement of passengers and freight will be discussed, with a focus on port container traffic and passenger movement by air. Next, issues pertaining to progress in research will be addressed by examining changes in countries’ expenditure with respect to GDP and the number of researchers per capita over time in the region. Finally, progress made in areas of communications will be examined, including trends in access to mobile-cellular telephone subscriptions and fixed broadband subscriptions.

9.1 Safe and sustainable transport infrastructure

Efficient, reliable and safe transport infrastructure and services are crucial to regional integration and the sustainable and inclusive economic and social development of countries. Asia and the Pacific has continued to see improvements in transport infrastructure and services against a backdrop of substantial growth in output, trade and investment experienced by many countries in the region. On the other hand, the improvements have been quite uneven both across and within countries. Long-term commitment is required to address critical issues in the transport sector to support sustained economic growth, improve the living standards of the people and further increase the competitiveness of economies in the region. At the same time, political commitment and effective interventions are required to improve road safety and the energy efficiency of the transport sector.

The Asian and Pacific region continues to account for the major share of global port container traffic, with that share being more than 57 per cent in 2012

The Asia-Pacific region in 2012 accounted for approximately 57 per cent of the global share of “port container traffic”, a term referring to measurement of the flow of containers from land-to-sea transport and vice-versa, calculated in twenty-foot equivalent units (TEU). The share of that traffic coming to the Asia-Pacific region has been gradually rising since 2000 when the region’s share was 48 per cent of the global total. The volume of port container traffic in China,
with its share being more than 45 per cent of the total regional volume, has contributed significantly to the region’s increase. Since 2000, China’s port container traffic has increased by 11.7 per cent per annum, growing from 41 million TEU in 2000 to 155 million in 2012. (Fig 1)

The contribution of port container traffic to GDP, measured in TEU per $1 million of GDP, has been in decline in the Asia-Pacific region since 2007, dropping from 17.0 TEU to 13.5 in 2012. However, the figure is still much higher than those for Europe (5.3 TEU) and North America (2.7 TEU). The South-East Asian subregion has the highest figure in Asia and the Pacific at 35.1 TEU per $1 million of GDP, whereas the North and Central Asian subregion has the smallest figure at 2.1 TEU.

A total of 1.26 billion passengers flew with airlines registered in Asia and the Pacific in 2014, an annual increase of 8.6 per cent a year since 2010

Passengers flying both domestically and internationally with airlines registered in the Asian and Pacific region have been steadily increasing in number, growing from 902 million air passengers in 2010 to just under 1.26 billion in 2014.

The subregion with registered airlines carrying the most passengers is East and North-East Asia, which accounted for 48 per cent of the region’s total in 2014. All subregions in Asia and the Pacific have experienced solid growth of between 8 and 12 per cent per annum in their air transport passenger numbers, with the exception being the Pacific subregion, which still grew, but by a modest per cent.

Not all countries have experienced growth in the number of airline passengers, with Turkmenistan, Tajikistan and Nepal showing the largest annual drops in the number of passengers, that is, by 34, 16 and 13 per cent respectively. Cambodia, the Democratic People’s Republic of Korea and the Lao People’s Democratic Republic had the largest percentage increase in airline passengers, with increases of 41, 34 and 31 per cent respectively. (Fig 2)
9.2 Research and science, technology and innovation

The critical role of science, technology and innovation (STI) in efforts to achieve sustainable and inclusive development was confirmed globally in the outcome document of the 2012 United Nations Conference on Sustainable Development, entitled “The future we want.” STI is also one of the cross-cutting issues relevant to many of the goals and targets contained in the 2030 Agenda for Sustainable Development, covering all three dimensions – economic, social and environmental – of sustainable development. Within the concept of STI, importance is placed not only on developing and utilizing new technologies, but also on learning to use existing technologies, enhancing local absorption capacity and transferring knowledge to meet the needs of cross sections of society.

In the Asian and Pacific region, countries such as China, Japan and the Republic of Korea have developed substantial levels of STI competence and capabilities, which are driving their national development. However, most developing countries are at various stages of acquiring STI competence and capabilities, while least developed countries and Pacific island developing States have yet to put in place STI infrastructure and develop suitable policies to harness the potential benefits of STI. This situation can be gauged from the 2015 Global Innovation Index, which shows that only 6 Asia-Pacific countries are among the top 20 countries. (Box 1)

Economies in Asia and the Pacific have actively invested in research and development over the past decade. In 2013, in high income economies, 2.3 per cent of GDP was spent on such activity, compared with only 0.3 per cent in low income economies (Fig 3). Growth in expenditure on research and development across groups at all income levels is significant (Fig 4). In low, lower-middle and upper-middle economies, annual growth in expenditure on research and development was between 7.8 and 12.9 per cent from 1999 to 2013.

In Asia and the Pacific, China is leading in expenditure on research and development, spending $287 billion in 2013, 10 times more than the $28.7 billion spent in 1999. The next largest spender on research in the region was Japan with expenditure of $141 billion in 2013, an increase of one third over the $107 billion spent in 1999, a far smaller increase than that of China. Other countries in the region that invest significantly in research and development include the Republic of Korea ($65 billion in 2013), India ($43 billion in 2011) and the Russian Federation ($25 billion in 2013).
The high income economies of Asia and the Pacific have over 30 times more researchers per person than the low income economies

The number of researchers per million inhabitants is increasing throughout the Asia-Pacific region; the numbers increased the fastest in the upper middle-income economies at 7.7 per cent per year from 1999 to 2013 (Fig 5). The high income economies still had by far the highest proportion of researchers, that is, 3,814 researchers per million inhabitants in 2013 compared with upper middle-income

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Global Innovation Index

The Global Innovation Index 2015 covers 141 economies around the world (32 from Asia and the Pacific) and uses 79 indicators across a range of themes. The index presents a rich data set to identify and analyse global innovation trends.

The indicator model, which incorporates the 79 indicators, covers three main categories:

(a) Quantitative/objective/hard data (55 indicators);
(b) Composite indicators/index data (19 indicators);
(c) Survey/qualitative/subjective/soft data (5 indicators).

Of the 32 countries and areas in the Asia-Pacific region, Singapore ranked highest at seventh, although its ranking had dropped from third place in 2012. Other countries and areas in the region that ranked highly in the index in 2015 were Hong Kong, China (eleventh); the Republic of Korea (fourteenth); New Zealand (fifteenth); Australia (seventeenth); and Japan (nineteenth). At the other end of the scale, countries in the region that ranked poorly among the 141 countries analysed were Myanmar (138th), Nepal (135th) and Pakistan (131st).
9.3 Access to information and communications technology

Access to information and communications technology (ICT) continues to improve in most regions in the world. The ubiquity of mobile phones and affordable communications contributes to the empowerment of previously marginalized and poor people through an increase in people-to-people connectivity and facilitated exchange of knowledge. However, even though more people around the world are now online thanks to the rapid uptake in mobile-broadband technology, large disparities in terms of ICT access and use continue to exist in the Asia-Pacific region, with least developed countries still lagging far behind their developing neighbours in terms of access and use.

In Asia and the Pacific, there was just under one mobile-cellular phone subscription per person in 2014

In the Asia-Pacific region, the number of mobile-cellular subscriptions continued to increase, from 89.3 per 100 population in 2013 to 93.3 in 2014. This figure is a little below the global average of 95.8 (Fig 6). According to ITU estimates, the number of mobile-cellular subscriptions is almost equal to the number of people on Earth (7.0 billion in 2014). Of those with mobile subscriptions, nearly 60 per cent (4.1 billion) are situated in the Asia-Pacific region. As the market reaches saturation levels, however, the annual growth rate of mobile-cellular subscriptions in the region has slowed to single-digit rates. The annual growth rate in 2004 was 28.7 per cent, while in 2014, it was only 4.5 per cent.

Within the Asia-Pacific region, it is notable that countries in North and Central Asia continue to show the highest rates of mobile-cellular subscriptions (138.2 per 100 persons); South-East Asian countries follow closely (123.5 per 100 persons). In terms of growth rate, countries and territories in the Pacific subregion showed the strongest annual growth rate at 17.9 per cent in 2014. (Fig 7)
In 2014, despite recent progress there were only 8.7 fixed broadband subscriptions per 100 people in Asia and the Pacific, which is below the global average of 10.4.

The number of fixed broadband subscriptions in the Asia-Pacific region increased from 0.4 per 100 people in 2001 to 8.7 in 2014. Despite the steady growth in the subscription rate, the Asia-Pacific region still lags behind the global average of 10.4 per 100 people in 2014. Within the region, subscriptions in countries and territories in the Pacific subregion remained highest at 19.8 per 100 people (largely influenced by Australia and New Zealand) in 2014, with East and North-East Asia having the second highest subscription rate at 16.7 per 100 people. South and South-West Asian countries had the lowest rate at 2.0 per 100 people. In terms of annual growth rate, subscriptions in the Asia-Pacific region grew by 6.1 per cent in 2014, higher than the global average of 4.3 per cent. (Fig 8)

The uptake of mobile broadband is increasing at a dynamic pace in the Asia-Pacific region; subscriptions increased from 4.6 per 100 people in 2009 to 30.5 in 2014. The subscription rate in Asian and Pacific high income economies is as high as 97.1 per 100 people compared with low income economies in the region, for which the subscription rate is 10.8 per 100 people. (Fig 9)

Since fixed broadband offers many more development-enhancing applications than a mobile-cellular subscription and can therefore have far-reaching potential for contributing to the achievement of national development goals, it would be desirable to take measures to increase the uptake of and access to fixed broadband, including addressing existent inadequacies in ICT infrastructure.

9.4 Data and monitoring issues

Huge data gaps on transport infrastructure, innovation and research

Data on “port container traffic”, measured in TEU and per $1 million of GDP, are not available for more than half the countries in the Asia-Pacific region. For those countries where such data do exist, the data are available only for the period up to 2012. In the Pacific subregion, only 6 of 21 countries and territories had such data available; in North and Central Asia, 2 of the 9 countries in that subregion had relevant data. For many of the countries which did have such data, the data became available only from 2007 onwards.
Data on air passengers recorded by airlines operating in Asia-Pacific countries are available for most countries in the region, but only for the period 2010-2014. Only the Pacific subregion was missing data for most countries and territories; in most of those economies, while flights operate internationally and domestically, they do not have their own airlines to report such information.

Information about countries’ spending on research and development in absolute terms and as a percentage of GDP was available for most countries in the subregions of Asia and the Pacific from 1999 through to 2013, although in South-East Asia and South and South-West Asia, most such statistical information is missing for many years. In the Pacific subregion, such data were available only for Australia and New Zealand.

Details on the number of persons undertaking research activities was available for most countries on a yearly basis in East and North-East Asia, along with the Russian Federation, but they were available only for some years for many of the other countries in Asian subregions. In the Pacific subregion, data were available for three economies only (Australia, Guam and New Zealand).

**Box 2**

**Asia-Pacific information superhighway**

In recognizing that large segments of the population in the Asia-Pacific region remain unconnected and excluded from the many social and economic opportunities offered by broadband Internet connectivity, ESCAP launched the Asia-Pacific information superhighway initiative in 2015. The “superhighway” is a continent-wide meshed network of terrestrial optical fibre which is aimed at increasing the availability and affordability of broadband Internet across Asia and the Pacific.

Through a working group, ESCAP countries are currently preparing a regional cooperation framework that would set standards for a range of measures to strengthen the regional broadband terrestrial backbone network; establish sufficient Internet exchange points; harmonize Internet traffic management systems and policies; enhance transmission infrastructure resilience; and provide inclusive access for all to broadband Internet.


**Good data availability on subscriptions to ICT services**

Data on mobile-cellular phone subscriptions were available from 1990 to 2014 for all countries in Asia, with only Timor-Leste having started its series more recently in 2007. In the Pacific subregion, most countries and areas, with the exception of the Cook Islands and Niue, had data for most years during this same period.

For subscriptions to fixed broadband, data were also readily available for all countries in Asia, with the exception of the Democratic People’s Republic of Korea, from 2000 to 2014, although for a few countries some data were missing in the earlier part of this period. In the Pacific subregion, data were available for 16 of the 21 countries and territories.

**Measurement challenge: Access to roads**

In rural areas of the developing world, where the majority of the poor live, good transport connectivity through road infrastructure and transport services is an essential part of the enabling environment for sustainable growth.
A lack of detailed nationwide data has limited previous efforts to develop measures of access to roads in rural areas that would guide policy and investment. The World Bank, with support from the Department for International Development (DFID) of the United Kingdom of Great Britain and Northern Ireland, has been piloting a methodology that exploits advances in digital technology to assess population distribution and infrastructure location and quality. The resulting Rural Access Index (RAI) may serve as a useful and cost effective tool for Governments planning their rural transport programmes and as an indicator of progress towards the achievement of Sustainable Development Goal 9.

An initial such index introduced in 2005 primarily used household surveys to estimate road accessibility, defined as a population living within 2 km of an all-season road. The survey methodology was the source of several weaknesses in the index. In addition to being difficult and costly to conduct and update, household surveys cannot provide both consistent and extensive data on road conditions.

A new, GIS-based index that exploits advances in digital technology is under development. The purpose is to create a more accurate, operationally relevant and cost effective RAI that will also aid in monitoring improvements in accessibility. As in the original survey methodology, access to transport is defined as the share of the rural population living within 2 km of the nearest all-season road. In Africa and South Asia, eight countries are currently testing the new RAI methodology, and preliminary estimates are available for Kenya and Mozambique, but not yet for South Asia.

Endnotes

1 General Assembly resolution 66/288, annex.
2 General Assembly resolution 70/1.