Policy perspectives on building an inclusive and sustainable digital future for accelerated implementation of the Sustainable Development Goals

Note by the secretariat

Summary

Accelerating progress towards the implementation of the 2030 Agenda for Sustainable Development is a priority in Asia and the Pacific, and innovations in digital technology applications are emerging as a powerful means of implementation. In the present document, the secretariat discusses the role of digital transformation in building an inclusive and sustainable future. It also presents innovative practices across sectors and countries, drawing from the key findings contained in the Asia-Pacific Digital Transformation Report 2024. The digital transformation framework developed by the secretariat was used in the preparation of the report to introduce a hypothesis on the nexus between digital transformation, growth and climate change. Furthermore, the secretariat proposes policy recommendations aimed at strengthening regional cooperation on digital transformation in support of accelerated implementation of the Sustainable Development Goals.

The participants in the Asia-Pacific Ministerial Conference on Digital Inclusion and Transformation may wish to provide the secretariat with guidance on policies and programmes for building an inclusive and sustainable digital future.

* ESCAP/MCDIT/1.
I. Introduction

1. Accelerating progress towards the full implementation of the 2030 Agenda for Sustainable Development is a priority in Asia and the Pacific. Positive strides have been made towards eliminating poverty (Sustainable Development Goal 1) and bolstering sustainable industry, innovation and infrastructure (Goal 9).\(^1\) Furthermore, notable contributions to progress towards Goal 9 have stemmed from the development of resilient and inclusive infrastructure and from improved access to information and communications technology.

2. However, progress on many of the Sustainable Development Goals has been uneven and inadequate. Climate action (Goal 13) is an immediate priority, notably due to an ongoing regression in the progress made. Consequently, it is important to integrate digital technologies and solutions into national climate policies, strategies and robust measures and to strengthen resilience and adaptive capacities to address climate-related risks and natural disasters.

3. If progress on the Sustainable Development Goals continues 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 accelerated. With the support of enabling policy and regulatory environments, digital innovations and connectivity could play a decisive role in finding the solutions needed to make a meaningful course correction.

4. 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.\(^2\)

5. In the present document, the secretariat discusses the role of digital transformation in building an inclusive and sustainable future. It also presents innovative practices across sectors and countries, drawing from the key findings contained in the forthcoming Asia-Pacific Digital Transformation Report 2024. The digital transformation framework developed by the secretariat was used in the preparation of the report to introduce a hypothesis on the nexus between digital transformation, growth and climate change. Furthermore, the secretariat proposes policy recommendations aimed at strengthening regional cooperation on digital transformation in support of accelerated implementation of the Sustainable Development Goals.

II. Digital transformation for accelerated implementation of the Sustainable Development Goals

6. Digital innovations are promoting inclusive and sustainable development throughout Asia and the Pacific. In the region, the most visible and common impact is observed in new societal values and better services

---

\(^1\) *Asia and the Pacific SDG Progress Report 2024: Showcasing Transformative Actions* (United Nations publication, 2024).

\(^2\) *Seizing the Opportunity: Digital Innovation for a Sustainable Future* (United Nations publication, 2024).

---
related to sustainable development that address societal, economic and environmental needs.

7. Innovations in government technology and digital platforms have improved the efficiency and transparency of public services, supporting progress across the Sustainable Development Goals, including by enhancing the inclusion and resilience of the poor and those in vulnerable situations (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). In Kazakhstan, the Digital Family Card has enabled the Government to more effectively support vulnerable families in areas such as education, social protection, finance, justice and health. Nearly 6 million families benefited during the first phase alone.3

8. Emerging technologies are also being applied to build sustainable cities and communities that promote good health and well-being, build inclusive societies and reduce inequalities (Goals 3, 10 and 11). In China, an adaptive machine-learning algorithm has been employed in the Beijing-Tianjin-Hebei region to forecast air quality and provide automatic forewarning of heavy pollution, inform health-related advisories and promote urban sustainability.4 In Japan, the Nippon Foundation has developed Bmaps, a barrier-free map application that uses artificial intelligence and virtual reality in generating its solutions and that enables persons with disabilities to navigate outdoor spaces freely and safely.5

9. The wide-ranging applications of digital technologies across sectors and services provide unparalleled transformation opportunities to accelerate the implementation of the Sustainable Development Goals. However, the replication and scaling up of digital innovations across Asia and the Pacific will require both enabling environments that nurture the growth of digital innovations and the alignment of those innovations with the 2030 Agenda, as will be discussed in section IV below. In that context, high-quality, timely, reliable and disaggregated data will enhance evidence-based decisions to spur the adoption of digital technologies in an intersectoral manner.

III. Mitigating the potential of a climate catastrophe

10. Embedded in a context of rising carbon emissions, as well as digital device and electricity usage, the climate crisis intersects with digital transformations through a complex mix of challenges and opportunities. Progress in the Asia-Pacific region is not in line with the emission reduction trajectories recommended by the Intergovernmental Panel on Climate Change to limit global warming to 1.5°C above pre-industrial levels.6 In addition, the region is highly vulnerable to the consequences of a climate catastrophe through more frequent extreme weather events and other disasters. At the same time, countries in Asia and the Pacific are at the heart of the digital

6 *2023 Review of Climate Ambition in Asia and the Pacific* (ST/ESCAP/3100).
transformations that can help tackle the climate crisis and reduce long-term energy consumption. Nevertheless, digital innovations would still result in increased greenhouse gas emissions if derived from non-renewable energy resources. In the Asia-Pacific Digital Transformation Report 2024, the evidence for these findings is examined and consideration is given to the ways in which the Asia-Pacific region can follow the most positive trajectory to mitigate the potential of a climate catastrophe.

A. The Sustainable Development Goals and the nexus between digital transformation, growth and climate change

11. Today’s digital transformations are the latest chapter in the story of industrialization, economic growth and social changes. Historically, economic growth has come at a cost, resulting in greater environmental degradation and increased greenhouse gas emissions. However, at later stages of development, and with the use of innovative technologies, there is a turning point beyond which the level of carbon emissions starts to drop.

12. The digital transformation framework, which uses 105 indicators to assess a country’s digital transformation progress, was first introduced in 2022. It was found that carbon emissions would initially rise with increasing per capita gross domestic product, but beyond a threshold, with continuous economic and technological development, emissions would start to fall. In addition, it was noted that the reduction would likely be steeper for countries with the highest digital capacities. 7

13. Technological development has an influence on the carbon emissions trajectory. However, the extent to which digital technology capacities contribute to climate action is also affected by other factors, including a country’s industrial and economic structures, its sociocultural context and deliberate country policies and actions.

14. In the Asia-Pacific Digital Transformation Report 2024, the alignment of digital transformations with energy transitions is also highlighted. The correlation between digital transformation and energy transition readiness underlines the importance of using efficient digital infrastructure and systems for energy optimization in support of Goal 7 (Affordable and clean energy). Notably, smart grids can reduce greenhouse gas emissions by minimizing power losses and integrating renewable sources of energy.

B. Digital applications for climate action

15. Digital technologies can be game changers in addressing climate change. Artificial intelligence, the Internet of things, digital twins and other emerging technologies provide innovative solutions that are aimed specifically at Goals 7 and 13 (Climate action), as well as other related Goals such as Goals 14 (Life below water) and 15 (Life on land). Digital tools are also critical for climate adaptation. For example, advanced analytics and geospatial technology are helping countries to respond to increasingly frequent and more severe climate-induced natural disasters. 8 This also includes more precise air pollution monitoring due to phenomena such as drought, land degradation, desertification and wildfires and thus contributes to achieving target 3.9 and

---

indicator 3.9.1 of the Goals, by which States committed themselves to substantially reducing the number of deaths and illnesses from air pollution.

16. In the Asia-Pacific Digital Transformation Report 2024, numerous cases and country examples demonstrating the power of digital innovations for climate action are presented, with ripple impacts across a range of Sustainable Development Goals. There are numerous such innovations, including in the areas of infrastructure, governance, mobility, industry and trade, digital data centres, disaster risk reduction, and agriculture and biodiversity ecosystems.

17. Infrastructure is steadily becoming smarter with regard to enhancing efficiency throughout its full life cycle. In addition to the design, construction, operation and management stages, enhancing efficiency also includes reusing infrastructure waste and optimizing the consumption of energy, which accounts for about 80 per cent of greenhouse gas emissions in the Asia-Pacific region. In the Russian Federation, blockchain technology is being tested for use in improving the efficiency of the electricity market. Artificial intelligence-driven smart grids can optimize supply and demand, facilitate the integration of renewables into energy systems and reduce reliance on fossil fuels. Digital twins are helping to build climate-resilient infrastructure through the use of climate modelling and the optimization of building infrastructure. In the Republic of Korea, a food waste management system based on radio frequency identification is being used to urge citizens to reduce the amount of, and recycle, daily food waste.

18. Governments in Asia and the Pacific are increasingly using digital tools and platforms to enhance public services. For example, digital identification systems are a critical component of digital infrastructure. The Singpass programme in Singapore, first launched in 2003, provides residents with a trusted digital identity for easy and secure access to over 2,000 government and private sector services. The Aadhaar programme in India is the world’s largest biometric identification system, serving as a digital platform for citizens’ biometric and demographic data. In the Russian Federation, blockchain technology is being tested for use in improving the efficiency of the electricity market. Artificial intelligence-driven smart grids can optimize supply and demand, facilitate the integration of renewables into energy systems and reduce reliance on fossil fuels. Digital twins are helping to build climate-resilient infrastructure through the use of climate modelling and the optimization of building infrastructure. In the Republic of Korea, a food waste management system based on radio frequency identification is being used to urge citizens to reduce the amount of, and recycle, daily food waste.

19. In Asia and the Pacific, transport demand and carbon emissions could increase by more than 50 per cent by 2050. Innovations in the transformation of transport include more than just electric vehicles. They also comprise ride-sharing schemes and public transport systems that take full advantage of satellite navigation, artificial intelligence and fifth-generation telecommunications networks. Some cities have implemented integrated systems that provide mobility as a service. For example, in 2020, the city of

---

9 Closing the Gap for SDG7 in the Asia-Pacific Region (United Nations publication, 2023).
10 Economic and Social Commission for Asia and the Pacific, “How can blockchain accelerate the SDG7 implementation?”, 5 June 2020.
Beijing introduced such an initiative, which included a carbon credit-inclusive incentive scheme to encourage participation. Kazakhstan and Uzbekistan have introduced digital features into their national rail networks, including electronic payment systems, digital client interfaces and links to other parts of the logistics system. Improving fuel efficiency is also an important concern while the transition to electric vehicles is under way. The ASEAN Fuel Economy Roadmap for the Transport Sector 2018–2025 with Focus on Light-Duty Vehicles is aimed at reducing the average fuel consumption of new light-duty vehicles by around 25 per cent.

20. Globally, the manufacturing industry accounts for 20 per cent of carbon emissions. Many companies in the region are also investing in cleaner and more efficient technologies, including renewable energy sources such as solar and wind power, and integrating smart manufacturing solutions to promote sustainable industries. In Indonesia, which has the third-largest aquaculture industry in the world, one company has developed a device for feeding fish and shrimp that is connected to the Internet of things and can be controlled and customized using a mobile phone. In addition to improving efficiency and harvests, the device has also helped to improve water quality along the entire supply chain – both upstream and downstream – benefiting more than 200,000 aquaculture farmers across 280 cities in Indonesia.

21. Digitalization is also enabling climate-smart trade, thereby helping to reduce trade costs and make global supply chains more resilient. For example, the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific is aimed at promoting cross-border paperless trade by enabling the exchange and mutual recognition of trade-related data and documents in electronic form. In Asia and the Pacific, it is estimated that automated customs and paperless trade agreements that process information digitally could save approximately 13 million tons of carbon emissions annually.

22. Data centres constitute the core of the digital society and economy, powering everything from commercial activities to public services. By 2026, the amount of electricity consumed globally by data centres, cryptocurrencies and artificial intelligence is expected to range from 620 to 1,050 terawatt-hours. With data centre demand expanding very rapidly across many countries in the Asia-Pacific region, increased attention is being paid to decarbonizing data centres by using innovative solutions based on artificial intelligence for energy management and cooling systems. Measures to boost the sustainability of data centres are also important. For example, the Government of Australia has implemented an energy rating system to measure the environmental impact of domestic data centres with a view to highlighting the level of energy usage and incentivizing improvements in operational

---

16 Association of Southeast Asian Nations (Jakarta, 2019).
17 World Economic Forum, “Reducing the carbon footprint of the manufacturing industry through data sharing”, 23 March 2022.
energy efficiency.\textsuperscript{20} Similarly, the United Nations Global Service Centre – as the leading provider for the digital technology and supply chain needs of the United Nations – uses an infrastructure monitoring system to track its energy consumption in real time and integrates infrastructure efficiency measures, which have resulted in a reduction in power use despite the increasing capacity of the Centre. In addition, at the United Nations Information and Communications Technology Facility, Valencia, all of the electricity consumed by the data centre is provided by a solar farm comprising 3,800 solar panels and 69 inverters, which since 2012 have prevented the release of 1,334,163 kg of carbon emissions into the atmosphere.

23. Digital technologies are helping to reduce risks and improve disaster management, thereby reducing both human casualties and economic losses. Accurate and timely information on climate risks is now available from space technology applications that utilize satellite-generated data and geographic information systems, combined with generative artificial intelligence applications and big data analytics. In North and East Asia, for example, the steep fall in mortality rates and in economic losses resulting from typhoons can be attributed to impact-based forecasting and risk-informed early warning products.\textsuperscript{21} The pan-Asia partnership for geospatial air pollution information is enabling the utilization of remote sensing data from sources such as the Geostationary Environment Monitoring Spectrometer and the Pandora spectrometer instrument for precise and in-depth study of air quality in pilot cities such as metropolitan Manila. SatGPT leverages large language models and cloud computing platforms to plot the hotspots of floods and other disasters. Starlink has provided emergency communication services using satellites, for example, after Tropical Cyclones Judy and Kevin in Vanuatu in 2023 and the eruption of the Hunga Tonga-Hunga Ha’apai volcano in Tonga in 2022.

24. Higher temperatures, irregular rainfall and extended periods of drought are creating harsher conditions for agriculture and biodiversity ecosystems. Smallholder farmers, who are disproportionately affected, can benefit from digital solutions that address climate shocks and stressors. In Pakistan, the BaKhabar Kissan digital platform provides farmers with weather information and agricultural expertise.\textsuperscript{22} In Nepal, the Aloi digital platform helps smallholder dairy farmers to access loans for investing in agricultural inputs when coping with lower crop yields of livestock forage.\textsuperscript{23} Digital solutions are also helping to improve the efficiency of natural resource management and address biodiversity loss. In Thailand, one company is developing a mobile biodiversity app that will provide traceability for its tea products from source to customer and will collect data on biodiversity using artificial intelligence-powered biosensors.\textsuperscript{24}

\textsuperscript{20} For more information on the National Australian Built Environment Rating System, see www.nabers.gov.au/ratings/spaces-we-rate/data-centres.


C. Envisioning future scenarios

25. The interaction of digital transformations with climate change can result in multiple complex outcomes. In a positive scenario, digital transformations reduce long-term carbon emissions by enhancing efficiency, innovation and connectivity. The positive scenario can result from three main effects:

   (a) **Efficiency effect.** Digital transformation improves efficiency, optimizes existing infrastructure and boosts supply and demand. According to the International Energy Agency, the deployment of digital technologies and big data could save about $80 billion per year, equivalent to approximately 5 per cent of global annual power generation costs;25

   (b) **Substitution effect.** Using new technologies, enterprises can replace physical needs and processes with digital and virtual alternatives that help to shrink carbon footprints. Having more activities networked or online is already dematerializing and transforming the ways in which individuals, companies and Governments operate and communicate;

   (c) **Combinatorial effect.** Many of the benefits of digitalization emerge not so much from individual technologies or policies but from the ways in which they interact, creating new synergies, innovations and values between foundational and emerging technologies, in particular through the introduction of artificial intelligence.

26. In a negative scenario, as countries move towards digital economies, soaring energy demands from digitally driven devices and services outweigh productivity gains. The digital economy confronts the dual challenge of meeting the increasing energy demands of inclusive digital societies and addressing the mounting climate concerns. The negative scenario can result from three main factors:

   (a) **Proliferation of digital devices and data centres that use artificial intelligence.** With the expansion of digital infrastructure, including data centres, and an increase in the use of artificial intelligence, total carbon emissions increase across product life cycles – from production to distribution to consumption to disposal;

   (b) **Uneven investment in climate technologies.** Another issue is uneven capital investment, in particular by the business sector, due to the gap between the short-term investment and long-term return. Insufficient private capital investment in carbon mitigation goes into sectors that generate the biggest shares of global emissions as the expectation is that capital investments into these sectors will come from banks, Governments and other providers;

   (c) **End-user demand increases carbon footprints.** Digital connectivity and the Internet of things are reshaping consumer preferences, choices and behaviours. Smartphones, smart home applications and social media are increasing the number of digital devices and time spent connected to the Internet of things, resulting in important carbon footprint implications related to operational energy consumption and the disposal of e-waste.

27. In a neutral scenario, increasing energy use and the resulting carbon emissions from the digital economy could erase the benefits of digital transformation for climate action, resulting in a neutral outcome. Whether digital transformation helps or hinders climate action has been a subject of

---

scientific debate. Yet, the extent to which digital transformation contributes to climate change will depend on a country’s technological capacity, industrial structure and deliberate policy measures.

IV. Policy recommendations on strengthening regional cooperation on digital transformation

28. Across Asia and the Pacific, countries differ widely in their levels of technological capacity, regulatory policies, industry structures, existing infrastructure, digital culture and behaviour patterns. Each country will adopt policies tailored to its specific context, but there are likely to be common elements. Well-designed policies, regulatory frameworks and sustained investments in digital technologies, data and integrated digital platforms can help accelerate digital transformation.

29. Building on the five pillars of the secretariat’s digital transformation framework, the following policy actions are recommended:

(a) With regard to pillar 1 (infrastructure and network), it is recommended that Governments invest in resilient, modular systems that take advantage of the co-deployment of fibre-optic cables along linear infrastructure such as power grids, highways and railways. Deploying such integrated infrastructure solutions is not only cost-effective; they are also key for the communication systems that underlie smart infrastructure. It is also necessary to establish principles for the sharing of software and infrastructure design as a means of finding collective knowledge-based solutions and of scaling up the impact of digital solutions on the implementation of the Sustainable Development Goals;

(b) With regard to pillar 2 (Government), it is recommended that Governments integrate digital solutions for climate action across ministries and national policy and planning processes, while strengthening stakeholder contributions. Towards that end, data governance principles, open data policies and concomitant regulatory measures should be integrated into digital solutions. In addition, policy officials need to be provided with opportunities to continuously acquire the skills and knowledge necessary to harness the benefits and minimize the risks of emerging technologies;

(c) With regard to pillar 3 (business), it is recommended that Governments improve regulatory frameworks, for example, through sector-specific experimental regulatory sandboxes. Such an approach may be useful for artificial intelligence applications, as it allows for the promotion of entrepreneurial innovation while mitigating potential societal risks in a controlled way that averts systemic risk. Furthermore, enacting targeted policy incentives that boost investments in low carbon markets, green technologies and renewable energy infrastructures and fill the gaps between short-term investment and long-term returns can be of further benefit. Such actions can enhance business sustainability by incentivizing the adoption of processes that produce and consume less carbon and leveraging digital technologies to optimize efficiency. Such actions should be in line with promoting sustainability across business strategies and actions, including integrating environmental, social and governance metrics to help reduce adverse environmental and social impacts, in support of the 2030 Agenda;

(d) With regard to pillar 4 (people), it is recommended that Governments raise public awareness and increase support for the effective use of digital knowledge, products and services. They should also take steps to invest in the acquisition of lifelong digital skills by all members of the public
so that behavioural changes in the sustainable use of new technologies are driven by whole-of-society, bottom-up approaches;

(e) With regard to pillar 5 (ecosystem), Governments and businesses can work together through public-private partnerships, which would enable researchers, policymakers and businesses to build knowledge and cooperative networks that would facilitate the sharing of the latest research findings and solutions. Ecosystems that promote digital innovation for accelerated implementation of the Sustainable Development Goals are crucially dependent on reliable, accessible and actionable data. In that regard, it is essential to increase the availability of open-access data, taking into account national contexts, and to ensure data interoperability in order to facilitate its use. In addition, it is important to develop tools to measure the impacts of actions aimed at digital transformation on the achievement of the Goals at the target and indicator levels.

30. The Asia-Pacific region has an unparalleled digital transformation opportunity to accelerate the implementation of the Sustainable Development Goals. Given the transboundary nature of economic, social and environmental challenges, it is beyond the ability of any single country to address them on its own. It is therefore imperative that Governments throughout Asia and the Pacific engage in regional cooperation in order to build an inclusive digital future, extend connectivity to all and harness new technologies for sustainable development.

31. In that regard, in May 2023, the Economic and Social Commission for Asia and the Pacific adopted its resolution 79/10 on promoting digital cooperation and inclusion through the Action Plan for Implementing the Asia-Pacific Information Superhighway Initiative, 2022–2026.

32. In April 2024, the Commission adopted its resolution 80/1, in which it expressed its appreciation to the Government of Kazakhstan for offering to host the Asia-Pacific Ministerial Conference on Digital Inclusion and Transformation and noted with appreciation the initiative of the Government of Kazakhstan on establishing a digital solutions centre for sustainable development to provide practical digital solutions in Central Asia and beyond.

V. Issues for consideration by the participants in the Ministerial Conference

33. The following draft recommendation is proposed for adoption by the participants in the Ministerial Conference:

Recommendation

The participants in the Asia-Pacific Ministerial Conference on Digital Inclusion and Transformation recommend that the Economic and Social Commission for Asia and the Pacific, at its eighty-first session, endorse the Astana Ministerial Declaration on Digital Inclusion and Transformation in Asia and the Pacific.

34. The following draft decision is proposed for adoption by participants in the Ministerial Conference:
Decision

The participants in the Asia-Pacific Ministerial Conference on Digital Inclusion and Transformation adopt the Astana Ministerial Declaration on Digital Inclusion and Transformation in Asia and the Pacific.

35. Members and associate members of the Commission are invited to share national policy perspectives on digital innovation and solutions for accelerating sustainable development.