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Item 5 of the provisional agenda**
Presentation on the theme of the fifty-eighth session of the Economic Commission for Africa

Economic Commission for Africa
Conference of African Ministers of Finance, Planning and Economic Development
Fifty-eighth session
Tangier, Morocco, (hybrid) 2 and 3 April 2026

Item 3 of the provisional agenda***
Dialogue on the theme of the fifty-eighth session of the Economic Commission for Africa

Issues paper

Growth through innovation: harnessing data and frontier technologies for the economic transformation of Africa

I. Frontier technologies and innovation for transformation in Africa

1. Innovation has not had a significant impact on growth in Africa. Between 2000 and 2023, the continent's growth in gross domestic product (GDP) averaged 3.5 per cent but the composition of the growth shows that the continent made limited progress in productivity-enhancing transformation.[1] Results indicate that growth was driven almost entirely by factor accumulation, capital and labour. Total factor productivity, which captures efficiency, technological progress, institutional quality and unmeasured inputs, made no significant contribution, which signals that productivity improvements have not accompanied the expansion of factor inputs.

2. There has been a slow reallocation of labour and capital from low-productivity activities to higher-productivity manufacturing and modern services. This is unlike in East Asia, where industrialization drove rapid and sustained growth over the same period. The very low levels of productivity growth and industrialization across most African countries indicate enormous potential for growth that is yet to be unlocked.

3. If frontier technologies and innovation are harnessed, they can be used to unlock the growth potential of Africa and to enhance the competitiveness of African economies through productivity growth and diversification. Frontier technologies can also be used to accelerate structural transformation, allowing the much-needed reallocation of resources from low- to high-productivity sectors.

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*** E/ECA/CM/58/1.
[1] United Nations, Economic Commission for Africa, *Economic Report on Africa 2026, Growth through Innovation: Harnessing Data and Frontier Technologies for Africa's Economic Transformation* (Addis Ababa, 2026).

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When embedded within an enabling policy and regulatory environment, supported by adequate financing and informed by data analytics, frontier technologies and their ongoing innovation will not only improve living standards but will also build countries' capacity to secure a durable competitive advantage.

4. Empirical work underscores that innovation is a fundamental determinant of productivity growth dynamics, economic resilience and long-term development. The central role of technology and innovation has been highlighted in economic theory for a long time. In an application of the concept of creative destruction, as described by Schumpeter,[2] Africa should harness frontier technologies to replace outdated production structures and reallocate resources towards more productive uses. Likewise, pursuant to endogenous growth theory, in which technological progress is embedded in production systems, it is possible to sustain long-term growth through knowledge accumulation, learning-by-doing, and research and development investments.

5. Manufacturing and high-value services benefit the most from frontier technologies and innovation. Recent evidence from a study by the Economic Commission for Africa[3] reveals that measurable productivity and growth dividends are associated with technology adoption in Africa. This reflects the fact that frontier technologies not only boost efficiency, through total factor productivity, but also enhance the mobilization and combination of labour and capital by improving worker capabilities and participation and by increasing the effectiveness and use of machinery, equipment and infrastructure. Sector-level findings in the same study reinforce the macro-level outcomes, with both manufacturing and services displaying clear productivity gains from technological innovation and adoption.

6. Frontier technologies and innovation present significant opportunities for African countries to ensure social and economic transformation, regional integration and progress towards attainment of the Sustainable Development Goals. The African Continental Free Trade Area, supported by interoperable digital systems, harmonized digital trade rules and trusted data governance frameworks, provides the scale, competitiveness and market integration necessary for Africa to harness the power of data and frontier technologies to drive growth.

II. Frontier technologies: gaining traction in Africa, lagging in the global marketplace

7. The global market for frontier technologies is big and is growing. Recent estimates suggest that the market will grow from $2.5 trillion in 2023 to $16.4 trillion by 2033.[4] Africa is home to about a fifth of the world's population, 42 per cent of young people, 30 per cent of the world's critical mineral reserves and 60 per cent of its best solar resources.[5] With such resources, the region has strong potential to capture a meaningful share of the growing market for frontier technologies but must leverage them effectively.

8. Geoeconomic strategic shifts present challenges and opportunities for Africa for specific and interconnected technologies and innovations. Frontier technologies are reshaping global economic governance, with growing debates

[2] Joseph Schumpeter, *The Theory of Economic Development: An Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle* (London, Routledge, 2017).

[3] United Nations, Economic Commission for Africa, *Economic Report on Africa 2026, Growth through Innovation: Harnessing Data and Frontier Technologies for Africa's Economic Transformation* (Addis Ababa, forthcoming).

[4] *Technology and Innovation Report 2025: Inclusive Artificial Intelligence for Development* (United Nations publication, 2025).

[5] Global Solar Council, *Africa Market Outlook for Solar PV: 2025–2028* (London, Global Star Council, 2025).

taking place on data sovereignty, the regulation of artificial intelligence, cybersecurity and cross-border digital trade. In addition, industrial policies are being put in place – especially in emerging and developing economies – to secure strategic capabilities, in particular in semiconductors, critical minerals, battery technologies and renewable energy value chains.

9. Certain frontier technologies are emerging as particularly strategic for structural transformation in Africa. They include artificial intelligence and automation, blockchain technology, the Internet of things, biotechnology and nanotechnologies. They also include green industrial technologies, financial technology (fintech) and digital payment systems (see section III), as well as data infrastructure and digital public infrastructure (see section IV).

10. Africa is lagging behind on artificial intelligence and needs to close the gap. Artificial intelligence is expected to contribute 5.6 per cent to the GDP of Africa, Oceania and developing Asian markets by 2030, which may seem substantial, but is far below the 10.4 per cent expected for developed economies in Asia, 14.5 per cent for North America and 10.3 per cent for Europe.[6] Recent mapping exercises show a growing number of artificial intelligence start-ups and solutions focused on such practical challenges as crop monitoring, diagnostics, credit and financial risk assessment, and language services tailored to local contexts.

11. Other frontier digital technologies show similar dynamics. The use of blockchain applications, for instance, is expanding across finance, cross-border payments, public registries and the energy sector. In recent years, the share of blockchain funding as a portion of all venture funding has increased in Africa. Nevertheless, the portion of global blockchain venture funding and deals in Africa declined in 2024.[7] The share of venture capital funding and deals in blockchain technology has surpassed the share in other sectors in Africa. By way of comparison, the market for the Internet of things in Africa may expand from $7 billion in 2024 to more than $20 billion by 2031,[8] driven by rising smartphone penetration, expanding licensed cellular connections and increased use of smart agriculture, logistics and utility management systems. The figure, however, is only about 0.9 per cent of the projected $2.65 trillion global market in 2031.[9]

12. Progress is also visible in frontier biotechnologies and nanotechnologies, but it remains modest relative to global trends. Biotechnologies in Africa are proliferating, driven by the advanced treatment of rising chronic and infectious diseases. For example, the number of African countries with high-throughput gene sequencing facilities grew from 7 in 2019 to 31 in 2022,[10] driven partly by the inadequacies exposed by the coronavirus disease (COVID-19) pandemic.

13. There is still more value to be created in biotechnology, with the sector's market size in Africa expected to reach $138.2 billion by 2030,[11] compared with a global market of $3.88 trillion.[12] Limited investment in research facilities, a lack of skills in some regions and a small base of pharmaceutical industries constrain the pace at which biotechnologies are adopted in Africa.

14. The same trend is also observed in nanotechnology, a frontier technology that enables the design and production of lighter, smaller, stronger and more innovative materials and devices. The African nanotechnology market is projected

[6] PwC, "Sizing the prize: what's the real value of AI for your business and how can you capitalise?" (2017).
[7] Hank Coetzee and Albert Stoffberg, *CV VC Africa Blockchain Report 2024* (Zug, Absa, 2024).
[8] Ravi Bhandari, *Africa IoT Market Report* (Delhi, 2023).
[9] Ibid.
[10] Africa Centres for Disease Control and Prevention, "A six-year journey: advancing pathogen genomics in Africa", 4 April 2003.
[11] Verified Market Research, "Africa pharmaceutical and biotechnology market size and forecast".
[12] Grand View Research, "Biotechnology market summary".

to grow from $18.4 billion in 2025 to $61.2 billion by 2031, driven by applications in nanomedicine, nanomaterials for renewables and nanoelectronics.[13]

15. Although Africa is making progress in frontier technologies, it is clearly not doing so as quickly as other regions. Given that the continent is starting from a low base in terms of technological, industrial and economic development, frontier technologies may widen the gaps if they are not fully harnessed by Africa. Furthermore, there is a deep interconnectedness and interdependence among frontier technologies, which means that suboptimal performance in one such technology is likely to have a ripple effect on others. Conversely, advances in the Internet of things, 5G networks and blockchain technology are likely to create windows of opportunity for artificial intelligence, the metaverse and robotics.

III. Opportunities for Africa to harness data and frontier technologies

A. Energy and minerals

16. Africa is endowed with unparalleled energy resources that are vital for technology and innovation-driven economic transformation. Africa has 12 per cent of global feasible hydropower potential,[14] with the capacity to add up to 350 GW of electricity from this source. It also has abundant potential for other energy sources: 110 GW for wind energy, 15 GW for geothermal energy and 10,000 GW for solar energy.[15] Such global-scale energy resources offer strategic advantages for developing low-cost, clean-energy capacity to drive green industries, enable digital centres and facilitate productive competitiveness. The development of regional electricity markets offers an operational framework to leverage such resources.

17. Green hydrogen has the potential to revolutionize renewable energy in Africa, and several countries are seizing the opportunities that it offers. South Africa, for instance, is exploring the use of green hydrogen in mining and manufacturing, guided by its road map on the subject; Namibia is seeking to increase the role of green hydrogen in its energy mix, export it to Europe and use it in the steel, shipping and fertilizer industries; Kenya is aiming to achieve 100 per cent renewable energy by 2030 and plans to replace diesel with hydrogen in its heavy transport sector; Nigeria is diversifying its energy portfolio with renewables and has included hydrogen in its energy transition plan; Egypt is expanding its investments in green hydrogen; and Morocco is integrating hydrogen into such projects as the solar complex in Ouarzazate. The $40 billion Aman green hydrogen project in Mauritania will generate 1.7 million tons of green hydrogen.[16]

18. African countries are increasingly interested in nuclear energy technology. Such technologies as small modular reactors are ideal for decentralized or off-grid set-ups owing to their small size and low infrastructure requirements compared with traditional nuclear power stations.[17] Their modular design enables scalable capacity, making them particularly suitable for the growing, dispersed energy demands of Africa. In addition, they provide dependable baseload power, effectively supporting the integration of renewable energy sources. Several African countries are investigating these nuclear options. In one estimate, nuclear

[13] Mobility Foresights, “Africa nanotechnology market size, share, trends and forecasts 2031”, 4 August 2025.
[14] David Appleyard, “Africa’s hydropower future”, 1 January 2014.
[15] African Development Bank, “Why Africa is the next renewables powerhouse”, 7 December 2019.
[16] Global Energy Association, “Mauritania to outline the largest green hydrogen project in Africa”, 9 June 2022.
[17] International Atomic Energy Agency, “Small modular reactors: a new nuclear energy paradigm” (2024).

capacity in Africa could triple by 2030 and increase tenfold by 2050, requiring investment exceeding $100 billion.[18]

19. Africa is endowed with critical minerals that are vital for the energy transition and for technology manufacturing. Nearly 30 per cent of the world's critical minerals that are essential for clean-energy technologies[19] and the majority of cobalt resources are located in Africa, giving the continent a demonstrable comparative advantage. Strategic industries such as digital technologies and telecommunications also depend on these critical minerals. By localizing production and increasing participation in local, regional and global value chains, African countries can drive forward green industrialization and sustainable development.

20. Frontier technologies, such as digital traceability, blockchain technology and biometrics, are transforming the mining industry in Africa. They support policies aimed at formalizing artisanal and small-scale mining and promoting responsible sourcing, with a view to improving traceability, safeguarding worker rights and enhancing environmental standards. For instance, in pilot projects in the Democratic Republic of the Congo, traceability tools, smartphone applications, digital ledgers and biometric systems are used to monitor cobalt and other minerals. Such initiatives have led to tangible improvements in site productivity and better income for miners. Data from the Mutoshi pilot project showed increased output per worker and higher monthly earnings for women, averaging approximately $34, with some earning as much as $100 per month.[20] By 2021, the Better Mining monitoring programme covered about one in five accessible artisanal and small-scale cobalt mining sites in the Democratic Republic of the Congo, serving more than 55,000 miners.[21] These frontier technologies support the Africa Mining Vision[22] and the African Green Minerals Strategy.[23]

B. Agriculture and food security

21. Frontier technologies have the potential to transform agriculture in Africa, since they can be used to boost crop productivity, enhance water and land-use efficiency and promote climate resilience and adaptation. Four sets of frontier agricultural technologies – biotechnology; agricultural digital technology; precision technology; and the Internet of things and sensors – have had a substantial impact on the sector and hold significant promise if they can be deployed at scale in Africa.

22. Biotechnology involves harnessing advanced breeding techniques to develop climate-smart or climate-resilient crop and animal varieties, such as those resistant to drought, pests and diseases and those that are high-yielding, nutrient-rich and fast-maturing. Biotechnology has stabilized crop yields, improved farmer incomes and enhanced resilience to climate change in many parts of Africa. For example, under the Water Efficient Maize for Africa initiative in Kenya and the United Republic of Tanzania, a genetically modified, drought-tolerant hybrid variety of maize was developed that produces 35–50 per cent higher yields during

[18] International Atomic Energy Agency, "Outlook for Nuclear Energy in Africa" (Vienna, 2025).

[19] African Development Bank, "Critical minerals for Africa's inclusive growth and development" (Abidjan, 2025).

[20] Stephanie Shumsky and others, "Mutoshi cobalt pilot project, DRC: transforming ASM for increased productivity, safer working conditions, and fairer female earnings" (2020).

[21] RCS Global, "Better Mining impact report 2021" (2022).

[22] For more information about the Africa Mining Vision, see African Union, "Africa Mining Vision" (2009).

[23] For more information about the African Green Minerals Strategy, see African Minerals Development Centre, *Africa's Green Minerals Strategy*.

drought conditions than conventional maize varieties and wastes 30 per cent less water.[24]

23. Agricultural digital technologies, also known as agritech, include mobile applications and digital platforms that provide real-time data on weather forecasts, market prices and other agricultural information and services. They address information asymmetries, facilitate access to such critical services as credit and insurance and help to de-risk agricultural markets.[25] In East Africa, for example, a mobile money platform used across the subregion has catalysed financial inclusion, facilitating access to microloans and insurance products.

24. Precision agriculture includes the use of drones, satellites, artificial intelligence and big data analytics to monitor soil health, crop health and outbreaks of pests and disease and to predict yields and optimize the use or allocation of resources, such as water, fertilizer and seeds. Satellite imagery and data models are being used across Africa to prepare smallholder farmers for floods, droughts and outbreaks of pests and disease through early warning system networks. For example, sugarcane farmers in KwaZulu-Natal, South Africa, have been using multispectral satellite imagery to detect early signs of water stress, allowing for timely irrigation adjustments.

25. The Internet of things and sensors enable smart irrigation and the precision application of fertilizers and pesticides, thereby reducing costs and increasing incomes. In Kenya, for example, solar-powered Internet of things systems, such as drip irrigation kits, have cut water and energy costs by half for smallholder farmers. Across Africa, the drip irrigation kits can greatly increase smallholder yields and reduce water use[26] while also reducing water and diesel costs.[27]

C. Workforce, employment and social inclusion

26. The global digital revolution and advances in frontier technologies require an adaptive workforce. Africa has a comparative demographic advantage in localizing value chains. Data from the 2024 edition of World Population Prospects by the United Nations indicate that Africa has the youngest population of any region in the world, with a median age of 19, as compared with 33 years in Asia, 42 years in Europe, 33 years in Latin America and the Caribbean, 39 years in Northern America and 33 years in Oceania.[28] The young population in Africa tends to be more adaptive and creative and tends to consume more digital and innovative technologies, creating a broader market.

27. Globally, artificial intelligence and automation could create 170 million jobs while displacing 92 million jobs by 2030, resulting in a net gain of 78 million jobs.[29] Africa can also benefit from new jobs if enhanced digital skills training is provided, with 230 million digital jobs and 650 million opportunities for digital training by 2030.[30] Agriculture employs the most workers on the continent, but manufacturing exhibits productivity gains, albeit unevenly, across countries.

[24] Xie Chen “The role of modern agricultural technologies in improving agricultural productivity and land use efficiency”, *Frontiers in Plant Science*, vol. 16 (2025).

[25] Frank Jude, Winsome Clara and Clement Pater, “Mobile technology, farmer knowledge, and market access: implications for food security in rural African Communities”, ResearchGate, November 2025.

[26] Fatima Benabdelaziz-Tair, “Light up the night and brighten the harvest”, European Investment Bank 30 November 2017.

[27] SunCulture website available at https://sunculture.io/blog/2021/01/01/the-sunculture-impact-improving-lives-of-smallholder-farming-households-with-life-changing-technology/.

[28] United Nations, “Median age of population”, World Population Prospects: The 2024 Revision. Available at https://population.un.org/wpp/ (accessed on 31 December 2025).

[29] World Economic Forum, *Future of Jobs Report 2025: Insight Report* (Cologny, 2025).

[30] Landry Signé, ed., *Foresight Africa: Top Priorities for the Continent – 2025–2030*, (Washington, D.C., Brookings Institution, 2025).

Kenya and South Africa are exhibiting what is known as "servicification" in manufacturing on a small scale, with local system integrators supporting technology installation, data processing and software development, thereby boosting productivity and job creation.[31]

28. Digital platforms hold significant potential to reduce poverty, generate employment opportunities, promote economic integration and drive economic growth. Digital payment systems and mobile money platforms are transforming economies in Africa by lowering transaction costs, boosting efficiency, enhancing access to finance and markets and advancing financial inclusion. Such systems and platforms enable businesses to reach new customers, streamline their operations and establish digital credibility. Mobile money ownership is rapidly increasing across the continent, with 33 per cent of adults in sub-Saharan Africa having a mobile money account.[32]

D. Regional integration and connectivity

29. The Agreement Establishing the African Continental Free Trade Area provides unique advantages for regional integration and connectivity in the world's most dynamic economic zone. Connecting 1.5 billion people and with a total annual GDP of more than $3.4 trillion, the African Continental Free Trade Area is one the world's most significant trading blocs. In a turbulent global macroeconomic environment with fragmenting trade regimes, the Agreement offers immense opportunities for investment, industrialization, innovation and development.

30. Emerging frontier technologies are vital for advancing the Agreement, since they can reduce transaction costs, improve transparency and increase trade efficiency. E-commerce and payment interoperability are crucial to the effective implementation of the Protocol to the Agreement on Digital Trade, and with it a single digital market, which would reduce fragmentation, improve market efficiency and facilitate seamless cross-border trade.[33] The Pan-African Payment and Settlement System enables instant cross-border payments among local currencies, cutting transaction costs by almost half.[34] The Africa Trade Exchange platform, developed by the Economic Commission for Africa and the African Export-Import Bank with support from the African Union and the secretariat of the African Continental Free Trade Area, enables businesses of all sizes to access new markets and to streamline their supply chains in Africa.[35]

31. Frontier technologies offer leapfrogging opportunities to Africa, with its young population and wealth of resources, since it is not as greatly burdened as any other region with legacy infrastructure, policies and institutions designed to serve a different social, economic and market structure. Innovation and frontier technologies are often creatively disruptive in a Schumpeterian way, requiring new sets of policies, institutions and infrastructure.

[31] Max Walter and others, *Economic Transformation in the Fourth Industrial Revolution: Insights from African Manufacturing and Guidance for Policymakers* (London, Tony Blair Institute for Global Change, 2024).

[32] World Bank, "Global Findex Database 2021 survey headline findings on account ownership", 2021.

[33] Prachi Agarwal and Angela Kolongo, "Unlocking Africa's trade potential: a guide to implementing the AfCFTA Digital Trade Protocol", ODI Global, 7 May 2025.

[34] Pan-African Payment and Settlement System, "How it works".

[35] United Nations, Economic Commission for Africa and Konrad-Adenauer-Stiftung, "Private sector as the backbone of the AfCFTA implementation" (2022).

IV. Preconditions for maximizing the adoption of frontier technologies and the associated risks

A. Preconditions

32. High-level, dedicated national leadership on frontier technologies is crucial. An agile, high-level national team is needed to spearhead the design of relevant national policies and strategies, provide adequate resources, monitor progress and make adjustments to address new and emerging issues. Such teams, often headed by high-level political officials, such as the president or prime minister, can mobilize the entire Government, identify industrial champions, attract investment and signal to the world that their country is prepared to harness technology for good.

33. The diffusion of frontier technologies to the informal economy and to micro-, small and medium-sized enterprises must be supported. Recent efforts in developed countries to establish centres of excellence for the rapid development and application of artificial intelligence among small and medium-sized enterprises and to provide funding and training could serve as a template for African countries to deploy similar approaches as part of efforts to empower informal and microenterprises to harness frontier technology.

34. Fixing the infrastructure deficit and pursuing data sovereignty go hand in hand. Africa currently hosts less than 1 per cent of global data centres.[36] When a country is dependent upon data centres located outside Africa, costs can be higher, time delays can be longer and the risk of sensitive data (e.g. medical, financial and security data) being exposed can be greater. Such a compromising situation arises because public and private investment in data centres and domestic capacity to build them is limited. The shortage of adequate, stable energy and water supplies also discourages foreign investors. Data centres around the world use a total of approximately 415 TWh of electricity a year, or 1.5 per cent of global electricity consumption,[37] and a 1 MW facility can require up to 25.5 million litres of water yearly for cooling, enough to cover the daily water consumption of roughly 300,000 people.[38]

35. Africa must implement and enforce continental frameworks and policies to drive digital transformation. It struggles to strike a balance between engaging in global digital partnerships and maintaining regional independence. As a result, digital governance frameworks are often influenced by external forces and lack local relevance. Given that domestic capacity to build digital infrastructure, such as data centres, remains limited, investment comes from external parties. Such a situation raises concerns about control, surveillance and governance. Large foreign technology firms profit from the user data of Africans without adequate regulation, fuelling fears of what has been described as “digital colonialism”.[39]

36. The skills gap in Africa poses significant challenges for the diffusion of frontier technologies. Although there is a growing need for digital skills, only half of the countries in Africa have incorporated computer education into their school programmes, compared with 85 per cent of countries in other regions.[40] The gap, as shown in figure I, hampers the role of education in enabling young people to drive development in Africa and prepare for future labour-market needs.

[36] Hiedberg Insights, “The potential for data centers in Africa with the rise of AI”, Medium, 14 July 2025.

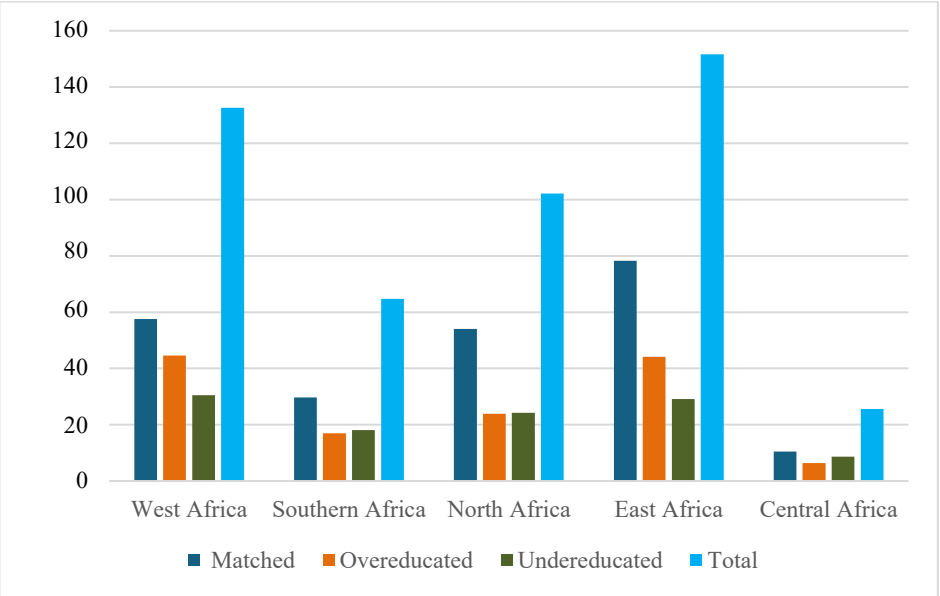
[37] International Energy Agency, *Energy and AI*, World Energy Outlook Special Report (Paris, 2025).

[38] Chris King, “Why smarter cooling is the key to sustainable data centre growth”, DCR Data Centre Review, 18 June 2025.

[39] Toussaint Nothias, “An intellectual history of digital colonialism”, *Journal of Communication*, vol. 75, issue 5 (October 2025).

[40] Salah-Eddine Kandri, “Africa’s future is bright—and digital”, World Bank, 23 October 2019.

Figure I
Skills mismatch in subregions of Africa, 2017–2021
(Millions of people)

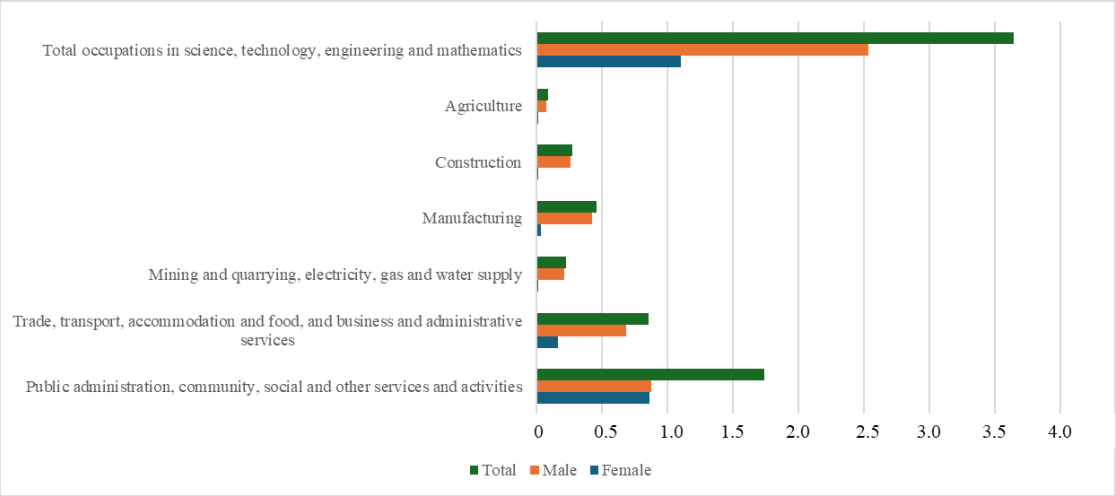


Source: ECA, based on data from International Labour Organization, "Employment in STEM occupations by sex and economic activity (thousands)", Worker and Sector Profiles (2025).

37. Investment in training and jobs in the fields of science, technology, engineering and mathematics and in closing gender gaps is essential to ensuring the diffusion of frontier technologies. According to data from the International Labour Organization on 16 African countries in 2022,[41] of various categories of all science, technology, engineering and mathematics occupations, public administration, community, social and other services and activities had the highest proportion of such occupations (47.7 per cent), followed by trade, transport accommodation and food, and business services (23.5 per cent), manufacturing (12.6 per cent), construction (7.6 per cent), mining and quarrying and electricity, gas and water supply (6.1 per cent) and agriculture (2.5 per cent), as shown in figure II.[42] Across the six categories, men accounted for 69.7 per cent of total jobs in the fields, which reflects a persistent gender employment gap in such occupations. The imbalance is most pronounced in industrial sectors, whereas service-oriented sectors, such as public administration, community and social services, show greater gender inclusion, with 49.6 per cent female employees and 50.4 per cent male employees in 2022.

[41] International Labour Organization, "Employment in STEM occupations by sex and economic activity (thousands)", Worker and Sector Profiles (2025).
[42] Ibid.

Figure II
Employees in science, technology, engineering and mathematics occupations in 16 African countries,[a] 2022
(Millions of workers)



Source: ECA on the basis of International Labour Organization, "Employment in STEM occupations by sex and economic activity (thousands) – Annual", "ILOSTAT Data Explorer".

[a] Angola, Benin, Botswana, Burkina Faso, Egypt, Guinea-Bissau, Kenya, Madagascar, Mali, Mauritius, Mozambique, Rwanda, Senegal, Togo, Zambia, Zimbabwe.

B. Risks

38. The storage of most data from African countries in data centres outside the continent is a risk, in particular for medical, financial and security data, given their sensitivity. Gaps in institutional and human capacity, along with outdated or missing data protection, cybersecurity and digital identification document policies, further impede progress towards full data sovereignty on the continent.

39. Cybersecurity threats, technological dependencies and supply chain risks are real, and Africa must address them. Many countries lack national cybersecurity strategies, incident-response teams and protection for critical infrastructure, making them more vulnerable to cybercrime, cyberespionage and systemic digital disruption, one of the top emerging risks in recent regional assessments.[43]

40. Dependence on imported hardware, software, cloud infrastructure and specialized components exposes African economies to supply shocks, price volatility and technology lock-in.[44] Limited domestic manufacturing and insufficient capacity for research and development further restrict opportunities for local value addition.

41. The disruptive effects of new technologies in the African labour market cannot be ignored. Technology-driven job losses tend to occur quickly, whereas job creation often happens more slowly. Furthermore, new roles associated with emerging technologies are often in different industries or locations and require different skills, which increases the risk of job displacement and poses significant

[43] Internal Audit Foundation and African Federation of Institutes of Internal Auditors, "2026: risk in focus – hot topics for internal auditors" (Lake Mary, 2025).

[44] *Digital Economy Report 2021: Cross-border Data Flows and Development – For Whom the Data Flow* (United Nations publication, 2021).

challenges for policymakers who manage workforce transitions.[45] Labour-market disruptions, combined with existing rigidities, can worsen unemployment numbers and magnify social and economic inequality across the continent.[46]

V. Proposed transformative action

A. Data infrastructure and governance

42. Governments must treat frontier technology infrastructure as an essential public good and a strategic sovereign asset to reduce broadband costs and enhance data sovereignty. This will require cross-ministerial coordination and robust public-private partnership frameworks. More specifically, Governments should:

(a) Classify digital infrastructure (e.g. broadband and data centres) alongside traditional utilities, such as water and energy, in their national planning to prioritize public investment and subsidies;

(b) Require the inclusion of renewable energy offtake guarantees in primary power purchase agreements for data centres, with a view to ensuring a reliable power supply without straining the national grid.

43. Governments should establish robust national cybersecurity strategies and data governance frameworks, with independent data protection authorities and national cybersecurity agencies, in order to mitigate systemic digital disruption and build the trust necessary for a thriving digital economy. More specifically, Governments should:

(a) Enact and enforce comprehensive data protection laws that balance cross-border data flows with national security and privacy requirements;

(b) Develop national cybersecurity strategies that include the formation of computer emergency response teams and critical infrastructure protection protocols.

B. Innovative financing and blended finance

44. Governments should deploy innovative financing mechanisms to de-risk frontier technology investments. By strengthening their national development banks and their regulatory capacity, they can attract private investment and reduce fiscal burdens through mechanisms that de-risk high-impact technological ventures. More specifically, Governments should:

(a) Use blended concessional finance to lower the cost of capital for high-risk technology projects;

(b) Implement portfolio guarantee schemes (e.g. through the African Guarantee Fund) to encourage commercial bank lending to tech start-ups and micro-, small and medium-sized enterprises.

[45] United Nations, Department of Economic and Social Affairs, *Frontier Issues: The Impact of the Technological Revolution on Labour Markets and Income Distribution* (2017).

[46] Johannes Fedderke, “The cost of rigidity: the case of the South African labor market”, Economic Research Working Paper, No. 290 (June 2012).

45. Governments should also commit themselves to increasing national research and development spending to 1 per cent of GDP. Creating national innovation funds to channel resources into high-impact sectors will reduce dependence on imported technologies and could generate $60 billion–$70 billion annually in new economic value. More specifically, Governments should:

(a) Set statutory targets for research and development spending to reach 1 per cent of GDP by 2030, in line with recommendations from the African Union;[47]

(b) Introduce fiscal incentives for research and development expenditure in the private sector, such as tax credits and immediate expensing, in order to complement public spending.

C. Skills and human capital for a digital economy

46. Governments should align national curricula with future labour-market needs through initiatives in science, technology, engineering, mathematics and digital literacy. Addressing the critical skills mismatch requires partnerships between education ministries and the private sector to establish retraining and re-education centres, ensuring that the workforce is adaptive and industry-ready. More specifically, Governments should:

(a) Mandate the integration of computer science and digital literacy into primary and secondary school curricula;

(b) Expand technical and vocational education and training programmes to include practical modules on artificial intelligence, robotics and equipment maintenance;

(c) Reform teacher-training programmes to ensure that educators are proficient in digital tools and modern pedagogy.

47. Governments should bridge the gender gap in science, technology, engineering and mathematics and support workforce transition. To maximize total factor productivity and mitigate inequality, they must close the gender gap and support workers displaced by automation by deploying labour-market information systems and gender-responsive budgeting. More specifically, Governments should:

(a) Implement targeted scholarship and mentorship programmes for women in science, technology, engineering and mathematics to address the current gender disparity, with men holding the majority of jobs in those fields;

(b) Establish funds for retraining and skills enhancement to support workers displaced by automation, with a focus on their transition to higher-value roles.

D. Regional technology and industrial corridors under the African Continental Free Trade Area

48. Governments must accelerate the implementation of the Protocol to the Agreement Establishing the African Continental Free Trade Area on Digital Trade, including the provisions on interoperable payment systems. Strengthening the secretariat of the Free Trade Area and coordinating central banks for the harmonization of digital rules will lower cross-border transaction costs and create a unified market that will be attractive to global investment. Governments should:

[47] United Nations, Economic Commission for Africa, “Towards achieving the African Union’s recommendation of expenditure of 1 per cent of GDP on research and development ”, ECA Policy Brief, No. ECA/18/004.

(a) Adopt the Pan-African Payment and Settlement System for intra-African trade in order to reduce the reliance on hard currency and lower transaction costs;

(b) Harmonize digital trade rules and data governance standards across members of ECA, with a view to creating a single digital market.

49. Governments must develop regional value chains for strategic frontier technology sectors, and the regional economic communities must facilitate multi-country industrial planning to pool resources for data infrastructure and localize value addition in strategic green economy sectors. Governments should:

(a) Establish cross-border special economic zones focused on battery and electric vehicle production, leveraging the continent's critical mineral endowments;

(b) Pool resources to build regional data centres and supercomputing facilities, thus overcoming the high costs of country-level fragmentation.

E. Enabling regulation and business environment

50. Governments should move beyond traditional bureaucracy by institutionalizing agile regulatory bodies, led nationally at a high level, and by formally consulting the private sector. By doing so, they will accelerate decision-making and foster an environment that is conducive to rapid innovation. Specifically, Governments should:

(a) Create high-level presidential or prime ministerial task forces to spearhead digital strategy, signalling political will and ensuring whole-of-government coordination;

(b) Adopt regulatory sandboxes that allow for the safe testing and piloting of new technologies (e.g. fintech and drones) before full-scale regulation is enacted.

51. Governments should facilitate technology diffusion to the informal sector and to micro-, small and medium-sized enterprises. Empowering small and medium-sized enterprise development agencies to deliver digital extension services can drive productivity and formalization in the informal sector, which currently employs the vast majority of the workforce in Africa. Specifically, Governments should establish digital extension services, similar to agricultural extension services, to help informal firms to adopt digital tools for bookkeeping, payments and market access.

VI. Policy issues for discussion

52. The following policy issues and important questions may be raised for discussion:

(a) How can Africa leverage frontier technologies to use its natural resources, young population and sizeable markets to boost productivity growth?

(b) What are the main factors driving low structural transformation, and what can countries do, as frontier technologies rapidly change the landscape, to accelerate labour productivity growth and to enhance the associated structural transformation?

(c) What policies can countries adapt or implement in agriculture and rural development to promote sustainable growth and productivity while incorporating frontier technologies and innovations?

(d) How can countries leverage frontier technologies to accelerate implementation of the Agreement Establishing the African Continental Free Trade Area to their advantage?

(e) What innovative financing strategies can be implemented to support investment in technology and innovation for sustainable growth?

(f) What steps can countries take to enhance their education systems and infrastructure in order to make the most of the growth opportunities on the continent?