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Technology progress: Carpe Potestatem - Seize the opportunities for the region

The high productivity growth in previous decades has enabled the Asia-Pacific region to make significant advances in economic development. Productivity in the region has grown faster than in other regions, yet growth is slowing.[1] Technology development is critical to boost productivity growth and to sustain medium- to long-term economic resilience. The region has a great potential. However, technology advancement also brings risks of increasing inequality and adapting to the changing nature of work. Government policies could focus on strengthening fundamental infrastructure, providing knowledge and skills, introducing redistributive measures, supporting technology diffusion and enhancing regional and global cooperation. Recent ESCAP publications provide detailed insights into the topic. Please refer to *Inequality in Asia And the Pacific in the Era of the 2030 Agenda for Sustainable Development* and *Frontier technologies for sustainable development in Asia and the Pacific*.

Technology is key to boosting productivity

Technological progress is critical for productivity growth. History shows that technology and successive industrial revolutions have had huge impacts on national competitiveness and economic growth (see figure 1).[2] New technologies, such as three-dimensional printing, big data, robotization of production process and artificial intelligence are making in-roads in production processes and could provide impetus to economic growth in the future. Moreover, technology is a key enabler of sustainable development. For example, clean technology improves energy efficiency, curb carbon emissions and reduce negative environmental impacts.[3] Fintech business could largely improve financial inclusion.[4] Using e-governance can also help reduce leakages in taxation and social transfer.[5]

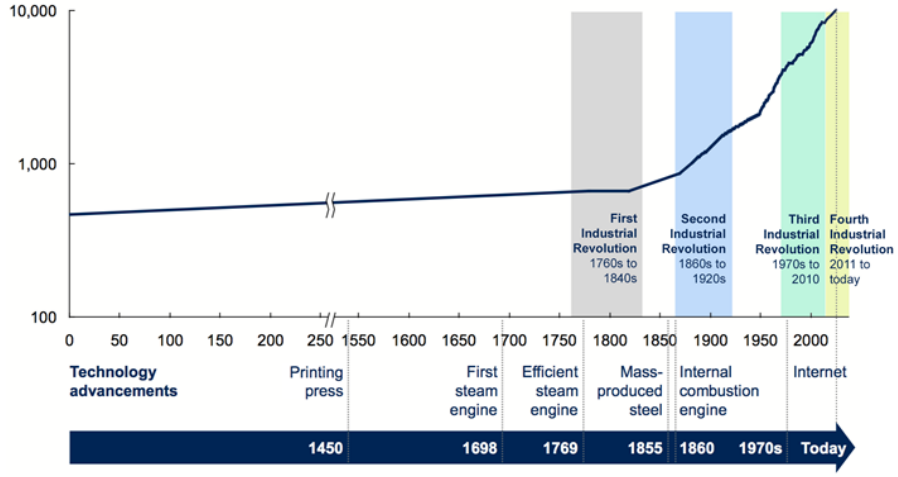
The region has a great potential to take advantage of new technologies…

The Asia-Pacific region as a whole has a great potential to take advantage of technology to boost productivity. The region has been leading information and communications technology (ICT) growth in the past decade. Some of the region's ICT-advanced economies, including Australia, Hong Kong (SAR, China), Japan, Republic of Korea, New Zealand and Singapore, are top performers worldwide in major ICT indicators such as ICT Development Index and the Networked Readiness Index.[6] Latest figures show that half of the countries in the region have a mobile phone penetration over 100 percent (measured by Mobile cellular subscriptions per 100 people); in over a third of the countries their internet users account for over 50 percent of their population; and almost 80 percent of new patent applications of the world are submitted in the region.[7]

… but challenges exist

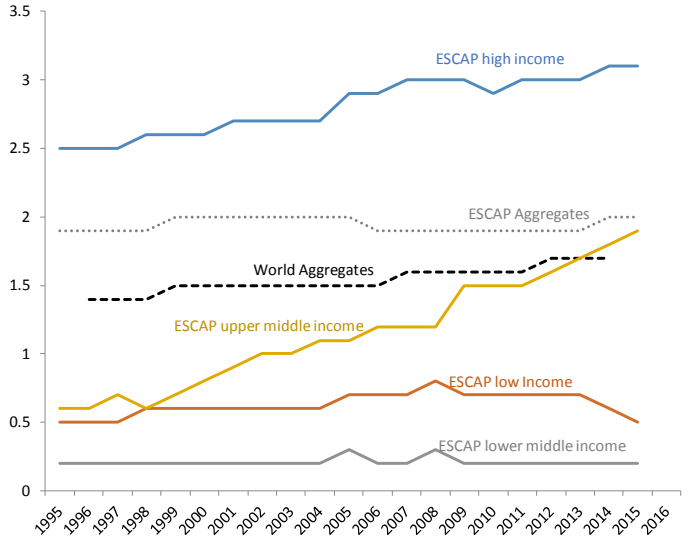
However, the region is also facing significant digital divide between and within countries, as well as between rural and urban areas and between men and women, driven by availability, affordability and reliability of the digital technologies. Evidence from the region suggests that economies with higher technology absorption capacity and investment in ICT services, urban areas and men are at a more advantageous status to harness technological gains.[8] Other technology-related gaps exist such as R&D expenditures.

Figure 1. Economic growth is positively correlated with technological progress



Sources: United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP), *Inequality in Asia and Pacific in the Era of the 2030 Agenda for Sustainable Development*. Sales No. E.18.II.F.13, based on McKinsey Global Institute, *Disruptive Technologies: Advances That Will Transform Life, Business, and the Global Economy* (Seoul, May 2013, p. 24). The figure was derived from Angus Maddison, Maddison project database: Statistics on world population, GDP and per capita GDP, 1-2008 AD". Data for 2008-2016 are GDP per capita (constant 2010 US$), from World Bank national accounts data. Available from https://data.worldbank.org/indicator/NY.GDP.PCAP.KD.
Note: The graph is on a log scale—the actual slope of the line after World War II is much steeper than visually depicted.

Figure 2. R&D expenditures gaps in the Asia Pacific region



Source: ESCAP Statistics. Available from http://data.unescap.org/escap.stat/#data/ (accessed 19 February 2018).

Overall, ESCAP economies spent a larger share of GDP on R&D investment compared with the world average, mainly attributed to high-income economies and rapid catch up by upper middle-income economies such as China, Malaysia, Thailand and Turkey (see figure 2). However, many countries spend less than 0.2 percent of GDP on technology advancement, including Azerbaijan, Cambodia, Indonesia, Kazakhstan, Kyrgyzstan, Mongolia, the Philippines, Tajikistan, and Uzbekistan. Countries with special needs, especially least-developed countries, are associated with lower R&D expenditures.

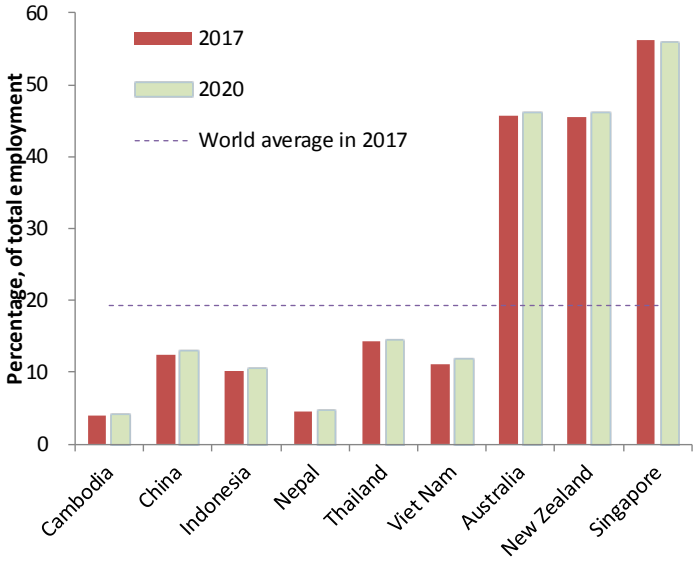
Meanwhile, there are fundamental concerns about how technology will shape the future of work. Frontier technologies such as robotics, artificial intelligence, and machine learning are ushering in a new age of automation.[9] Although empirical analyses do not support a positive correlation between technology development and unemployment in the long run, unemployment may increase in the short- to medium-term due to the frictions in labour markets.[10] Technically, about half of today's work activities worldwide could be automated by 2055.[11] Among the developing economies, this share should be up to two-thirds.[12] In Asia Pacific economies, the risk of jobs being automated is also high – 785 million workers or 51.5 percent of total employment in the region.[13] "Routine tasks" that are based on well-understood procedures and can be described by clear rules and algorithms are more likely to be automated; whereas workers that perform "non-routine" and cognitive tasks, particularly in knowledge-intensive industries, are favoured by technological progress.[14]

With that said, automation could also happen in more advanced economies, where adopting new technologies could be cost effective.[15] However, this could exert further pressure on the potentially technology-induced job polarisation, which could challenge the labour market in the region. Many developing economies are seeing a persistently low share of high-skilled jobs (see figure 3a) and a high share of vulnerable employment, especially in South and South-West Asia (see figure 3b).

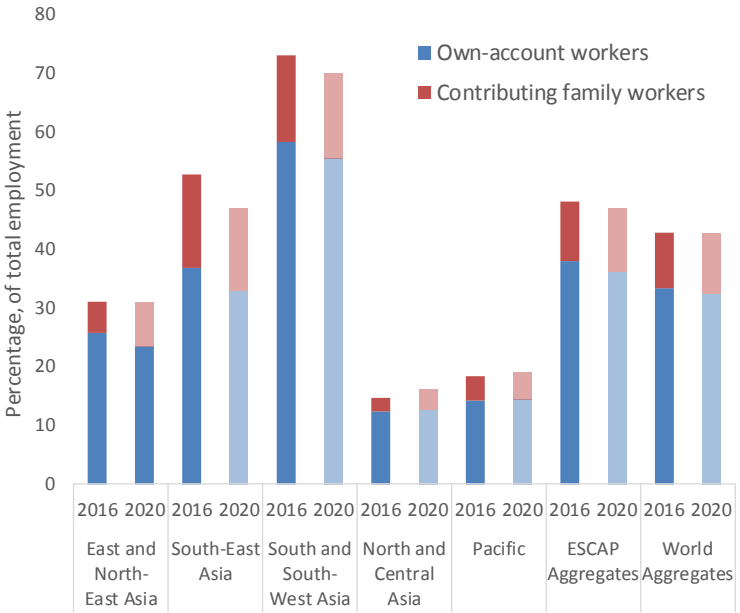
At the international level, technology progress is reshaping the global production patterns. The pattern of global trade depends on the availability and the price of production factors. Low transport costs, the transferability of technology and the availability of cheap labour and capital attracted a substantial share of industrial production moving to the region.[16] However, technology advancement and automation call into question if the region will maintain its comparative advantage. Some forecast that industrial production is likely to return to the developed world, i.e. "reshoring".[17] This could limit the scope for "late converger's" industrialization through a traditional focus on labour-intensive manufacturing, and shrink opportunities to create more jobs. This has implications for countries such as India, which

Figure 3. Lack of decent jobs challenges the region to harness new technologies

a. Persistently low share of high-skilled labour



b. Informal employment is popular



Source: ILO Stat. Available from www.ilo.org/ilostat/ (accessed 10 March 2018).

aims to increase value added by the manufaturing sector to 25 percent by 2020, from 16 percent in 2015. Arguably, this is not an imminent risk. Increasing labour productivity and the resulting rise of wages in China is creating opportunities for poorer developing countries in labour-intensive manufacturing where the use of robots is not economically viable.

A more worrisome challenge is technology-induced increasing inequalities. Technology has features to favour skilled over unskilled labour and bias capital over labour.[18] Therefore, technology advancement could potentially put downward pressure on wage, especially for the unskilled labour, which could worsen the income distribution. Between 1995 and 2009, the global income share of low- and middle-skilled labour dropped by more than 7 percentage points.[19] This has contributed to widening income and wealth inequality. Similar trends were also analysed for the Asia-Pacific region in the 2016 *Survey.*

Policies to support technology and innovation and to minimize side-effects

Political support: In order to harness the potential of frontier technologies and mitigate associated risks, policymakers can proactively take actions to provide an enabling environment. Many of the leading technology-savvy countries in the region have taken a "whole-of-Government approach", with an overarching governance structure for science, technology and innovation (STI) based on committed leadership that has oversight of the STI strategy. Japan, for example, set up the STI Council within the Cabinet Office to coordinate STI policies and resources. The Council is under the direct leadership of Japan's Prime Minister.[20] Strong political support for innovation can ensure access to and use of technologies.

Infrastructure development: Fundamental infrastructure for information and communications technologies (ICT) is essential to underpin innovation and technological progress. In the region, there is room for countries to improve their ICT infrastructure, such as availability, access and affordability of broadband, Wi-Fi and mobile data-intensive services. A major investment push can help countries to deploy such backbone infrastructure. With stronger ICT infrastructure, countries can not only conduct research and connect it to business sectors more quickly, but also narrow the existing digital divide and disparities through financial, transport and trade links.

Education and training: The working population should be equipped with the correct skills. The innovative capacity of any country depends on the skills set of its population, which relies heavily on education and training systems. In order to develop core skills for people to be flexible and responsive to rapid changes brought about by new technology, more students, especially female students, should be encouraged to take science, technology, engineering and mathematics (STEM)-related courses; governments and businesses need to anticipate the skills needed and provide technical and vocational education and training (TVET).[21] The availability of low-cost online courses has greatly expanded the opportunities for continuous learning.[22] Many countries in the region have launched massive open online courses, including China, Indonesia, Japan, Malaysia, the Republic of Korea and Thailand, and ave attracted millions of users.[23]

Technological diffusion: Policymakers also need to ensure that the benefits of innovation-led economic growth are widely shared. From the perspective of industrial strategy, technology and innovation policies should move beyond the traditional focus on economic competitiveness. Governments should work with enterprises and support industries that have dynamic linkages to other economic sectors, enhance industry-services linkages and promote technological diffusion across a wider range of firms, including small enterprises, to stimulate broad-based productivity and employment gains.

Redistributive measures: Governments can consider a wide range of redistributive measures to mitigate the risks of technology-induced inequality and unemployment. Progressive income taxes and wealth-related taxes could help mitigate inequalities while creating needed revenues for better public education, training and social protection. Reducing taxes on labour generally encourages employment, reducing the need for redistribution, whereas taxing new technologies risks reducing economic growth and technology adoption, and reducing sources for redistribution. Instead, taxing rents and high profits arising from concentrated market structures may be more conducive to balance social and economic objectives.[22]

Other policy proposals: Other more radical proposals are available but are considered somewhat controversial. The proposal most closely associated with the impact of technology on unemployment is the notion of a universal basic income, whereby every individual would receive an unconditional cash grant.[25] This proposal would serve to guarantee a minimum level of income regardless of employment status and simplify the administration of various public programmes. Other proposals, associated for example with Varoufakis,[26] attempt to directly distribute profits more equitably with a "universal basic dividend". Under this strategy, a fixed share of new equity issuance by firms is placed in a public trust, generating an income stream which is then distributed evenly among different segments of society. Taxes on robotics are also under discussion but have yet to be tested.

Regional and international cooperation: For all countries, but in particular those with low technological capacities, regional and international cooperation are effective instruments to harness technological dividends and reduce capacity inequalities. In line with the 2030 Agenda, governments have committed to fostering technology development, dissemination and transfer, and to the strengthening of scientific and technological capabilities of all countries. Regional and international collaboration can help countries, especially those with special needs, to gain access to much-needed investment and to facilitate cross-border technological learning through trade, FDI, mobility of human

resources and access to technology and knowledge.

Various regional and international mechanisms and platforms are in place to facilitate technology development and dissemination, and to ensure that new technologies can be employed in a way that moves the world closer to sustainable development. Examples include: Asia and Pacific Centre for Transfer of Technology (APCTT); Regional Space Applications Programme for Sustainable Development (RESAP); the decision to launch a technology facilitation mechanism as called for by the Addis Ababa Action Agenda to support achievement of the Sustainable Development Goals; and the United Nations technology bank established to help least developed countries in particular to lift themselves out of poverty.[27]

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[11] MGI, *A Future That Works* (see endnote 9).

[12] World Bank, *World Development Report* (see endnote 8).

[13] ESCAP, *Inequality in Asia and Pacific* (see endnote 2).

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The MPFD Policy Briefs aim at generating a forward-looking discussion among policymakers, researchers and other stakeholders to help forge political will and build a regional consensus on needed policy actions and pressing reforms. Policy Briefs are issued without formal editing. This issue was prepared by Zhenqian Huang, benefitting from inputs by Daniel Jeong-Dae Lee, Tengfei Wang and Jonathan Wong, under the guidance of Hamza Ali Malik and Mia Mikic. For further information on this issue, please contact Hamza Ali Malik, Director, Macroeconomic Policy and Financing for Development Division, ESCAP (escap-mpdd@un.org).

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