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

OUTLOOK

Projected investment needs in Asia and the Pacific are substantial. Hundreds of millions of people in the region still live without access to basic infrastructure, including for connectivity. Improving the quality of available infrastructure, its resilience and environmental sustainability needs to be a priority for the region.¹ Progress on inclusive and sustainable industrialization and innovation has been uneven. Gaps are widening in some areas, such as manufacturing value-added per capita. Concerted efforts to keep developing countries from missing out on the New Industrial Revolution are needed.² While much remains to be done, support for innovation as measured in terms of spending on research and development has increased.

THE PHOTO

Green Power Development Project construction workers passing through a tunnel in the Dagachhu Hydropower Development in Bhutan

Photo credit: ADB
Insights

- There has been significant progress in expanding infrastructure services in energy generation, information and communications technology (ICT), transport, water and water sanitation, but gaps remain in meeting the basic needs of poor households, particularly in rural areas, and in ensuring the quality and environmental sustainability of the built infrastructure. Connectivity infrastructure, such as roads and air transport, increased, while rail transport became less of a priority in the region.

- Infrastructure helps reduce poverty when integrated with wider development efforts. For example, road connectivity, energy and irrigation services can ease and reduce the costs of access to markets and jobs, but the impacts on poverty tend to be greater when combined with efforts to improve access to health care and education.

- An inclusive and sustainable industrial sector drives economic growth, job creation, social stability and environmental protection. Careful, inclusive and sustainable industrialization policies can help soothe the critical issues confronting many countries in the region around jobs, informal employment, the middle-income trap and low levels of entrepreneurship. These policies should be designed to address sources of social grievances, such as youth unemployment, inequalities in the nature and extent of women’s and men’s engagement in economic activity and rapid urbanization.

- The contribution of manufacturing to employment creation is well documented. As of 2014, global employment in manufacturing was estimated at 482 million jobs, which included jobs in the formal and informal sectors as well as in manufacturing-related services. Manufacturing in emerging economies often combines high relative productivity with a strong capacity to absorb labour.

- Manufacturing also supports sustained rapid growth: Driven by manufacturing industries, 13 developing economies globally (several from the Asia-Pacific region) managed to sustain rapid growth of at least 7 per cent for 25 years or more after World War II. Structural changes in the economy, in conjunction with industrialization, can support the emergence of a middle class. Some countries in the region have substantially expanded the share of GDP from services sector, however, before expanding the role of industry.

- Real value added per unit of CO₂ emission tends to increase with rising real GDP per capita across various manufacturing industries. Measures to support the transition from dirty manufacturing to relatively green are needed.

- Innovation has a critical role in driving industrialization, particularly in middle- and high-income countries. The New Industrial Revolution offers tremendous opportunities in the region, with countries like China, Japan, New Zealand and the Republic of Korea global leaders in additive manufacturing.
BRIGHT SPOTS

Upgrading infrastructure and retrofitting industries

- There was significant progress in expanding infrastructure services in energy generation, ICT and transport. Access to paved roads increased from 16.3 kilometres to 19.2 kilometres per 10,000 people between 2009 and 2014. Air transport in terms of passengers carried grew at a faster rate than freight, at an annual average of 7 per cent in 2000 and of 3 per cent in 2015.

- As countries shift to less energy-intensive industries, cleaner fuels and technologies and stronger energy-efficiency policies, they are experiencing a reduction in the carbon intensity of their GDP.

- Access to ICT in the region has increased substantially. Nowadays, 45 per cent of the population in Asia and the Pacific has access to the internet through mobile telephones, and this is expected to increase to 70 per cent by 2020. The majority of the region’s population (62 per cent, or 2.5 billion people) subscribed to mobile telephone services in 2015, a rate on par with the global average of 63 per cent.

Inclusive and sustainable industrialization

- Asian developing countries have outperformed industrialized countries as well as developing countries in other regions in terms of their share of manufacturing employment in total employment (Asian developing countries’ manufacturing employment share grew 73 per cent between 1970 and 2013, reaching a 15.7 per cent share in 2010–2013). There are five economies in the region (China, India, Indonesia, Japan and the Republic of Korea) that belong to the world’s 15-top manufacturers, which together contribute 78.5 per cent of global manufacturing production. China, with an average annual growth rate of 10.6 per cent between 2005 and 2015, has emerged as the world’s largest manufacturer.

- The creation of formal jobs through industrial development recently gained policy priority. The recognition of industry as a development accelerator has led to a revival of industrial policy, including in Bangladesh (Industrial Policy 2016), China (Made in China 2025), India (Make in India), Indonesia (Master Plan for the Acceleration and Expansion of Indonesia’s Economic Development), Japan (New Robot Strategy) and the Republic of Korea (Manufacturing Innovation 3.0).

Innovation

- Investment in research and development has increased significantly in recent years. The number of researchers in the region has also increased. Continued efforts to support domestic technology development are needed.

- In 2014, research and development expenditure as a percentage of GDP doubled to 2 per cent after remaining relatively flat during the period 2006–2013, albeit at the same level as in 2000–2005.

- The number of researchers rose by 19 per cent, from 686 per million inhabitants in 2000 to 846 in 2010.

HOTSPOTS

Resilient and sustainable infrastructure

- The infrastructure investment needs of the region are diverse and substantial—projected by the
ADB at about $26 trillion between 2016 and 2030 in its developing member countries, particularly in power and transport.\textsuperscript{18} Infrastructure stock in ASEAN-5 (Indonesia, Malaysia, the Philippines, Singapore and Thailand) is 30 per cent below the benchmark for advanced economies, which is calculated at 70 per cent of GDP.\textsuperscript{19}

- The region’s CO\textsubscript{2} emissions per one dollar of GDP (2011 PPP) have decreased, from 521.6 grams to 389.3 grams between 1990 and 2013 (a decrease of 25 per cent). However, this is still above the global average (at 312.9 grams in 2013).\textsuperscript{20} Separating economic growth from greenhouse gas emissions growth remains an imperative for the region.

- From 2011 to 2014, the growth in total goods transported by railway remained relatively flat in Asia and the Pacific, registering at 10,570 million tonnes per kilometre in 2013 and 2014. In South Asia (where data are available), the number of passengers carried by railway peaked in 2007 and has continued to dip since then, settling at 20,619 million passengers per kilometre in 2011–2014.\textsuperscript{21}

- Many Asian countries are struggling with the middle-income trap. Infrastructure investment, including to scale up cross-border and transboundary policy and infrastructure development that also considers human well-being, is needed to help countries escape this trap.\textsuperscript{22}

### Inclusive and sustainable industrialization

- The per capita gap of manufacturing value added (MVA) between least developing countries and high-income countries is widening. MVA as a proportion of GDP was 23.9 per cent in 2014 in the region on average, ranging from 8.4 per cent in the Pacific to 29.4 per cent in upper-middle-income economies.\textsuperscript{23}

- Least developed countries in the region have increased their MVA share over the past 25 years, from 11.9 per cent in 1990 to 18.4 per cent in 2015. There remains a gap, however, with the upper-middle-income and high-income countries (upper-middle-income countries’ MVA share increased from 17.2 per cent to 29.5 per cent, while the share in high-income countries increased from 19.2 per cent to 20 per cent over the same period).\textsuperscript{24}

- In terms of per capita MVA, the increase was much greater in high-income economies than in landlocked developing countries and least developed countries. MVA per capita in landlocked developing countries and least developed countries increased from $180 to $235 and $28 to $112, respectively, between 1990 and 2015. In high-income countries of the region, it increased from $4,890 to $7,214 over the same period.\textsuperscript{25}

### Scientific research and technological capability

- While investment in research and development has increased overall, it is uneven across countries. The share of GDP spent on research and development in lower-middle-income economies was 0.5 per cent in 2011 while it was 1.7 per cent in upper-middle-income economies in 2014. The figure is larger in high-income economies but with only marginal improvements since 1999 (2.7 per cent).\textsuperscript{26} The Republic of Korea, the leader in this area, spent nearly 4.3 per cent of its GDP on research and development in 2014, almost doubling the share since 1999.\textsuperscript{27}

- With 5,544 researchers per one million inhabitants in 2014 (up from nearly 4,146 in 2000, or a 33.7 per cent increase), high-income countries in the region have a considerable edge over upper-middle-income economies, which had on average 1,262 researchers in the same year (up from 788 in 2000, or a 60 per cent increase) At the low end of the scale in 2014 was Georgia, with 585 researchers per one million inhabitants, while the Republic of Korea topped the high end, at 8,899 researchers.\textsuperscript{28}
EMERGING ISSUES

• Growth-stimulating policies need to remedy slow employment creation. To a large extent, slow growth is caused by a services sector-driven growth pattern in South Asia; it is also affected by some capital- and energy-intensive manufacturing sectors that entrench the informality of the economies there (see also the SDG 8 profile). The revival of industrial policy in some countries is likely to support the creation of formal jobs, contributing to the reduction of poverty and inequality.

• Against the backdrop of rapid urbanization, holistic policies are needed to tap into cities’ potential to concentrate economic activity and attract infrastructure investment and innovation while decreasing local environmental footprints.

• More extensive deployment of clean technologies will increase the likelihood of achieving the proposed SDG target of upgrading infrastructure and retrofitting industries to make them sustainable, with increasingly efficient use of resources and greater adoption of clean and environmentally sound technologies and industrial processes. Additional sources of infrastructure financing are available in the region as new financing institutions to overcome the gaps are created and existing development finance institutions seek to step up their support for sustainable infrastructure.

TARGETS

9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all.

9.2 Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry’s share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries.

9.3 Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets.

9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities.

9.5 Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending.

9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States.

9.b Support domestic technology development, research and innovation in developing countries, including by ensuring a conducive policy environment for, inter alia, industrial diversification and value addition to commodities.

9.c Significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet in least developed countries by 2020.