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Review of the implementation of the 2030 Agenda for Sustainable Development in Asia and the Pacific and issues pertinent to the subsidiary structure of the Commission: trade, investment, enterprise and business innovation

Enabling inclusive and sustainable development through digital trade, investment, innovation and the use of technology

Note by the secretariat

Summary

Digital technologies are transforming the landscape of global trade, investment and innovation, but they are also posing new challenges that risk exacerbating existing inequalities across and within countries. It is thus critical to ensure equitable access to digital technologies for all and to enable countries to leverage and benefit from emerging opportunities in digital trade, investment and innovation.

In the present document, the secretariat provides an overview of the state of digital trade and investment in Asia and the Pacific. It presents the evolving policy environment supporting these flows, with a particular focus on emerging regional cooperation and integration initiatives. It also examines how these developments in digital trade, investment, innovation (including in the business sector and the digital economy) and emerging digital technologies (including fourth industrial revolution technology applications) are enabling inclusive and sustainable development in the Asia-Pacific region. Furthermore, it provides recommendations on how these trends can be effectively harnessed to achieve the Sustainable Development Goals and presents issues for consideration by the Economic and Social Commission for Asia and the Pacific.

The Commission may wish to review the present document and provide guidance on the future work of the secretariat.

* ESCAP/80/1.

I. Introduction

1. Digital technologies are transforming the landscape of global trade, investment and innovation, but they are also posing new challenges that risk exacerbating existing inequalities across and within countries. It is thus critical to ensure equitable access to digital technologies for all and to enable countries to leverage and benefit from emerging opportunities in digital trade, investment and innovation.

2. In the present document, the secretariat describes the linkages between digital trade and sustainable development and discusses trends in digital trade and related policies. It also presents an overview of digital foreign direct investment (FDI) trends and related policies. In addition, it summarizes sectoral initiatives and innovations in the digital economy, as well as opportunities and challenges, along with their implications for sustainable development. Furthermore, the secretariat notes emerging digital technologies and their implications for sustainable development. It also provides policy recommendations and highlights issues for consideration by the Economic and Social Commission for Asia and the Pacific (ESCAP).

II. Trends in digital trade[1]

A. Digital trade and sustainable development

3. Digital trade can have a transformative impact on the economic and social landscape, labour markets and entrepreneurial opportunities. Digital platforms and services help reduce costs for businesses entering new markets, thereby enhancing productivity and fostering innovation. Digital trade diminishes labour market frictions by lowering search and information costs, and it promotes higher-paying jobs through the adoption of advanced technologies, such as computerization and automation. These technologies improve labour productivity and catalyse the creation of new job types, especially in self-employment sectors such as e-commerce and remote professional services. In addition, digital trade is crucial in driving the adoption of fourth industrial revolution technologies, as it grants producers access to vital inputs such as data, information and knowledge.

4. Digital trade further promotes inclusivity, in particular for small businesses and marginalized groups. By reducing trade costs and expanding market opportunities, digital trade enables micro-, small and medium-sized enterprises to have a global presence without physical establishments. Online platforms offer features such as customer reviews and payment systems that build trust among buyers and investors, thereby reducing transaction costs for micro-, small and medium-sized enterprises. Digital trade also lowers entry barriers to markets and jobs for marginalized groups, including women, who have shown significant engagement in online businesses in the Asia-Pacific region. Women-led microenterprises thrive on e-commerce platforms. Digital trade opens up new job avenues with flexible work arrangements. Furthermore, it enhances access to essential services in health care, education and finance, exemplified by the growth of telemedicine, e-learning and digital financial solutions, respectively.

[1] The discussion in this section draws from *Asia-Pacific Trade and Investment Report 2023/24: Unleashing Digital Trade and Investment for Sustainable Development* (United Nations publication, 2023).

5. Environmental sustainability can also be positively affected by digital trade, which serves as a pathway to innovative environmental solutions by providing access to Internet-of-things solutions and data analytics, both crucial for developing resource-efficient technologies. The shift from traditional methods to digital processes, including e-signatures and e-communications, not only streamlines transactions but also supports sustainability objectives by reducing environmental footprints. This transition facilitates the growth of the circular economy and the optimization of supply chains, thereby enabling waste reduction. Digital trade, therefore, emerges as a significant contributor to both economic growth and environmental conservation.

6. However, several challenges persist that impede the full realization of digital trade's potential, including infrastructure disparities, policy barriers and challenges specific to micro-, small and medium-sized enterprises and marginalized groups.

7. A primary challenge is the so-called infrastructure divide – that is, the significant portion of the global population that remains offline, in particular in least developed countries and low-income regions. For instance, in 2022, only about 20 per cent of individuals in least developed countries used the Internet. The disparity is not only between countries but also within them, as is evident in the Asia-Pacific region, where urban Internet penetration significantly outpaces rural penetration. That digital divide, exacerbated by regulatory and institutional barriers, elevates the costs of Internet access and digital devices, thereby obstructing digital trade adoption. Despite extensive fourth-generation wireless network coverage in some regions, less than half the population uses the Internet, indicating that digital trade is being hindered by factors such as legal and regulatory frameworks and electronic commerce payment issues, and not by issues related to information and communications technology (ICT) connectivity.

8. Micro-, small and medium-sized enterprises, in particular in rapidly growing South-East Asian countries, exhibit considerable disparity in digital skills and knowledge. Owing to the language barrier resulting from information tending to be presented only in English, few of them engage in e-commerce. Gender disparity in the digital economy is also significant, as women generally possess fewer digital skills, such as coding, compared with men. That gap extends to digital transactions and e-commerce, with women often earning less than men for identical products. The coronavirus disease (COVID-19) pandemic further highlighted that many consumers and micro-, small and medium-sized enterprises, especially in developing countries, were not digitally equipped to capitalize on e-commerce.

9. Although digital trade helps to facilitate environmental sustainability, it also poses environmental challenges. The growth in parcel trade for e-commerce, which involves packaging, shipping and transportation, results in increased packaging waste and transportation emissions. In addition, significant electricity consumption by data centres and electronic devices contributes to larger carbon footprints. The disposal of electronic devices, essential to digital trade, presents further challenges, with a projected increase in global e-waste. The Asia-Pacific region, in particular, has a low e-waste recycling rate and lacks adequate recycling facilities compared with developed regions, thus posing environmental concerns.

10. As a result, digital trade presents both challenges to and opportunities for sustainable development. An overview of trends in trade flows and policies that can help to harness the potential of digital trade and reduce its associated risks is presented below.

B. Digital trade flows

11. Digital trade encompasses international trade flows that are digitally ordered and/or digitally delivered.[2] While existing data do not permit the computation of a single indicator that captures the full magnitude of digital trade flows, studies typically use trade flows of digitally deliverable services as a proxy to gauge trends in digital trade, with a particular focus on the digitally delivered component.

12. Digitally deliverable services are those that can be conveyed through an ICT network.[3] Using the trade flows of these services as a proxy, it was found that exports of digitally deliverable services totalled $3.9 trillion in 2022, representing 55 per cent of the global services trade. During 2022, the Asia-Pacific region exported digitally deliverable services worth approximately $958 billion, which represented 52 per cent of all exports of services from the region.

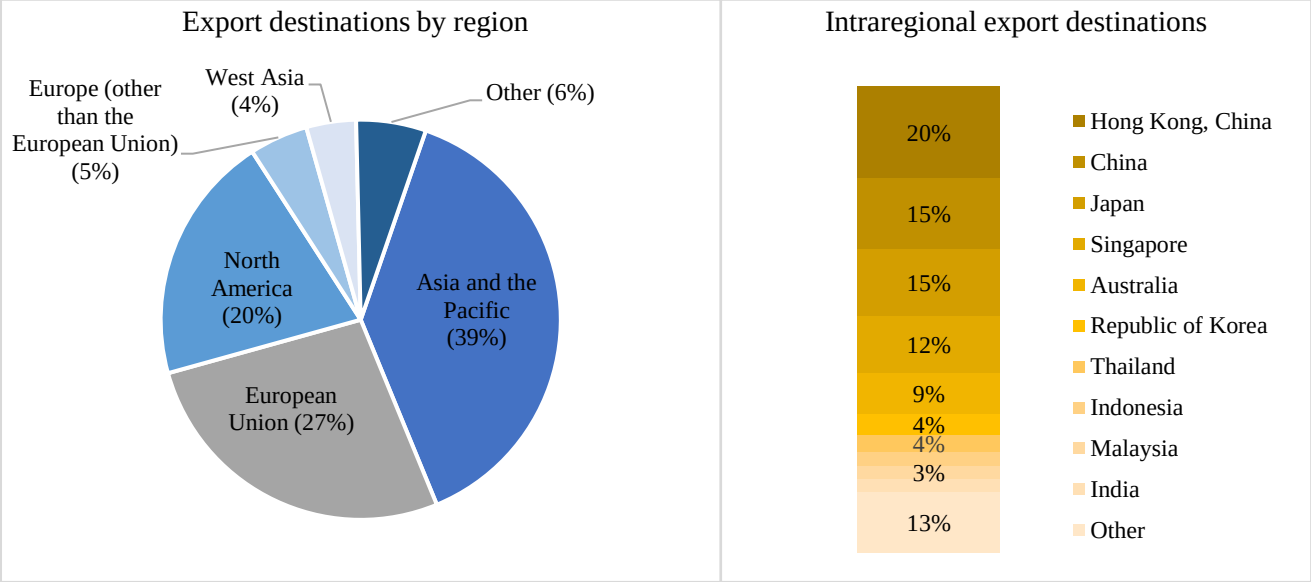
13. Globally, exports of digitally deliverable services grew by 6.8 per cent per year between 2015 and 2022. That rate outpaced the growth of all exports in commercial services, which was 5.1 per cent per year in the same period. The Asia-Pacific region represents about a quarter of the global trade in digitally deliverable services. The region's exports of digitally deliverable services grew by 8.6 per cent annually, with imports increasing at 7.2 per cent per year between 2015 and 2022. With its dynamic trade performance, the region's share in global exports of digitally deliverable services rose from 22 per cent in 2015 to 24 per cent in 2022, and its share of global imports also increased modestly from 23 per cent to 24 per cent.

14. Growing intraregional demand has driven exports of digitally deliverable services in the Asia-Pacific region. Between 2015 and 2021, the share of digital intraregional exports rose from 36 per cent to 39 per cent. The top five markets for Asia-Pacific intraregional exports were, in descending order, Hong Kong, China; China; Japan; Singapore; and Australia (see figure I). Outside the region, economies in the European Union and North America were the main trading partners. Those advanced markets accounted for 27 per cent and 20 per cent, respectively, of the region's exports.

[2] For a detailed discussion, see chapter 1 of *Asia-Pacific Trade and Investment Report 2023/24*.

[3] International Monetary Fund and others, *Handbook on Measuring Digital Trade* (Geneva, World Trade Organization, 2023).

Figure I
Export destinations of digitally deliverable services from Asia and the Pacific in 2021, measured regionally and intraregionally



Source: Economic and Social Commission for Asia and the Pacific (ESCAP) calculations based on OECD-WTO Balanced Trade in Services dataset. Available at www.oecd.org/sdd/its/balanced-trade-statistics.htm (accessed on 1 June 2023).

15. East and North-East Asia accounted for nearly 44 per cent of the region's digitally delivered exports in 2022, while South-East and South-West Asia together accounted for about 50 per cent. Notably, just six economies were responsible for 85 per cent of the region's exports of digital services. In descending order, they were India; China; Singapore; Japan; the Republic of Korea; and Hong Kong, China.

16. Increasingly, digitally deliverable services are becoming important exports for economies across the region, representing more than half the region's services exports. This shift has been largely driven by the repercussions of the COVID-19 pandemic. As the post-pandemic landscape continues to evolve, experts anticipate that exports of digital services will not only continue but will require countries to be actively prepared to engage in such trade.[4] Such a transformation may prove challenging for many Pacific small island developing States and least developed economies, in particular those economies in which digitally deliverable services constitute a negligible share in the services trade.

C. Digital trade-related policies

17. A well-structured regulatory framework is essential for fostering dynamic digital trade and reaping sustainable development benefits. However, excessive regulatory interventions can restrict the categories of products that can be remotely delivered or ordered. For example, banning cross-border data flows can hinder not only digital trade but also the evolution of digital value chains, both of which are vital engines for economic growth.

[4] United Nations Conference on Trade and Development (UNCTAD), *Digitalisation of Services: What Does it Imply to Trade and Development?* (Geneva, 2022).

18. From a macro perspective, Asia-Pacific economies demonstrate a dualistic approach in their digital trade and investment policy formulation. That observation is confirmed by ESCAP in a study based on the regional digital trade integration index framework (see box).

Regional digital trade integration index framework in brief

The regional digital trade integration index is a unified framework employed by ESCAP, the Economic Commission for Africa and the Economic Commission for Latin America and the Caribbean to analyse digital trade regulations in Asia and the Pacific, Africa and Latin America and the Caribbean.

In the index, digital trade and investment policies are given scores of zero (low cost of compliance) or one (high cost of compliance). In the current version of the index (2.0), digital trade policies are evaluated across 12 areas, which are grouped into three categories: traditional trade policies (tariffs, non-tariff measures and ICT standards); other domestic regulations (public procurement, FDI, intellectual property rights and telecommunications regulations); and digital governance policies (data policies, privacy rules, intermediary liability, content access and online sales). A score greater than zero indicates that at least one of the following conditions occurs:

- Differential treatment between domestic and foreign providers
- Additional regulatory compliance costs to services provided online, relative to those provided offline
- Absence of certain international norms (e.g. international agreements, legislation or legal mechanisms considered to be important for interoperability across jurisdictions)

19. On the one hand, with regard to policies related to tariff measures, trade facilitation mechanisms and intellectual property rights, there is a tendency towards regulatory simplification and regional regulatory harmonization. These developments are generally encouraging, because they help to reduce costs to businesses participating in digital trade and to promote competition. Conversely, in the policy areas relating to foreign investment regulations for digital services, regulations for telecommunications services, government procurement policies and the digital governance framework, there is a tendency towards more stringent policies and varied sets of rules. The digital governance framework in particular comprises rules governing data transfers, online content, digital platforms and e-transactions. It is worth noting that the oversight for many of these policy areas extends beyond the traditional scope of trade and investment ministries. This expansion underscores the need for a more interdisciplinary and comprehensive approach to regulation in digital trade and investment.

20. The analysis by ESCAP reveals significant variations in the regulatory stances of Asia-Pacific economies. The variation in regulations across economies poses significant challenges, in particular by escalating compliance costs for cross-border business operations. This is especially true for smaller firms, which often lack the resources or expertise necessary to navigate complex regulatory landscapes.

D. Multilateral and regional initiatives

21. The evolution of multilateral cooperation in digital trade has been marked by a blend of progress and challenges since its inception in 1998 with the work programme on e-commerce of the World Trade Organization (WTO). A key development under the programme was the moratorium on customs duties on electronic transmissions, which many preferential trade agreements have made permanent. Despite some minor adjustments, WTO legislation on digital trade largely remains in a pre-Internet state, with existing rules applied to digital trade disputes by the WTO judicial body. However, there are ongoing debates about the suitability of applying pre-digital era WTO rules to contemporary digital trade. The WTO Agreement on Trade Facilitation, which is the only new multilateral agreement, supports trade digitalization by promoting the acceptance of electronic documents and payments by government authorities.

22. In response to the stagnation of the work programme on e-commerce, the joint statement on e-commerce was initiated. As at 23 October 2023, 90 WTO members were participants, representing over 90 per cent of global trade. Although discussions under the joint statement initiative have made significant progress, there is still no consensus on key issues. A comprehensive agreement on e-commerce appears unlikely. A more likely outcome would be a less ambitious agreement focused on enabling and facilitating e-commerce, with relatively relaxed commitments on data flows. Such an outcome could establish a baseline for future digital trade rules.

23. Meanwhile, many countries are turning to regional trade agreements for deeper digital trade integration. The past two decades have seen a surge in regional trade agreements with digital trade provisions, including stand-alone chapters on e-commerce and the emergence of digital economy agreements, an area in which Singapore has been particularly active. Two examples of such agreements are the Asia-Pacific Economic Cooperation cross-border privacy rules system and the Association of Southeast Asian Nations (ASEAN) framework on personal data protection, both of which only address data privacy. The ASEAN Single Window and the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific are two other examples, both of which focus on the digitalization of trade documents.

III. Digital foreign direct investment and its implications for sustainable development

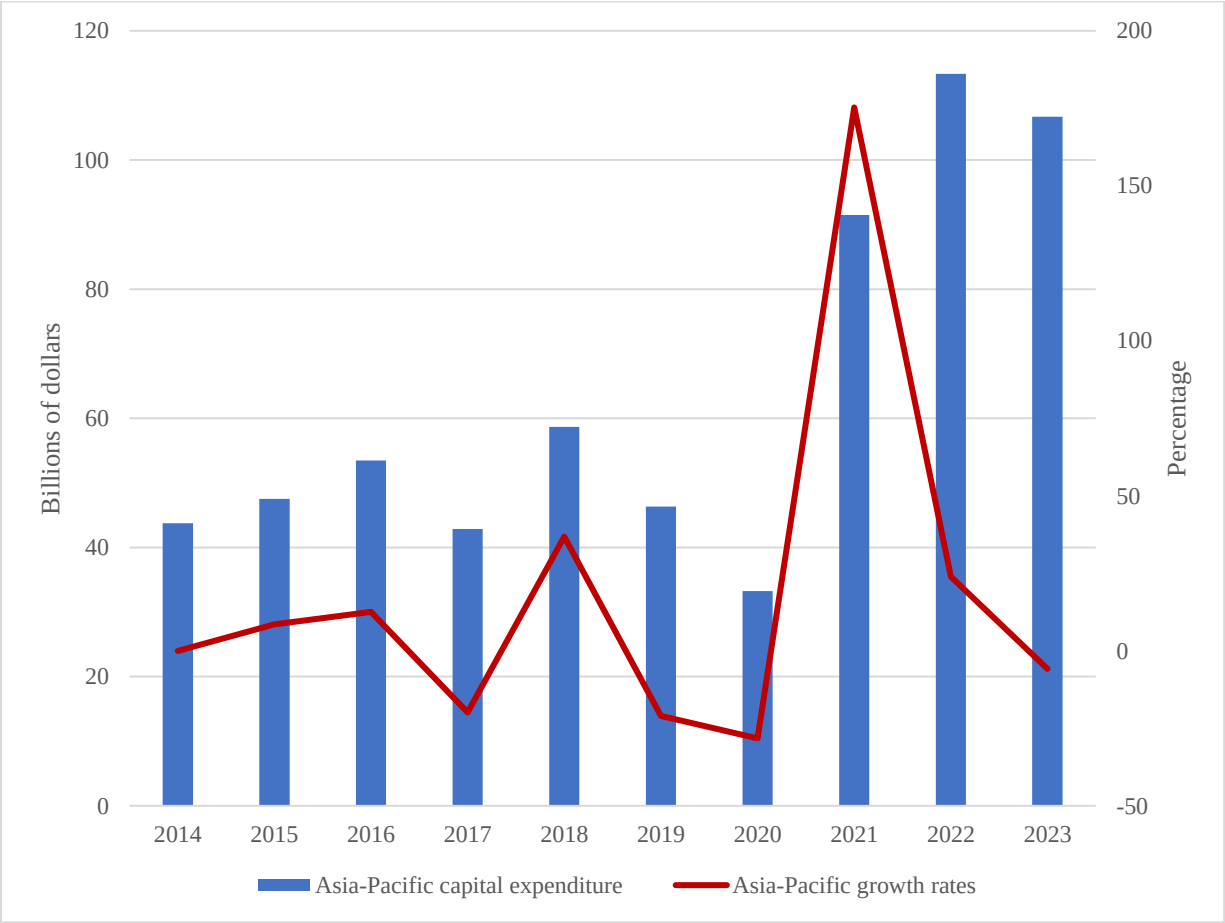
24. FDI in the digital economy can both drive economic development and support a paradigm shift towards sustainable investment. Investments from firms using digital technologies in additive manufacturing can dramatically minimize resource use, wastage and pollution by relying on stronger, more efficient synthetic materials and boosting precision in production. Artificial intelligence, digital connectivity and analytics could significantly boost agricultural yields and end hunger. Big data and three-dimensional virtual reality can help to realize breakthrough innovations in medicine, which combined with telemedicine could revolutionize health outreach, even to the world's poorest and most remote communities. Despite this recognition, many countries, especially in Asia and the Pacific, continue to struggle in terms of how they can practically and realistically attract and leverage such investment.

25. Several broader categories of digital FDI are outlined below and an overview is presented of recent trends in both FDI flows and policies in the region.

A. Trends in volume of digital foreign direct investment

26. The interplay between the COVID-19 pandemic and the digital transformation significantly affected the landscape of digital FDI. In 2021, digital FDI in the Asia-Pacific region grew by 175 per cent, outpacing global growth rates (see figure II). Data processing, communications and semiconductors became the leading beneficiaries of global greenfield FDI in 2021.[5] Over the past decade, consistent increases in FDI have been seen across digital sectors, such as software and information technology services, and electrical and electronic components.

Figure II
Digital greenfield foreign direct investment percentage growth and volume



27. The significant increase in digital FDI has been correlated with the rise in digital connectivity and consumers' embrace of digital technology. Greenfield FDI in core digital sectors in the Asia-Pacific region rose from $44 billion in 2014 to $107 billion in 2023, with the predominant share allocated to the semiconductor industry. As a global hub for semiconductor manufacturing, the region recorded a significant increase in investments from digital infrastructure and device firms.

28. Foreign direct investors in the digital economy can help host economies to cultivate their digital environments. Digital FDI comprises: (a) FDI in digital infrastructure; (b) FDI that contributes to digital adoption and digitalization of the wider economy; and (c) FDI from and in digital businesses. These three

[5] Investment Monitor, "Global FDI annual report 2022" (2022).

core areas and the related opportunities and implications for sustainable development for host economies are outlined below.

B. Trends in digital investment and related policies

29. FDI, and investment policy measures more broadly, are among the most intricate facets of digital policies in the Asia-Pacific region. Two major trends shape FDI policy dynamics, both in the region and globally. First, there is a lack of clarity and increasing fragmentation in policy formulation, which is largely due to the peripheral role of specialized investment promotion agencies in the decision-making process.[6] As a result, these policies are primarily dictated by ministries whose areas of focus are broad and who therefore lack the specific expertise. Second, due to factors such as developmental differences and cultural and security issues, many Governments have intensified their inward FDI screening processes. These measures are aimed at mitigating risks associated with foreign control; evolving innovation environments; and the potential misuse of personal data.[7] Frequently, these measures take the form of requirements that companies must meet in order to obtain licences and register businesses. These policies usually form part of wider domestic efforts aimed at regulating the digital industry, sometimes covering several sectors.

30. In the current regulatory environment of many Asia-Pacific economies, e-commerce and online services are targeted by so-called risk-reducing competition policies. Data from the regional digital trade integration index reveal that 77 per cent of surveyed economies set limits on foreign ownership in sectors related to digital trade, apart from e-commerce and telecommunications. Meanwhile, 23 per cent set limits on foreign ownership in e-commerce businesses. Moreover, 27 per cent of these economies require digital service providers to be located in the territory, and 64 per cent require licensing for digital content providers, online services and apps, even if these services are offered remotely. Measures are especially extensive in South-East Asia.

31. On the one hand, FDI in digital businesses in the Asia-Pacific region is characterized by stringent requirements pertaining to ownership, registration and licensing. Regarding ownership requirements, in Indonesia, for example, the requirements for non-bank payment services are, in general, more stringent than for other businesses. For most businesses, Indonesian shareholders must hold a minimum of 15 per cent of the voting rights. However, that percentage jumps to 51 per cent for digital payment services. Moreover, in clearing and settlement services, 80 per cent of the shareholders must be Indonesian citizens.[8] Regarding registration and licensing requirements, in Indonesia, for example, foreign e-commerce businesses must establish a foreign trade company representative office as part of their business registration prerequisites. They must also register their home country business licence with an authority and comply with local procurement guidelines, among other stipulations.[9] In Türkiye, e-commerce service providers with a net transaction

[6] Organisation for Economic Co-operation and Development (OECD), “Investment promotion and the digital economy: a comparative analysis of investment promotion practices across the OECD”, *Investment Insights* (December 2021).

[7] Julien Chaisse, “‘The black pit:’ power and pitfalls of digital FDI and cross-border data flows”, *World Trade Review*, vol. 22, No. 1 (February 2023), pp. 73–89.

[8] UNCTAD, “Indonesia: issuing new regulation on payment systems”, *Investment Policy Monitor*, 1 July 2021.

[9] UNCTAD, “Indonesia: new requirements for e-commerce companies”, *Investment Policy Monitor*, 19 May 2020.

volume exceeding approximately $600 million and over 100,000 transactions within the economy, excluding cancellations and refunds in a calendar year, must obtain an e-commerce licence. Lastly, regarding conditions on e-commerce activities, various measures have been enacted to regulate e-commerce businesses. In India, for example, competition policy measures are aimed at protecting smaller sellers and curtailing potential abuses by platforms that hold market dominance; and e-commerce marketplace entities cannot source more than 25 per cent of their products from a single seller. Furthermore, firms that have equity ties with marketplace entities cannot sell their items on the said platform, and those entities must report compliance to the Reserve Bank of India on an annual basis.[10]

32. On the other hand, many countries have streamlined FDI regulations in digital sectors; introduced tax benefits; enhanced their industrial and special economic zones; and established regulatory sandboxes.

33. Countries are progressively relaxing FDI restrictions in the digital domain. For example, the Government of the Republic of Korea repealed its long-standing ban on foreign digital ride-sharing platforms, a measure originally intended to protect domestic taxi businesses. Similarly, the Government of China launched a trial programme welcoming FDI in telecommunications services in key cities, including Chongqing, Hainan, Shanghai and Tianjin. The initiative will also extend to areas such as technological services and e-commerce.[11]

34. Regarding regulatory modifications in cross-border working capital and venture capital rules, the Governments of India and Viet Nam, for example, have introduced advance price agreements to address potential governmental hurdles or taxes on subsidiaries. This is particularly crucial when digital projects demand close cooperation between local and parent firms.[12]

35. Monetary strategies are frequently paired with fiscal incentives. For example, in China and Malaysia, tax breaks are offered for up to five years for the acquisition of technology, software and companies.[13] Furthermore, in India and Singapore, investment incentives are granted to selected foreign start-ups with a view to promoting local technological growth and easing the progression from the "proof of concept" stage to market-ready solutions.[14] In the renowned Zhongguancun national innovation development zone in Beijing, partial rent exemptions are provided to high-tech projects for up to two years.[15] In

[10] UNCTAD, "India: new FDI rules for e-commerce", *Investment Policy Monitor*, 1 February 2019.

[11] UNCTAD, "China: opens several services sector to FDI in Tianjin, Shanghai, Hainan, and Chongqing", 20 April 2021.

[12] India, Ministry of Science and Technology, "Technology development programme (TDP)", available at https://dst.gov.in/technology-development-program-tdp; and Sean Foley and others, "Vietnam's revamped rules on advance pricing agreements", Bloomberg Tax, 21 October 2021.

[13] Association of Southeast Asian Nations (ASEAN) and UNCTAD, *ASEAN Investment Report 2020–2021: Investing in Industry 4.0* (Jakarta, ASEAN, 2021).

[14] India, Ministry of Finance, "CBDT signs 95 advance pricing agreements in FY 2022-23", 31 March 2023. See also www.edb.gov.sg/en/how-we-help/incentives-and-schemes/tech-sg.html.

[15] China, Government of Beijing Municipality, "Measures of Zhongguancun National Innovation Demonstration Zone on administration of support fund for improving entrepreneurship service and promoting talent development", 5 July 2021.

Azerbaijan, as a part of the country's new digital economy strategy, special incentives will be introduced for digital economy investments.

36. Many countries offer tax and tariff incentives. For example, in China, India, Japan and Singapore, fiscal incentives are used, including corporate tax exemptions, which can range from 5 to 20 years, depending on project priority and import duty waivers on equipment and construction materials.[16] In Cambodia, a depreciation allowance is offered, whereas in Indonesia, tax reductions are provided. In India, research and development costs can be deducted in full, as can specific payments to research institutions.[17] In Sri Lanka, companies exporting digital services are exempt from corporate taxes and are eligible for capital allowances if they are investing above a certain threshold. It is important to note that if factors such as quality connectivity, digital expertise or venture capital availability are lacking, such fiscal incentives might not be as effective.[18] Thus, it is vital to evaluate the incentives within the broader business landscape of each country.

37. Asia-Pacific economies are digitally enhancing their industrial parks and special economic zones to attract investors. For example, in China, fifth-generation wireless networks and state-of-the-art broadband have been incorporated in the special economic zones in Shenzhen and Urumqi, catering to fourth industrial revolution initiatives.[19] In a similar vein, in Singapore and Thailand, incentives are provided for the formation of smart industrial zones connected to research and development centres.[20] Such digital transitions bolster the operational efficiency of special economic zones and underscore their significance in the host economy.

38. Regulatory sandboxes have been launched as temporary measures, before eventually being transformed into permanent initiatives. For example, the Central Bank of the Philippines piloted the use of peer-to-peer mobile money systems, culminating in a national e-money policy in 2009. In Malaysia, the Central Bank explored electronic know-your-customer solutions and digital onboarding tools. A financial technology firm participating in the initiative innovated peer-to-peer remittances and crafted a user verification mechanism using facial recognition. The Central Bank of Malaysia granted its approval in 2019 after necessary regulatory tweaks.[21]

39. These policy trends and developments in the region can provide useful inputs for investment promotion agencies and policymakers to use when attempting to revise their national digital economy frameworks. However, certain key considerations ought to be in place to ensure alignment and coherence, in order to maximize the benefits for the host economy.

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16 ASEAN and UNCTAD, *ASEAN Investment Report 2020–2021*.

17 Deloitte, "Survey of global investment and innovation incentives", 31 October 2020.

18 *Policy Guidebook on Attracting and Promoting FDI in the Digital Economy* (ST/ESCAP/3075).

19 China, State-owned Assets Supervision and Administration Commission of the State Council, "China mobile contributes to 5G development in special economic zone", 10 September 2020; and Seetao, "The first 5G industrial IoT industrial park in Xinjiang", 23 March 2022.

20 See HLB Thailand Tax, "Incentives for smart cities in Thailand", available at www.hlbthai.com/incentives-for-smart-cities-in-thailand/. See also https://estates.jtc.gov.sg/jid/about#overview.

21 World Bank, *Global Experiences from Regulatory Sandboxes* (Washington, D.C., 2020).

C. Digital foreign direct investment and economic and social transformation

40. Generally, digital FDI can provide much-needed capital inflows, which can help to facilitate technology and knowledge transfer, as well as digital literacy and education. Such inflows can also help to bolster the skill level of the labour force and introduce superior standards, thus helping address some traditional obstacles to economic development.[22]

41. Digital FDI can also enable the further development of industrial-scale and quality digital infrastructure. It may also open up other channels for the digital economy, paving the way for increased digital adoption and the proliferation of digital businesses. Through digital FDI, factors related to location are relegated to the background since an otherwise remote area can increasingly host key functions of the digital economy. The proliferation of new technologies and reduced costs is also levelling the playing field when it comes to technology deployment and the access to technology of local small and medium-sized enterprises vis-à-vis multinational corporations. Digital technologies may also make it easier for small and medium-sized enterprises to access skilled talent by improving their connection to job recruitment sites and services, outsourcing and online task hiring. These technologies can also enhance the connection of small and medium-sized enterprises to knowledge partners.[23] In that regard, Malaysia has set up an agency with a mandate to promote and attract digital FDI, namely, the Malaysia Digital Economy Corporation. The agency is responsible for the digital economy at large, as well as for the promotion of domestic and foreign investment in it. At the same time, the Malaysian Investment Development Authority carries out work to attract FDI specific to electronic and electrical components.

42. Digital FDI may also have considerable social impact. It can contribute to gender equality through: (a) the potential movement of qualified women employees; (b) the institutional adaptation by local competitor firms of women-related human resources practices used by multinational corporations; (c) increased training for women; (d) demonstration effects; or (e) other support programmes.

43. However, there are caveats. Digital FDI projects are not without risk. They tend to be light on assets, reducing what are traditionally the most immediate and tangible benefits of FDI, namely project-related infrastructure developments and provisions; the upskilling and training of the labour force; and employment benefits. Oftentimes, the skill and infrastructure level required for these projects pose an impenetrable barrier for most developing countries. If investment promotion agencies and policymakers neglect digital FDI in their national development strategies altogether, the digital divide will only become more pronounced, with developing countries missing out on the opportunities presented by digital FDI.

[22] For a detailed discussion of the transformative effects of digital FDI, see *Policy Guidebook on Attracting and Promoting FDI in the Digital Economy* and *Asia-Pacific Trade and Investment Report 2023/24*, especially chapters 3 and 7.

[23] OECD, *Key Issues for Digital Transformation in the G20: Report Prepared for A Joint G20 German Presidency/OECD Conference* (Paris, 2017).

44. Overall, the transformational effect of digital FDI on the economic and social structures of host economies depends strongly on the prevailing policy environment and the promotional practices employed, which can result in FDI having an overwhelmingly positive or problematic impact. ESCAP has developed a suite of sustainable FDI project indicators covering the economic, environmental, social and governance dimensions so that the promotion and policy environment can be tailored and adjusted accordingly.

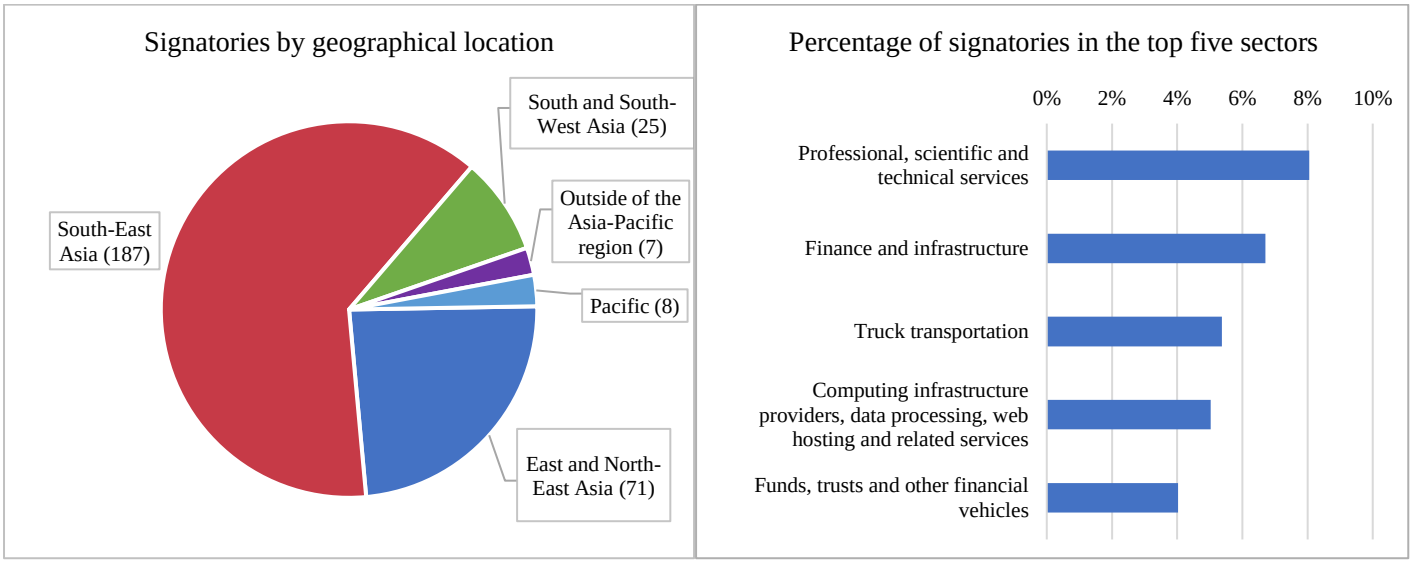
IV. Business sector initiatives and innovations in the digital economy: opportunities, challenges and implications for sustainable development

A. Asia-Pacific Green Deal for Business

45. Businesses have a critical role to play in harnessing digitalization for sustainable development. In this context, the Asia-Pacific Green Deal for Business, which has been initiated and promoted by the ESCAP Sustainable Business Network, represents a commitment by private actors in the region to act sustainably in the pursuit of a future that is not just commercially prosperous, but also environmentally and socially sustainable. The Green Deal calls upon businesses to advance the green transformation under five major themes. After launching the Green Deal at the Asia-Pacific Business Forum in 2022, and holding a discussion about its future direction at the 2023 Asia-Pacific Business Forum, the ESCAP Sustainable Business Network is now actively seeking more signatories for the Green Deal throughout the Asia-Pacific region.

46. As of December 2023, the Asia-Pacific Green Deal for Business had 298 signatories, namely businesses that are committing to a more sustainable future through private sector action. At present, the signatories are primarily from South-East Asia, but they are quite diverse in terms of the sectors they represent. The geographical makeup of these signatories reflects the countries where the ESCAP Sustainable Business Network is active and the engagement of the Network (figure III).

Figure III
Asia-Pacific Green Deal for Business signatories, by geographical location and by sector



B. Digitalization of environmental, social and corporate governance information

47. The Green Deal calls upon businesses to take action to reduce the environmental costs and impacts of their operations. That demand represents just one small component of the growing need for all businesses to reduce their scope 1, 2 and 3 emissions. As a result, businesses embedded in global supply chains are seeking the means to report on and reduce their carbon footprints. Businesses such as micro-, small and medium-sized enterprises are increasingly focused on calculating their carbon emissions, given the growing pressure to disclose that information. Digitalization provides a means to measure and reduce carbon emissions. The digitalization of the environmental, social and corporate governance information of micro-, small and medium-sized enterprises can be facilitated with big data and cloud computing approaches, which can in turn enable those businesses to increase their transparency to investors or lenders. Stakeholders, including companies that need to measure their scope 3 emissions, are more likely to do business with micro-, small and medium-sized enterprises whose environmental, social and corporate governance commitments are tracked and available to stakeholders. Financiers who are seeking new ways to grant green loans to businesses can also take advantage of that information and can provide greater access to finance to micro-, small and medium-sized enterprises that are more sustainable.

48. One such platform that facilitates the sharing of environmental, social and corporate governance information by micro-, small and medium-sized enterprises is the ESGpedia, launched in Singapore by a member of the ESCAP Sustainable Business Network.[24] The tool, which now also hosts the Asia-Pacific Green Deal for Business digital platform,[25] allows a business to input certain data such as energy use in order to calculate its carbon footprint and other metrics. Those data can then be accessed, with the business's permission, by selected stakeholders such as banks or clients. By taking advantage of such modern and user-friendly digital tools, micro-, small and medium-sized enterprises can take part in the growing trend towards using environmental, social and corporate governance excellence as a strategy for differentiating their businesses and gaining investor and customer confidence. Going forward, the ESCAP Sustainable Business Network, in particular through its green innovation pillar under the Asia-Pacific Green Deal for Business, could further leverage digital tools and technologies, including promising innovations such as artificial intelligence, to promote the measurement and impact of sustainability among businesses in the region.

V. Emerging digital technologies for sustainable development

49. Digital technologies provide a versatile range of innovative solutions to address the challenges of sustainable development. The digital transformation largely driven by fourth industrial revolution technologies has been unprecedented in terms of its speed, scope and scale of usage across the sectors. Key fourth industrial revolution technologies include artificial intelligence, the Internet of things, big data, machine learning and robotics. These are now becoming necessities for addressing the challenges of sustainable development. According to a study by the World Economic Forum, 70 per cent of the

[24] DigitalCFO Asia, "ESGpedia officially launches, aggregating verified ESG data and certifications across various sectors to enable more effective green finance", 18 May 2022.

[25] See https://esbn.esgpedia.io/.

169 targets under the Sustainable Development Goals could be enabled by existing fourth industrial revolution technology applications.[26]

A. Trends

50. The development and utilization of fourth industrial revolution technologies is occurring at an unprecedented rate as corroborated by an increase in their market share. The United Nations Conference on Trade and Development (UNCTAD) analysed the market share of 17 green and frontier technologies, such as artificial intelligence, Internet of things, electric vehicles and green hydrogen. In its *Technology and Innovation Report 2023*, UNCTAD highlighted that in 2020, those technologies already represented a market valued at $1.5 trillion, which could grow to over $9.5 trillion by 2030, or about three times the size of the economy of India. UNCTAD also noted that around half of the market value was attributed to the Internet of things, which comprises a vast range of devices across multiple sectors. At the same time, there was a rapidly expanding market for artificial intelligence, which by 2030 could be worth between $13 trillion and $16 trillion to the global economy.

51. In *Markets of Tomorrow Report 2023: Turning Technologies into New Sources of Global Growth*, published in 2023, the World Economic Forum noted that the advent of fourth industrial revolution technologies had led to wide-ranging opportunities for policymakers and businesses. The central importance of fourth industrial revolution technologies to the new markets of tomorrow was also highlighted.

B. Opportunities and challenges

52. Fourth industrial revolution technologies offer applications across a wide range of sectors, such as health care, climate change, clean energy, intelligent manufacturing and precision agriculture. In particular, digital and fourth industrial revolution technologies demonstrate great promise in terms of enhancing climate action.

1. Climate action

53. Fourth industrial revolution technologies and applications can help in addressing climate change through improved efficiency, reduced emissions, greater reliability and the optimization of costs in the energy sector. Artificial intelligence can improve energy efficiency by incorporating data from smart meters to estimate energy demand, and it can also help power utilities to optimize energy production. Fifth-generation wireless network-based smart grids can connect to numerous data points across long distances, ranging from wind turbines to rooftop solar panels and electric vehicle batteries.

2. Climate resilience

54. Advanced technologies are being used to adapt to climate risks and impacts across different sectors. Such technologies help to improve the effectiveness and efficiency of adaptation interventions. Big data has been used to provide better services for the improvement of crop management practices, including access to knowledge about weather and climate change; land; animal research; crops; soil; weeds; food availability and security; biodiversity; farmers' decision-making; farmers' insurance and finance; and remote

[26] World Economic Forum, "Unlocking technology for the global goals" (Geneva, 2020).

sensing.[27] Better planning to address the impacts of climate change can be accomplished through the provision of access to real-time monitoring and forecasting hazards at multiple spatial scales using digital technologies such as drought monitoring systems that rely on space technology and open data.

3. Disaster risk reduction

55. Advances in digital technologies have transformed data collection and decision-making in climate-induced disaster management. These technologies include artificial intelligence-based early warning systems and the use of big data for enhanced disaster preparedness, response and recovery. They enable faster risk communication, improve understanding of disasters, strengthen early warnings and enhance post-crisis knowledge management. Some innovative digital applications include: (a) the use of the metaverse to enhance public disaster preparedness in Japan,[28] (b) the quantified cities movement for evidence-based planning in India[29] and (c) the locally accessible cloud system as a portable communication tool in disaster situations in the Philippines.[30]

C. Enabling strategies

56. The potential impact of digital technology and fourth industrial revolution applications largely depends on how they are harnessed and implemented in different contexts. They also have their own set of potential challenges, including issues related to data capture and use; data security; the digital divide across different regions and socioeconomic groups; and their potential impact on employment. In order to foster their adoption, enabling strategies and innovative applications will be needed. At the same time, it will be necessary to address the challenges through appropriate policy frameworks, adequate infrastructure, capacity-building and partnerships. The presence of an enabling environment, the actions of different stakeholders and the technological advancements themselves will determine how these technologies could be used more effectively to achieve the Sustainable Development Goals.

1. Regional and international cooperation

57. Addressing climate challenges through digital technology solutions requires collaboration among Governments, industries, academia and civil society across the region. As countries have varied capabilities and resources, cross-border collaboration can promote innovation, access to technologies and human resources development. In addition, it can enhance the building of the local capacity of institutions and enterprises and help in identifying innovative ways for the scaling up and adoption of digital technologies.

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[27] Andreas Kamilaris, Andreas Kartakoullis and Francesc X. Prenafeta-Boldú, "A review on the practice of big data analysis in agriculture", *Computers and Electronics in Agriculture*, vol. 143 (December 2017), pp. 23–37.

[28] Tomo Kawane and Rajib Shaw, "The metaverse and regional challenges in Japan", *Asia-Pacific Tech Monitor*, vol. 40, No. 2 (April–June 2023), pp. 21–25.

[29] Sarbjit Singh Sahota and Siddharth Benninger, "Quantified cities movement: a framework for convergent risk-informed decentralised disaster risk reduction", *Asia-Pacific Tech Monitor*, vol. 40, No. 2 (April–June 2023), pp. 26–36.

[30] Toshikazu Sakano and others, "Locally accessible cloud system (LACS) as a portable communication tool in disaster situations", *Asia-Pacific Tech Monitor*, vol. 40, No. 2 (April–June 2023), pp. 37–47.

2. Scaling up and adoption

58. The strategy for scaling up and adopting digital and fourth industrial revolution technologies requires systematic planning; the identification of priority needs; open innovation; the pilot-testing of innovations and prototypes; skills development; the development of partnerships; enabling policy incentives; and finance. While developed countries are leading in the domain of fourth industrial revolution technologies, developing countries would require adequate policy thrust, incentives and finance offered with concessional terms and conditions to accelerate their adoption and diffusion. Appropriate policy incentives and economically viable business models would attract increased public and private investments for the scaling up and commercialization of fourth industrial revolution-based solutions.

3. Capacity-building

59. With an increase in the diffusion of advanced digital technologies, their effective utilization will depend on skilled professionals. These may include engineers, software developers, material scientists and a wide range of other specialists. The skilling, reskilling and upskilling of the workforce will also be necessary, in order to enhance the capacities of workers and foster innovation. In that regard, an important role will be played by academia; universities; and research and development institutions.

4. Policymaking and strategy development

60. Well-targeted policies, strategies and incentives have the potential to boost climate technology innovations; industrial research and development; and technology scale-up, transfer and adoption, with the objective of lowering the overall cost of achieving long-term climate goals.

VI. Policy recommendations and opportunities

61. The following section contains recommendations, including policy recommendations, for each thematic area outlined above.

A. Digital trade

62. **Align policy with WTO core principles.** It is of paramount importance that Governments in the Asia-Pacific region align domestic regulations with the principles of transparency and non-discrimination, ensuring compliance with the minimum requirements stipulated by existing WTO agreement guidelines. It is essential that these principles are consistently upheld across all policy interventions at the unilateral, regional or multilateral levels.

63. **Leverage existing regional frameworks to enhance cross-border interoperability of digital trade and investment rules.** Governments in the Asia-Pacific region should leverage international and regional agreements to address the fragmented regulatory environment in core areas such as data privacy, data transfer, cybersecurity and consumer protection. In addition, a regional joint effort, combined with the liberalization of the trade in services, including in the health, education and environmental sectors, is essential. As a starting point, Governments in the region should engage in regulatory dialogues, establishing the foundation for the eventual mutual recognition of protocols and standards. In addition, preferential trade agreement partners

should prioritize timely notifications of regulatory changes and work collaboratively to develop regulatory information portals.

64. **Expedite the implementation of paperless trade facilitation agreements.** Governments in the Asia-Pacific region should accelerate the implementation of the WTO Agreement on Trade Facilitation and reference the Framework Agreement on Facilitation of Cross-border Paperless Trade in Asia and the Pacific and the United Nations Commission on International Trade Law model laws when formulating digital trade facilitation policies. By leveraging these global and regional frameworks, they can significantly enhance cross-border interoperability for e-commerce facilitation, offering substantial benefits for micro-, small and medium-sized enterprises. Moreover, fully digitalizing trade regulatory processes in the Asia-Pacific region will reduce the adverse impact of trade on the environment.

B. Digital foreign direct investment

65. Just as the three core elements of digital FDI are inherently intertwined, efforts to promote them and attract investors are not mutually exclusive. Progress in the field of digital infrastructure is a precondition for fostering growth and inflows in the fields on digital adoption and digital business, for example. Keeping this in mind, Governments should design and implement a coherent national digitalization strategy that includes a central, realistic and practical role for FDI. The key benefits arising from digital infrastructure development are capital procurement and funding; technology acquisition and transfer; and the creation of a spectrum of new jobs. In order to help responsible ministries and investment promotion agencies to prepare to channel FDI into that area, key priorities of investors in the field should be considered, including the implementation of a functioning modern licensing system; the availability of skilled engineers and local labour; efficient spectrum allocation; independent regulation; the use of global digital infrastructure standards; and an open, liberal FDI regime.

66. The main drivers of digital adoption are cloud technologies; fourth industrial revolution technologies; big data and analytics; and mixed digital platforms, apps and digital subsidiaries. The main areas that policymakers should address to foster investments in the digital adoption include high-quality international and national digital connectivity; high-quality digital skills; a burgeoning technology and start-up ecosystem; and a robust regulatory framework for the digital economy.

67. In order to effectively generate leads and develop a local value proposition for foreign investors in digital business and digital start-ups, it is necessary for investment promotion agencies to keep abreast of developments in the start-up environment (both local and foreign). They also have to understand investor needs and recognize opportunities in order to support such firms.

C. Private sector

68. Given the role of the private sector in rapidly rolling out digital technologies, including artificial intelligence technologies, leading industry bodies and private sector networks should work hand-in-hand with Governments to discuss and share knowledge on the associated opportunities and risks. In its new terms of reference, the innovation task force of the ESCAP Sustainable Business Network highlights the need to discuss and contribute to the knowledge base on artificial intelligence technologies, including on their implications for sustainability and the emerging risks. The task force may be

positioned to investigate upcoming opportunities and risks in digital technologies, especially artificial intelligence, and to lend its expertise to advance the work of ESCAP. Given the possibility of existential risk, intergovernmental institutions such as ESCAP should take note of frontier developments in artificial intelligence. In that regard, the work of the innovation task force could be a valuable source of insight and practical advice.

D. Technology transfer

69. Recognizing the critical importance of digital and fourth industrial revolution technologies for sustainable development, ESCAP has been engaged in activities to promote the development, adoption and diffusion of these technologies. Through its Divisions and the Asian and Pacific Centre for Transfer of Technology, ESCAP has been organizing a series of international capacity-building events to discuss the opportunities and challenges related to these technologies and to identify priorities and the potential for regional cooperation.

70. In 2023, the Asian and Pacific Centre for Transfer of Technology compiled useful recommendations through its demand-driven regional consultations and capacity-building events. With regard to policy, the Centre recommended that Governments in the Asia-Pacific region should do the following:

(a) Undertake joint cross-border studies to examine specific climate change-related impacts, and design and implement focused actions to leverage fourth industrial revolution technologies for climate resilience, including the creation of policies to promote skills development and the development of green enterprises that include the participation of women and girls and other underrepresented groups;

(b) Undertake a technology needs assessment to help countries identify a priority list of needs, both in terms of technology itself and of the development and implementation of action plans and programmes;

(c) Examine and assess existing technologies before scaling up since existing traditional knowledge could help boost climate adaptation, for example, through the building of climate-resilient infrastructure or houses or through the use of unique farming methods as solutions at the community level;

(d) Use new models of intellectual property management and policies to enhance the accessibility of fourth industrial revolution technologies in developing countries;

(e) Adopt an integrated approach to air pollution control in cities, including air quality monitoring, impact assessment and modelling based on an emissions inventory and meteorological data and involving digital and fourth industrial revolution technologies;

(f) Use collaborative research and public-private partnerships to strengthen cross-border collaboration for the development and adoption of fourth industrial revolution technologies for climate adaptation and resilience;

(g) Develop a framework that takes into consideration the specific context and challenges in order to devise nature-based solutions; and support the implementation and wider adoption of those solutions through the dissemination of good practices and better understanding of their benefits, including through the use of digital and fourth industrial revolution technologies.

VII. Issues for consideration by the Commission

71. ESCAP may wish to take note of the present document and provide guidance on the future work of the secretariat.

72. ESCAP may also wish to discuss and consider areas in which the secretariat could provide support to members and associate members, including by identifying:

(a) Types of support, such as training and knowledge-sharing, tools, and research and advisory services, that may be required from the secretariat to promote trade, investment, business innovation and technology transfer;

(b) Policy issues related to trade, investment, business innovation and technology transfer that the secretariat should consider in greater detail to support members and associate members.