



Economic and Social Commission for Asia and the Pacific**Eightieth session**

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Item 2 (a) of the provisional agenda*

Theme topic, “Leveraging digital innovation for sustainable development in Asia and the Pacific”: general debate**Summary of the theme study on leveraging digital innovation for sustainable development in Asia and the Pacific****Note by the secretariat***Summary*

Asia and the Pacific is a hub for digitally driven innovations that have the potential to accelerate the region’s progress towards the 2030 Agenda for Sustainable Development.

In the present document, the secretariat discusses how Governments can encourage and support the development, replication and scaling up of digital innovations. First, it provides a framework that sets out the synergistic linkages between digital innovations and sustainable development. Second, through the prism of this framework, it identifies five enabling actions while advocating for strengthened stakeholder engagement and durable partnerships. Third, the secretariat recommends that existing regional cooperation mechanisms be leveraged along three pathways with a view to consolidating the contribution of digital innovations to the accelerated implementation of the Sustainable Development Goals. Throughout the document, illustrative case studies from across the Asia-Pacific region are drawn upon.

The Economic and Social Commission for Asia and the Pacific may wish to review the issues and recommendations contained in the present document and provide the secretariat with guidance on its future work in that regard.

* ESCAP/80/1.

I. Digital innovation landscape and sustainable development

A. Introduction

1. Accelerating progress towards the full implementation of the 2030 Agenda for Sustainable Development is a priority in Asia and the Pacific. Progress on many of the 17 Sustainable Development Goals has been alarmingly slow at both the global and regional levels. If it remains on its current trajectory, the region will achieve less than half of the necessary progress by 2030. Population groups in vulnerable situations remain exposed; the gap between countries in special situations and the rest of the region shows no sign of narrowing; and climate action urgently needs to be strengthened. With the support of enabling policy and regulatory regimes, digital innovations could play a decisive role in the extraordinary collective effort needed to make a meaningful course correction.

2. Asia and the Pacific is a hub for digitally driven innovations that have the potential to accelerate sustainable development. The region's sociodemographic profile, digitally literate youth, ability to leverage economies of scale and rapidly expanding access to digital infrastructure all provide fertile ground for the further development of digital innovations. Innovations in cognitive digital technologies, digital finance, government technology and the Internet of things carry great potential to accelerate the region's progress towards the 2030 Agenda for Sustainable Development.¹

3. To tap into this potential, in the present document the secretariat examines how Governments can encourage and support the development, replication and scaling up of digital innovations. First, it provides a framework that sets out the synergistic linkages between digital innovations and sustainable development. Second, through the prism of this framework, it identifies five enabling actions while advocating for strengthened stakeholder engagement and durable partnerships. Third, the secretariat recommends that existing regional cooperation mechanisms be leveraged along three pathways with a view to consolidating the contribution of digital innovations to the accelerated implementation of the Sustainable Development Goals. Throughout the document, illustrative case studies from across the Asia-Pacific region are drawn upon. The focus is not on digital technologies themselves, but on how they can be enabled and leveraged for the benefit of the environment and to improve people's lives.

B. Cognitive digital technologies

4. Cognitive digital technologies, which use advanced analytics, machine learning and generative artificial intelligence² to develop insight, have become drivers of transformational change.³ There are few technologies that have swept through systems with such speed and impact. Hardly a day passed in 2023 without generative artificial intelligence developments making it into the headlines. While still mired in caveats, unknowns and consequently widely divergent views on their benefits and threats, cognitive digital technologies

¹ Tuukka Mäkitie and others, "Digital innovation's contribution to sustainability transitions", *Technology in Society*, vol. 73 (May 2023).

² The creation of various forms of digital content using natural language prompts.

³ *Asia-Pacific Digital Transformation Report 2022: Shaping Our Digital Future* (United Nations publication, 2022).

could have a profound impact on the Sustainable Development Goals in at least the following ways:

(a) Cognitive digital technologies are improving diagnostic capabilities and enabling the discovery and development of new drugs, supporting good health and well-being (Goal 3). They are being used in a wide range of applications, from clinical trials for cancer therapies to telemedicine, which are improving access to health care in rural areas across the Asia-Pacific region;⁴

(b) Cognitive digital technologies are also mitigating the impact of natural disasters and environmental hazards by facilitating the rapid analysis and integration of a wealth of data derived from satellite, meteorological and ground sources. This can provide location-precise, time-sensitive, impact-based and life-saving early warnings, contributing to a number of the Goals, including, notably, the Goal on climate action (Goal 13). Furthermore, cognitive digital technologies are increasingly being used to forecast changes in air quality, thus allowing action to be taken ahead of heavy pollution, which is critical to achieving good health and well-being (Goal 3) and sustainable cities and communities (Goal 11);⁵

(c) Generative artificial intelligence is offering personalized educational content that could make a qualitative contribution to bridging regional educational gaps and achieving quality education (Goal 4) while enhancing teacher productivity and improving students' learning experiences, if supported by the right digital infrastructure, as well as the right policy and regulatory frameworks.

C. Digital finance

5. Digital finance has made it easier to gain access to financial services and enabled swift responses to crises. The finance sector in the Asia-Pacific region has embraced digital tools, and the value of digital transactions is projected to reach \$6.7 trillion by 2026.⁶ Countries that had invested in digital payment mechanisms were able to respond to the coronavirus disease (COVID-19) pandemic better, in part because they could swiftly make social assistance payments to stop people falling into poverty (Goal 1). Digital finance has also improved access to essential services such as banking and insurance, notably for women, for micro-, small and medium-sized enterprises and for remote and marginalized communities, thereby contributing to lower gender and income inequalities (Goals 5 and 10).

D. Government technology

6. Government technology has improved the efficiency, effectiveness, accessibility, reach and transparency of public services, supporting progress towards several Sustainable Development Goals. Government digital platforms, if they are user-friendly and have a low-bandwidth intensity, are

⁴ Philippe Lorenz, Karine Perset and Jamie Berryhill, "Initial policy considerations for generative artificial intelligence", OECD Artificial Intelligence Papers, No. 1 (Organisation for Economic Co-operation and Development (OECD) Publishing, 2023).

⁵ Dan Zhang and others, "Orchestrating artificial intelligence for urban sustainability", *Government Information Quarterly*, vol. 39, No. 4 (October 2022).

⁶ Economic and Social Commission for Asia and the Pacific (ESCAP), "Sixth session of the Asia-Pacific Information Superhighway Steering Committee", 30 September 2022.

already helping to reach areas and groups traditionally excluded from the benefits of digitalized public services.

E. Internet of things

7. Technologies linked to the Internet of things have the potential to optimize resource management, support responsible consumption and production (Goal 12) and strengthen the circular economy through informatization and dematerialization. They enable intelligent infrastructures that are equipped with sensors for data collection and monitoring, which in turn allow for a more efficient distribution and disposal and a lower consumption of scarce resources.

F. Digital innovations: looking ahead

8. Yet, for all these positive impacts on the Sustainable Development Goals, many challenges remain. For example, because cognitive digital technologies often depend on algorithms that draw on data that may be biased towards wealthier countries, their use can deepen inequalities. Furthermore, concerns about possible privacy violations, intellectual property infringements, the spread of misinformation and disinformation and security breaches, to mention but a few, have all rung the alarm and led to calls for regulatory regimes that mitigate possible harm.

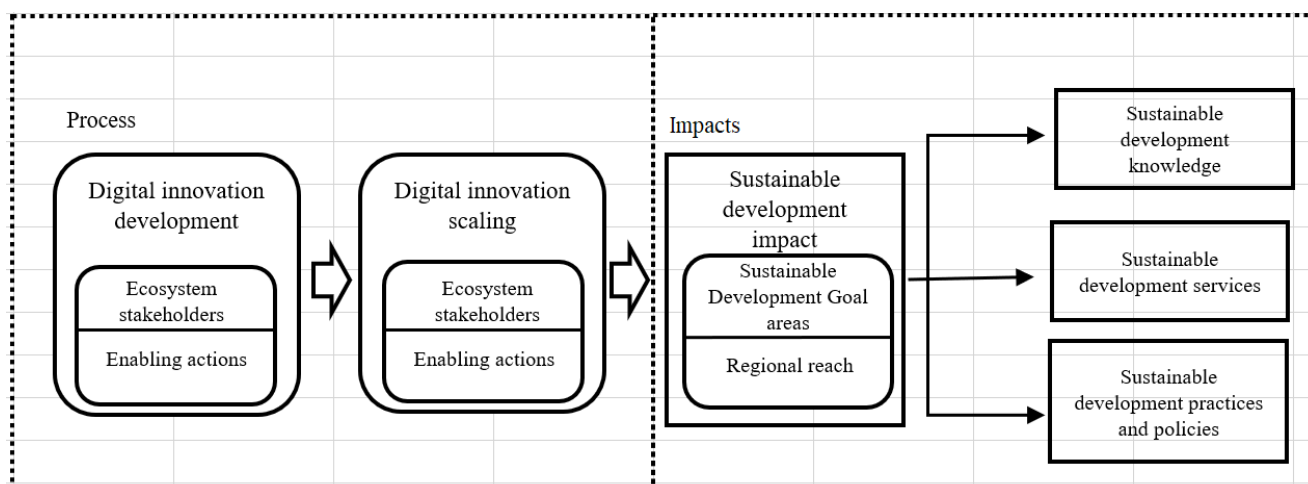
9. Nevertheless, it is equally important to consider how known – or pilot tested – digital innovation successes can be replicated and scaled up, without fear of unknown repercussions. In other words, can technology-driven solutions be used in combination to generate even greater added value, more quickly, than before? It has been said that innovators dominate headlines but that those who are able to scale up innovations dominate markets. An enabling policy and regulatory environment can help to encourage the scaling up of innovations for sustainable development.

10. What might the elements of such an enabling environment be and what role can regional cooperation play in scaling up innovations? These questions are considered in sections IV and V below. Section II contains a framework for harnessing digital innovation to accelerate progress towards the Sustainable Development Goals, and section III is focused on case studies.

II. Harnessing digital innovation: a framework

11. To accelerate the implementation of the Sustainable Development Goals, Governments need to be able to identify and foster digital innovations that connect technology to social, economic and environmental outcomes. This requires a structured approach to creating enabling conditions, engaging the stakeholders and ensuring the availability of metrics to measure the impact of the interlinkages between digital advancements and the Goals. For this purpose, the secretariat proposes a framework that supports two process-related actions with two resulting impacts (figure I).

Figure I
Framework for linking digital innovation and sustainable development



12. In the process phase, government initiatives to foster digital innovation should be clearly distinguished as being either aimed at the development of digital technologies or at scaling them up. To support development, Governments should encourage businesses, the public sector and citizens to collaboratively experiment with digital technologies to create new products or services. Only after these new products or services have been tested and have received financial investment, in an appropriate intellectual property and institutional infrastructure, can they lead to sustainable outcomes. Deliberate policy efforts that have been developed with and are therefore attuned to specific scientific and technological enterprises are needed to identify mature digital technologies that can be deployed on a larger scale. Such efforts include assessing the objectives of the innovation and the degree to which stakeholders and the policy environment can support the innovation so as to expand its reach to marginalized areas and population groups.

13. As digital innovations are scaled up, their contribution to achieving the Sustainable Development Goals can be viewed in three areas: knowledge; services; and practices and policies. Developing metrics for each area could improve understanding of how digital innovations are reshaping the landscape of sustainable development. A range of services – from education, finance and infrastructure development to policymaking – could become more inclusive and sustainable. Practical considerations are further discussed in sections IV and V below.

14. Despite the linear visual representation in figure I, the relationship between process and impacts is not unidirectional and impacts feed back into the process of developing and scaling up digital innovations. Cases where digital innovations have had a positive impact often lend support to the kind of policy environment that enables technological development and stimulate further investments into the process. Assessing the impacts of innovations is critical for deepening understanding and guiding the frequent iterations between process and impacts.

III. Digital innovation: case studies for the future

Transforming sectors

15. In the power sector, smart grid technologies enabled through the Internet of things are facilitating the development of renewable energy and enhancing the resilience, inclusivity and affordability of energy resources. Smart meters provide consumers with real-time signals and pricing information, allowing them to adjust their energy use. In the Philippines, a decentralized smart grid controlled by a cloud-based, mobile-enabled application using Internet of things connectivity has optimized power distribution across properties within a village.⁷ The application of blockchain technology in peer-to-peer energy trading platforms is another significant development. The value of blockchain technology has been demonstrated in a development project in Bangkok known as T77, where it minimizes information asymmetry between producers and consumers and supports efficient energy trading.⁸ The integration of rooftop solar panels, battery energy storage and network-enabled appliances is reshaping power systems, particularly in small island developing States.

16. In the transport sector, the focus is shifting from easing the flow of traffic to meeting people's needs. Smart mobility, mobility as a service and connected vehicles combined with big data applications that help understand trends have enhanced predictive capabilities, enabling more reliable, efficient and evidence-driven policymaking in support of road safety and the decarbonization of the sector. Emerging innovations in the region include research into autonomous vehicles in Singapore⁹ and the development of real-time and reliable road and traffic information systems in Japan.¹⁰ Kazakhstan and Uzbekistan have introduced several digital features into their national rail networks, including electronic payment systems, digital client interfaces and links to other parts of the logistics system.¹¹

17. Cognitive digital technologies could contribute to ensuring that every person on Earth is protected by early warning systems by 2027. Increasingly, artificial intelligence applications are delivering early warnings for floods, earthquakes and landslides. A flood early warning service that started in Bangladesh and India four years ago has since been scaled up to cover more than 90 countries.¹² Another digital early warning system, which uses android smartphones as mini seismometers to detect earthquakes, has detected hundreds of quakes without false positives, although many of them have not

⁷ International Energy Agency, *Unlocking Smart Grid Opportunities in Emerging Markets and Developing Economies* (2023).

⁸ Ksenia Petrichenko and Marco Schletz, "How can blockchain accelerate SDG7 implementation?", ESCAP Blog, 5 June 2020.

⁹ See, e.g., <https://cetran.sg>.

¹⁰ T. Yamamoto, M. Onosato and K. Ogiso, "Vehicle information and communication system (VICS) information services via FM radio multiplex", paper prepared for the Third World Congress on Intelligent Transport Systems, Orlando, Florida, United States, 14–18 October 1996.

¹¹ ESCAP, "Freight transport and COVID-19 in North and Central Asia: changing the connectivity paradigm", Policy Brief (Bangkok, 2019).

¹² Anneysha Zafrin, "Building community resilience through digital innovations in Bangladesh", Flood Resilience Portal, 28 April 2023.

required further human response action.¹³ Similarly, scientific monitoring and reliable telecommunications cable systems, through which oceanbed fibre-optic cables are equipped with sensors, can generate a wealth of data, including on sub-seafloor seismic activity, thus expanding the range of tsunami early warning systems. Such a system, which is relatively cost-effective, is being piloted along a cable route between Vanuatu and New Caledonia.¹⁴ These technological breakthroughs enhance the capacity to predict disasters and expand the reach of early warnings, enabling all who have reliable digital connectivity to take and benefit from risk reduction actions.

18. Digital solutions are improving the speed, rate of compliance, accuracy and responsiveness of tax collection processes, thus lowering administrative costs and discouraging tax evasion. Most countries in the region have e-filing systems and the COVID-19 pandemic accelerated this shift.¹⁵ The adoption of electronic tax identification numbers in countries such as the Republic of Korea and Singapore¹⁶ has simplified taxpayer registration procedures and broadened the tax base. Since its implementation in 2021, the track and trace system in Pakistan has led to increases in transparency and tax compliance and reductions in the prevalence of counterfeit goods.¹⁷ Uzbekistan has introduced e-invoicing options to improve compliance and to make it easier for businesses to gain access to and manage their invoicing records.¹⁸ Digital innovations can help to overcome the unequal access to health-care services in the region by addressing the challenges of geographical distance and resource constraints. In Bangladesh, the success of telemedicine depends on several enabling factors, including Internet connectivity, supportive government policies, a regulatory framework for telehealth services, partnerships with health-care providers and public awareness campaigns. In 2020, during the COVID-19 pandemic, the Government's Shasthyo Batayon telemedicine hotline handled approximately 80,000 calls per day, or 10 million calls over a six-month period.¹⁹ The Digital Family Card in Kazakhstan enables the Government to more effectively identify families from vulnerable groups, assess their needs and provide support in areas such as education, social protection, finance, justice and health. Nearly 6 million families benefited during the first phase alone.²⁰

19. A number of countries are considering issuing central bank digital currencies to facilitate payment processes, lower transfer costs and increase the transparency of both national and international payment systems. In so doing, they would be expanding the global research pool and contributing to the development of regulations that safeguard the stability and security of monetary and financial systems. Gaining a deeper understanding of the risks

¹³ Micah Berman, "Introducing Android earthquake alerts in India", Google India Blog, 27 September 2023.

¹⁴ See www.smartcables.org/systems/vanuatu-newcaledonia.

¹⁵ OECD Forum on Tax Administration, "Tax administration: digital resilience in the COVID-19 environment", 21 April 2021.

¹⁶ Hyung Chul Lee, "Can electronic tax invoicing improve tax compliance? A case study of the Republic of Korea's electronic tax invoicing for value-added tax", Policy Research Working Paper, No. 7592 (Washington, D.C., World Bank, 2016).

¹⁷ See www.fbr.gov.pk/introduction-track-and-trace/152962/152963.

¹⁸ VAT Update, "How does e-invoicing work in Uzbekistan?", March 2023.

¹⁹ Nizam Uddin Ahmed and others, "Telemedicine services of 'Shasthyo Batayon 16263' during pandemic: opportunities and challenges", *Bangladesh Medical Research Council Bulletin*, vol. 46, No. 3 (2020).

²⁰ United Nations Development Programme, "Digitalisation for sustainable development and social well-being of society", 13 February 2023.

related to implementing central bank digital currencies is important.²¹ As these currencies are at an early stage of development and because there is insufficient evidence of their net benefits compared to other technologies, regulations should facilitate competition between emerging digital payment solutions offering similar advantages. Encouraging diversity is essential for the development of more sustainable and inclusive financial systems.²²

20. Maldives is taking an iterative approach to considering the introduction of a central bank digital currency by initially working on developing a regulatory sandbox framework. Extensive staff training, as well as testing of a central bank digital currency and financial technology in a controlled setting, is planned within an overall policy objective of ultimately improving efficiency, equipping the economy with financial inclusion systems and supporting a payment system for the tourism sector.²³

IV. Building an enabling environment

21. The essential, albeit insufficient, condition for digital innovation to accelerate implementation of the Sustainable Development Goals is universal access to digital infrastructure. Through the prism of the framework presented above, in the present section the secretariat first discusses ways of strengthening digital connectivity and then presents five enabling policy actions to augment the positive impacts on sustainable development of universal digital connectivity.

A. Strengthening infrastructure and connectivity

22. In recent years, infrastructure development has greatly expanded Internet coverage. In 2022, 96 per cent of the population of Asia and the Pacific was covered by a fourth generation (4G) mobile network.²⁴ While all of the subregions of the Economic and Social Commission for Asia and the Pacific (ESCAP) experienced improvements, South-East Asia and East and North-East Asia have made progress faster over the past five years, a trend driven by the continued strong growth in terms of access in the Republic of Korea and Singapore (figure II). Notably, South and South-West Asia has lagged behind in terms of fixed broadband Internet access. Notwithstanding the incompleteness of statistical data, which weakens understanding of the extent and nature of connectivity gaps, it is known that Pacific small island developing States are among the most disconnected countries. The data on broadband Internet access in figure II is primarily for Australia and New Zealand.

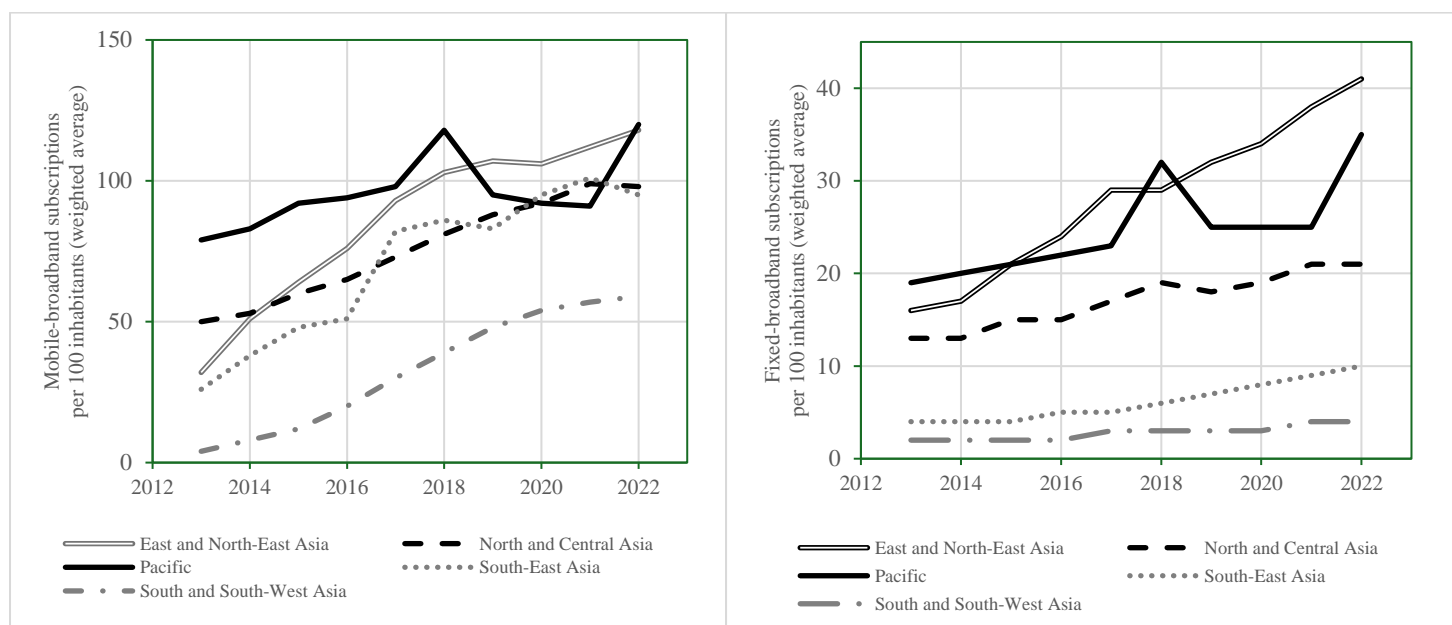
²¹ Bank for International Settlements, “Central bank digital currencies – executive summary”, 31 August 2023.

²² Marco Gross and Elisa Letizia, “To demand or not to demand: on quantifying the future appetite for CBDC”, IMF Working Papers, No. 23/9 (Washington, D.C., International Monetary Fund, 2023).

²³ ESCAP, *National Study on Central Bank Digital Currency and Stablecoin in the Maldives* (Bangkok, 2022).

²⁴ International Telecommunication Union (ITU), World Telecommunication/ICT Indicators Database, 27th ed. (2023). Available at www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx (accessed on 8 January 2024).

Figure II
Broadband Internet access in subregions of the Economic and Social Commission for Asia and the Pacific



Source: ESCAP calculations based on statistics from the International Telecommunication Union (ITU), World Telecommunication/ICT Indicators Database, 27th ed. (2023). Available from www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx (accessed on 8 January 2024).

23. Within countries, significant accessibility gaps remain. These gaps exist especially between women and men, young people and older persons, persons with and without disabilities, people living in urban and rural areas, and people with different income levels and educational backgrounds. Many who are covered do not have the skills necessary to make use of digital innovations. Consequently, 37 per cent of the population that has access to broadband connectivity does not use the Internet.²⁵

24. The scaling up of digital innovations in an inclusive way is critically dependent on overcoming disparities in skills. According to available data, only 40 per cent of the region's population has basic digital skills.²⁶ In this regard, programmes are needed at different levels: to offer foundational skills and digital literacy for all; to improve the digital skills of workers, including retraining for lifelong learning as the pace of digital innovation accelerates; and to hone the advanced skills held by specialists working in the information and communications technology sector.

25. In most countries, marginalized groups are particularly ill equipped, which prevents them from using digital technologies effectively.²⁷ Women are less likely than men to be able to use technology for basic activities, such as creating simple formulas in spreadsheets, and women in manufacturing face a higher risk of being replaced by automation than their male counterparts.²⁸ An estimated 86 million people, equal to 14 per cent of the workforce, in Australia, India, Indonesia, Japan, New Zealand, Republic of Korea and Singapore need

²⁵ ITU, *Global Connectivity Report 2022* (Geneva, 2022).

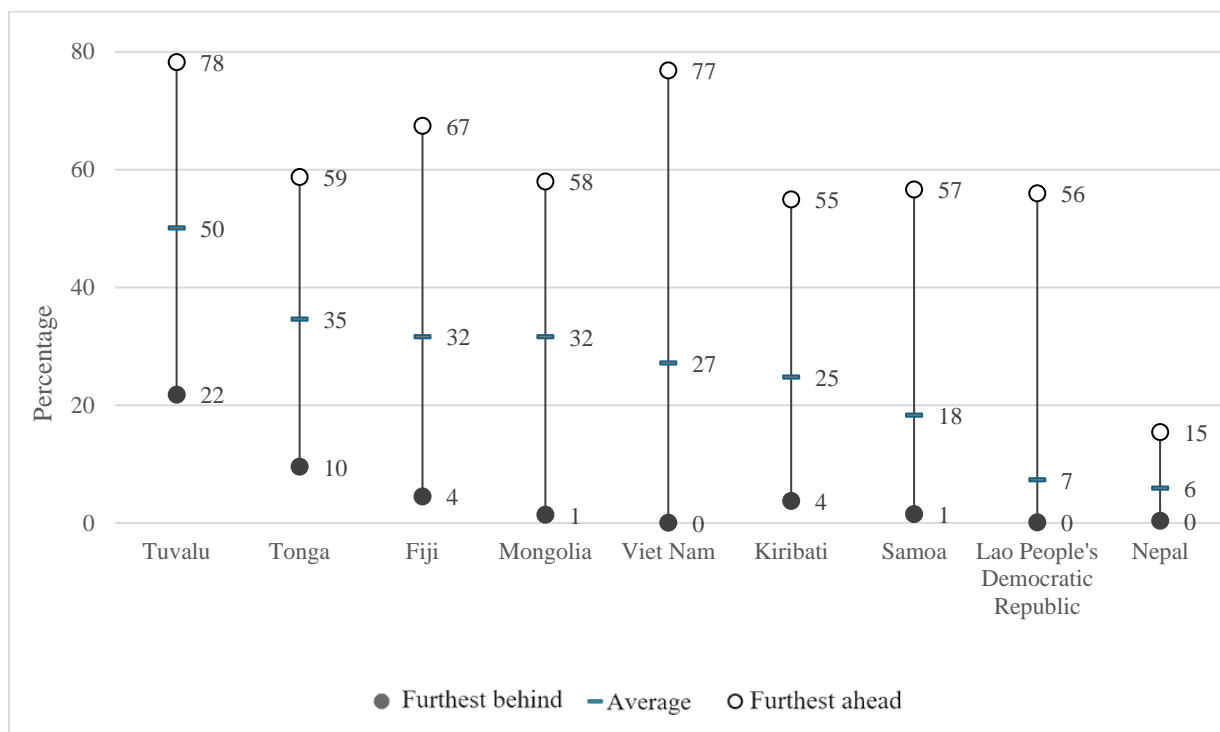
²⁶ ESCAP/79/7.

²⁷ Ibid.

²⁸ *Asia-Pacific Digital Transformation Report 2022: Shaping Our Digital Future*.

to receive training to keep pace with technological developments and gain new digital skills to succeed in their careers.²⁹ More broadly, the lack of skills is a barrier to digital innovation ecosystems, which benefit from population-wide interlinkages. Available data illustrate the chasm that exists between the information and communications technology skills of those furthest behind and those furthest ahead in several countries (see figure III).³⁰ Investment in the inclusive expansion of digital skills training is critical.

Figure III
Share of the population with basic information and communications technology skills, by furthest behind and furthest ahead groups (men and women aged 15–49 years)



Source: ESCAP calculations based on United Nations Children’s Fund (UNICEF), Multiple Indicator Cluster Surveys (2017–2021); and ESCAP, “Leaving no one behind” platform, available at <https://inob.unescap.org/> (accessed on 15 September 2023).

²⁹ AlphaBeta and Access Partnership, “Building digital skills for the changing workforce in Asia Pacific and Japan (APJ)” (2022).

³⁰ Multiple Indicator Cluster Surveys are nationally representative household surveys carried out by national statistical offices in partnership with the United Nations Children’s Fund (UNICEF). Over 15 countries in Asia and the Pacific have collected data by carrying out Multiple Indicator Cluster Surveys for over two decades. Some of the data, which are comparable across countries and over time, are relevant for assessing progress made in respect of several Sustainable Development Goal indicators. Additional information on the surveys is available from <https://mics.unicef.org/surveys>.

B. Five enabling actions

26. A careful combination of a predictable policy environment and regulatory reforms is necessary for the development and scaling up of digital innovations. Clear, coherent and increasingly harmonized regulations among countries need to be established to attract investment, which is in turn essential for achieving the economies of scale and network effects necessary for success. In the power sector, the harmonization of regulatory standards for smart grid interoperability under the United States of America-Association of Southeast Asian Nations (ASEAN) Smart Cities Partnership has led to the creation of the ASEAN Power Grid, an initiative that is aimed at achieving the seamless interaction of different technologies, thereby reducing costs and carbon emissions.³¹ To support the expansion of digitalization initiatives by tax administrations, it is critical for countries to implement a consistent and comprehensive framework of data security and privacy to protect taxpayer information. To strengthen digital trade, Malaysia and the Philippines have aligned compliance costs associated with non-tariff measures with international standards.³² The role of regional blocs in enabling such harmonization is important given their digital integration initiatives. For example, in the ASEAN region there is the Bandar Seri Begawan road map for digital transformation and the Digital Economy Framework Agreement. In addition, partnership agreements are being signed between countries. All these efforts help to promote the harmonization of regulations.

27. Just as stability and clarity are key enablers for investment, more flexible and iterative regulatory environments are crucial for promoting innovation. Flexible regulatory environments are positively correlated with innovation and have been linked to patent growth. The power sector in the region exemplifies the degree to which regulatory reforms can have a positive impact. Digitalizing grids improves efficiency and operations, strengthening the stability, security and reliability of the transmission and distribution network. Government interventions, such as incentives for smart grid investments and innovative taxes can shift consumer and business behaviour towards cleaner energy. As many of the power utilities in the region operate as State-owned utility companies, frequent updates to the policies that govern them are needed to catch up with societal sustainable development needs. Innovative tax reforms can encourage consumers and businesses to favour digitally driven sustainable development, as demonstrated by the feed-in tariff scheme implemented in Japan, which helped to increase the use of clean energy in that country.³³ Singapore has accelerated the uptake of artificial intelligence and the Internet of things in smart grids by incentivizing private-sector engagement in research and development, using the Pasir Panjang Terminal at the Port of Singapore as a living lab.³⁴

³¹ United States of America, Department of Commerce, International Trade Administration and Electric Power Research Institute, “Smart grid interoperability standards adoption in Southeast Asia: gap analyses for Indonesia, Malaysia, Philippines, Thailand, and Vietnam”, 2019.

³² ESCAP, Economic Commission for Africa and Economic Commission for Latin America and the Caribbean, *Digital Trade Regulatory Review for Asia-Pacific, Africa, and Latin America and the Caribbean* (2023).

³³ Japan, Ministry of Economy, Trade and Industry, Agency for Energy and Natural Resources and Energy, “Feed-in tariff scheme for renewable energy”, 1 July 2012.

³⁴ Singapore, Ministry of Trade and Industry, Energy Market Authority, Energy Innovation 2022, “AIOT-enabled smart grid applications for sustainable and resilient digital ports in Singapore” project summary.

28. Regulatory sandboxes can help to shape regulations that are supportive of digital innovation. Bangladesh has used this approach to develop regulations more favourable to cottage, micro-, small and medium-sized enterprises and to enhance their access to finance. To improve their operational efficiency, it has created a smart business profile platform, through which selected participants, adhering to robust data protection policies, are invited to test their software's effectiveness, streamline their processes and improve data accessibility. The pilot platform has benefited all those involved and is contributing to reducing lending costs for smallholder businesses.

29. Capacity-building is vital for leveraging the opportunities emerging from digital innovation. Governments, academic institutions and enterprises need to collaborate to develop comprehensive and agile curricula that build the skills in demand. Countries that have undergone a successful digital transition have adopted policies and strategies that help to facilitate the smooth integration of digital tools into the public sphere in an inclusive way. Connectivity-focused capacity-building programmes for regulators are needed to support the development of seamless regional infrastructures and digital ecosystems. In Indonesia, Kartu Prakerja is an online platform-based program that is boosting job skills development and entrepreneurial capabilities. Developed by the Government of Indonesia in partnership with the Asian and Pacific Training Centre for Information and Communication Technology for Development, Kartu Prakerja caters to diverse groups, including jobseekers, micro-sized and small business owners, women, persons with disabilities and individuals from disadvantaged communities, through training sessions held in person, online and using hybrid modalities.³⁵ Beyond having a direct impact on Indonesian entrepreneurs, the collaboration between the Centre and the Government on Kartu Prakerja can yield significant spin-off benefits for various sectors. As digital skills become easier to acquire by more people, the overall workforce's capacity to adapt to and thrive in a rapidly evolving digital landscape is being strengthened. This can increase productivity and competitiveness, improve services through digitalization and create a more versatile and adaptable labour force capable of driving innovation and economic growth.

30. Effective stakeholder engagement underpins the successful initiation and functionality of digital innovation platforms (see figure I above). Maintaining a continuous dialogue among Governments, start-ups, information technology developers and civil society representatives is a prerequisite for success. Involving users in the development stages and establishing iterative feedback mechanisms ensures user-centric platforms that are responsive to evolving needs. Using cognitive digital technologies for feedback analysis can further enhance the user experience. Campaigns to demystify platforms, highlighting their efficiency and convenience, can also be helpful. The secretariat's project entitled "Catalysing women's entrepreneurship" demonstrates the transformative impact of a holistic and multistakeholder approach to supporting women-owned micro-, small and medium-sized enterprises in Bangladesh, Cambodia, Fiji, Nepal, Samoa and Viet Nam in the digital age.³⁶

³⁵ International Labour Organization, *Technology in Public Employment Services to Promote Youth Employment in Asia and the Pacific* (Bangkok, 2023).

³⁶ See www.unescap.org/projects/cwe and ESCAP.

31. Upholding the rights of people in vulnerable situations in digital contexts requires a comprehensive understanding of the barriers encountered by diverse groups. For many marginalized groups, affordability is often a more significant barrier than the lack of Internet availability. Universal service funds, generally collected through levies on telecommunications operators, if well targeted, can support marginalized groups in gaining access to digital technologies.³⁷ For example, the Government of Malaysia has partnered with mobile network operators to provide a partial subsidy through a universal service fund for entry-level smartphone purchases by young people in rural areas.³⁸ That said, digital products and services need to be of good quality and easy to use, not only available. “Jan Dhan-Aadhaar-Mobile” is an initiative that has given 500 million people in India access to direct benefit transfers by leveraging public digital infrastructure connectivity, digital identification tools and financial technologies to promote financial inclusion. China has formulated guiding standards and encouraged information technology companies to develop accessible products for persons with disabilities. Accordingly, some companies have set up independent full-time teams to support the accessibility of their applications for e-commerce and digital payments.³⁹ Enhancing digital skills, particularly among marginalized groups, and promoting participation in science, technology, engineering and mathematics education and careers are vital, as is increasing marginalized groups’ ability to protect themselves from the risks associated with using digital platforms.

V. Regional cooperation for digital innovation and sustainable development

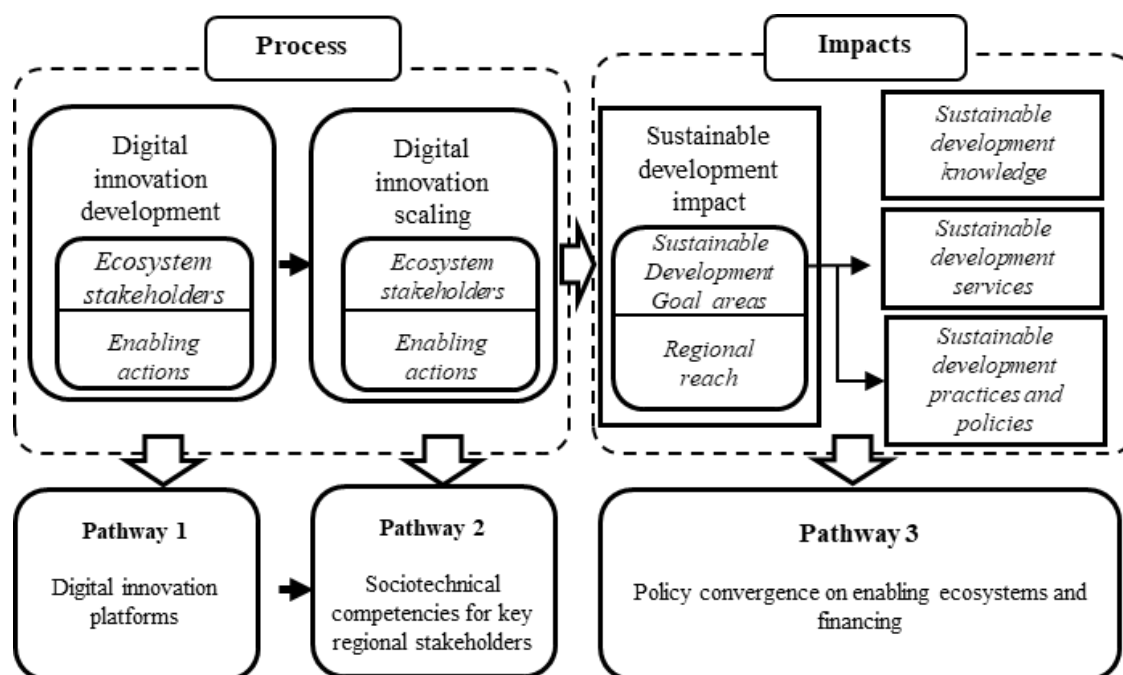
32. Regional cooperation can strengthen the link between digital innovation and sustainable development and promote the replication and scaling up of digital innovations across Asia and the Pacific. Drawing on the framework presented above and building on existing cooperation, the secretariat has identified three pathways to accelerate progress towards the Sustainable Development Goals (see figure IV).

³⁷ ESCAP, “The impact of universal service funds on fixed-broadband deployment and Internet adoption in Asia and the Pacific”, Asia-Pacific Information Superhighway (AP-IS) Working Paper Series (Bangkok, 2017).

³⁸ Ibid.

³⁹ ITU, *Output Report on ITU-D Question 7/1: Access to Telecommunication/ICT Services by Persons with Disabilities and Other Persons with Specific Needs – Study Period 2018–2021* (Geneva, 2021).

Figure IV
Three cooperative pathways of digital innovation



A. Pathway 1: embrace the platform model

33. Governments should continue to facilitate the development of digital innovation platforms that allow users to easily gain access to a combination of tools and resources that can, in turn, spur the development of new applications. Digital innovation platforms can help Governments to manage interactions within and across national borders and leverage this expanded network to improve services while reducing risk and improving scalability and inclusiveness. Digital innovation platforms that combine flexibility, scalability, inclusivity and a decentralized governance approach have an impact on sustainable development that is demonstrably superior to top-down innovation efforts. Yet, even those digital innovations most relevant for sustainable development can only be as good as the data upon which they draw. The platform model therefore needs to be underpinned by principles of data sovereignty and shared ownership and by safeguards for protecting the data privacy of individuals.

34. Through its analytical work and collaborative platforms, the secretariat can help ESCAP members and associate members to exchange solutions and strategies. It can also help them to identify scalable solutions and promote their adoption and adaptation to accelerate the implementation of the Sustainable Development Goals. In this regard, the secretariat’s capacity-building programmes can further strengthen the institutional and operational capabilities necessary for implementing clear governance principles, measuring the impact of digital innovations on the Goals, supporting the creation of enabling environments and replicating success at scale.

35. The secretariat is using the platform model to lower the entry barriers to adopting geospatial information-based digital innovations through a South-South cooperation initiative. Under the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030), ESCAP and the Aerospace Information Research Institute of the Chinese Academy of Sciences are working together to lower the cost of using cloud computing, machine learning and Big Earth data for automated crop monitoring and more

climate resilient agriculture in the countries of the lower Mekong region. The objective is to significantly increase access to new technologies, thus augmenting capacities to effectively process satellite and ground data. More needs to be done to understand better how such data can be used to strengthen efforts to measure the impacts of such innovations on the Sustainable Development Goals.

B. Pathway 2: build the sociotechnical competencies of key stakeholders in the region

36. Digital innovations are inherently sociotechnical, which emphasizes the need for stakeholders to cultivate competencies that extend beyond technical skills. This ensures that digital innovation complements effective governance rather than replacing it. Key measures include investing in training programmes for government officials and establishing regional knowledge hubs for businesses and non-governmental organizations engaged in digital innovation for sustainability.

37. Educational and training programmes such as the ones offered by the Asian and Pacific Training Centre for Information and Communication Technology for Development prioritize competencies that enable the seamless integration of digital innovations across all policy domains. Furthermore, as digitalization became the default mode during the COVID-19 pandemic, it assumed strategic significance in government policymaking agencies. There is a need, therefore, to support the development of strategic digital skills tailored to regional sustainable development needs. This includes fostering regional forums and digital diplomacy to facilitate negotiations at the regional level.

C. Pathway 3: promote policy convergence to strengthen enabling ecosystems and the financing of digital innovations

38. Increasingly harmonized policy frameworks across the Asia-Pacific region could create supportive environments that nurture the growth of digital innovations and their alignment with the 2030 Agenda for Sustainable Development. The development of common regional metrics could support this endeavour by building a shared understanding of how digital innovations are supporting accelerated progress towards the Sustainable Development Goals. The convergence of definitions and policies related to trade, financing and investment in digital technologies is particularly important. Ensuring that investments are directed towards innovations that can be scaled up, have a significant impact on sustainable development and benefit marginalized groups requires collaboration among Governments and financial institutions. By aligning their policies and financial strategies, Governments in Asia and the Pacific can collectively enhance the scalability, accessibility and impact of digitally driven sustainable development.

39. To support this third pathway, while bolstering the first and second, several cross-cutting ESCAP initiatives stand out:

(a) The Asia-Pacific Information Superhighway initiative is enhancing the availability and affordability of broadband Internet access across the region. The Action Plan for Implementing the Asia-Pacific Information Superhighway Initiative, 2022–2026, promotes research and partnerships among multiple stakeholders, especially civil society and government entities, to address the digital divide across countries and between rural and urban communities within countries, build capacity and facilitate information-sharing. It also promotes regional policy dialogues with the aim

of building a seamless information and communication space accessible to all. This initiative exemplifies how ESCAP can support the platform model of digital innovation discussed above;

(b) ESCAP is leading initiatives supporting the harmonization and interoperability of transport digitalization. This includes developing a regional road map and policy and regulatory frameworks for smart transport systems, as well as guidelines on smart mobility and transport-related Big Data. It also involves digitalizing the Asian Highway Network, the Trans-Asian Railway Network, dry ports, multimodal transport corridors and seaports, among others. The regional road map outlines major strategies and corresponding policy plans that countries can refer to when devising or updating their smart transport-related policies, plans and strategies. Establishing a dedicated cooperation mechanism for smart transport systems in Asia and the Pacific is one of the proposed policy plans. The Regional Action Programme for Sustainable Transport Development in Asia and the Pacific (2022–2026) aims to deploy smart transport systems, to increase awareness of innovative technologies and the use of big data, to interconnect maritime and port systems and to shift to smart regional transport networks;

(c) The Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific is accessible to countries at all levels of development wishing to develop or strengthen their capacity to engage in cross-border paperless trade and accelerate the implementation of digital trade facilitation measures. It is expected to reduce existing transaction costs by up to 30 per cent once it is fully implemented.

40. Building on all these initiatives along the three pathways identified above can accelerate the contribution of digital innovations to sustainable development. In a region that has emerged as an innovation hub, supporting this process requires collaborative governance and effective policy frameworks. While leveraging artificial intelligence, digital finance, government technology and the Internet of things comes with multiple challenges, it also offers an unparalleled opportunity for making progress. If it is to achieve the 2030 Agenda for Sustainable Development, it is an opportunity that the Asia-Pacific region must seize.

41. ESCAP may wish to review the issues and recommendations contained in the present document and provide the secretariat with guidance on its future work in that regard.