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Future Investment Initiative Institute
Impact on Humanity

GLOBAL FUTURE OF WORK REPORT

SERIES 4

ENABLING AFRICA'S YOUTH IN THE AGE OF AI

OCTOBER 2025

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McKinsey & Company

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PREFACE

FII Institue is delighted to launch the fourth edition of the *Global Future of Work Report*, which examines the state of labor markets in sub-Saharan Africa and the implications of demographic change and emerging technologies for the future of work.

The first edition, *Preparing Labor Markets in MENA for a New Technological Era*, identified the economic gaps and opportunities between the Global North and Global South, with a focus on the Middle East and North Africa (MENA). The second edition, *The Future of Work in Latin America*, analyzed the region's productivity slowdown, human capital challenges, and readiness to adopt automation and AI. The third edition, *The Future of Work in Europe*, explored how advanced economies are navigating demographic aging, rising automation, and shifting competitiveness.

This fourth edition turns to sub-Saharan Africa, the world's youngest region, where nearly 60% of the population is under the age of 24 and the workforce is projected to expand by 650 million people by 2050. This unprecedented demographic surge presents both a historic opportunity and a profound challenge: to transform a youth bulge into a demographic dividend rather than a liability.

The report highlights how sub-Saharan Africa's growth has so far been driven largely by head count, with productivity gains lagging behind those of global peers. Informality remains pervasive, education systems struggle with access and quality, and investment flows have been insufficient to generate enough high-value, formal jobs. Yet the region also demonstrates a remarkable ability to leapfrog: from the rapid adoption of mobile money to pioneering AI applications in agriculture, logistics, and healthcare. Harnessing this agility in the age of AI could help sub-Saharan Africa close competitiveness gaps, unlock new industries, and create millions of better jobs.

Two surveys informed the analysis: one of more than 1,200 business executives across nine African countries and another of more than 900 young people, capturing perspectives on skills, education, technology adoption, and job preparedness. Scenario modeling assessed the potential impact of automation and AI adoption on employment and productivity, while country-level segmentation highlighted the region's diverse economic trajectories.

Taken together, the findings confirm that, as in MENA, Latin America, and Europe, productivity, human capital, and technological readiness will be decisive. The challenge is not to avoid disruption but to prepare for transformation—by building job-ready talent pipelines, catalyzing entrepreneurship, and creating enabling conditions such as affordable digital infrastructure, catalytic financing, and regional integration.

This report has been developed in collaboration with McKinsey & Company as a knowledge partner. McKinsey research and insights have contributed to shaping the analysis. We hope it serves as a valuable guide to policymakers, business leaders, and investors seeking to harness sub-Saharan Africa's youthful talent and entrepreneurial energy to build a more prosperous, competitive, and future-ready economy.

EXECUTIVE SUMMARY

The future of work is rapidly taking shape in this new era of automation and AI. Firms throughout the world, particularly in the Global North, are embarking on expansive AI-driven strategies, shifting their labor requirements in the process. Automation was already phasing out some repetitive and routine work and shifting demand to higher-order professions. The spread of AI is accelerating those trends and putting even more emphasis on the need for a highly skilled workforce.

Sub-Saharan Africa has the youngest population in the world and is expected to add 650 million people to the global workforce by 2050. This next generation is set to experience a completely transformed labor landscape. This wave of young Africans will determine whether the region's historically lagging productivity can finally accelerate or whether the status quo characterized by limited economic output will remain the norm.

If sub-Saharan Africa is to raise living standards for hundreds of millions of households, GDP growth cannot continue to come from an increasing population. Rather, growth needs to stem from higher wages resulting from more gainful employment—jobs that expand the quantity and quality of work through higher productivity, better pay, and improved conditions—as well as through a reduction in market informality; currently, 88% of jobs in the region are informal, mainly in low-value agricultural and service jobs.

Overcoming structural barriers

Several structural barriers stand in the way of this desired transformation. Prominent among these barriers is a lack of human-capital capabilities. While education is improving, with rising enrollment and completion rates, it remains limited, and there is a sizable gap with other regions in terms of quality. Capital is also scarce: Gross fixed capital formation (GFCF) has declined in the past decade, with growth decelerating from 8% in 2004–14 to 5% in 2014–24. Debt service has crowded out public spending to the point where governments in 20 of 42 countries studied spend more on servicing debt than on health and education combined. Even when investment occurs, efficiency is low; public projects in sub-Saharan Africa deliver only about half of their potential value, compared with two-thirds in other emerging markets.

The story is not linear, and there are considerable differences among the countries in sub-Saharan Africa, which make the region a mosaic rather than a monolith. A group of countries we call "decelerating frontrunner" nations are ahead in the developmental journey. Their workforce is better educated, and their tech infrastructure is relatively advanced, but they nonetheless continue to face significant structural roadblocks. Nations that we term "dynamic growers" are going through a sustained growth phase that is reflected in their improving fundamentals and capabilities, but it remains to be seen how resilient they have become in a fragmented world. A third group of nations appear to be "underleveraged"—that is, they have natural advantages that could lift them up on the world stage, but they remain hindered by internal barriers and external shocks. (While there are 49 countries in sub-Saharan Africa, the research excludes seven countries due to risk concerns and poor data availability. See the technical appendix for the full list.)

Technology as a transformative opportunity

Against this backdrop, technology—and particularly AI—looms as both a risk and a transformative opportunity in sub-Saharan Africa. With most work concentrated in agriculture and low-wage services, only 9% of work hours in the region might be susceptible to being automated

by 2030, compared with nearly 30% in the United States, where less than 2% of the workforce is in agriculture. This insulation may buy time for sub-Saharan Africa: Technology here is more likely to create jobs than to destroy them, and the region could become a sandbox for experimentation—but only if the right skills and ecosystems are in place. Without them, the region's competitiveness would be further jeopardized.

Sub-Saharan Africa has already proved its capacity to leapfrog. Mobile money—cash accounts that are uniquely linked to a phone line—was pioneered in Kenya and spread faster in the region than anywhere, now accounting for 70% of global transactions. Rwanda turned itself into a test bed for drone-based medical delivery. Elsewhere in the region, AI is being applied to predict harvests and food security risks with satellite precision. These stories stand as evidence that sub-Saharan Africa can bypass legacy systems and build future-ready industries when conditions align.

Three imperatives for progress

The path forward is not about avoiding disruption but about preparing for transformation. That preparation rests on three imperatives: building job-ready talent pipelines, igniting entrepreneurship for regional solutions, and putting in place the enablers that make both possible.

Talent is the starting point. The pipeline narrows steeply today: Only 9% of adults complete tertiary or vocational education, and even among them, unemployment runs high. Sub-Saharan Africa could break this cycle by linking learning directly to jobs. Apprenticeships, micro-credentials, and employer offtake agreements can make training demand-driven rather than supply-driven. Offtake agreements are particularly powerful: They anchor global companies to local commitments, guaranteeing that if young Africans are trained to agreed standards, jobs will follow.

Entrepreneurship is the second lever. Sub-Saharan Africa cannot rely on imported technology alone; it will need to develop homegrown solutions for regional use cases. Too many promising ventures remain pilots because funding is scarce, computing resources are expensive, and regional markets are fragmented. Expanding incubators and accelerators, linking founders to corporate

> **Sub-Saharan Africa has the youngest population in the world, and the next generation is set to experience a completely transformed labor landscape.**

demand, and harmonizing regulations across borders can help ventures scale faster.

Finally, enablers are the foundation. Without reliable electricity, affordable broadband, and integrated markets, neither talent nor entrepreneurship will thrive. Today, 43% of households in sub-Saharan Africa lack access to power, and broadband costs remain among the highest in the world relative to income. Closing these gaps will require a mix of solutions: off-grid solar, satellite internet, infrastructure sharing, and pro-competition regulation that would promote off-grid and innovative solutions. Finance is another enabler. Sub-Saharan Africa accounts for just 1% of global venture capital (VC) flows and less than 1% of global AI investment. Blended and catalytic finance—using donor funds to crowd in private capital—can derisk early ventures and attract scale investors. Diaspora savings, pensions, and insurance pools could become significant sources of investment if properly channeled. And regional integration through the African Continental Free Trade Area can create the scale investors seek: a single market of 1.4 billion people.

Taken together, these measures are not abstract. They are the practical steps that could determine whether sub-Saharan Africa's youth wave becomes a dividend or a burden. Talent pipelines create a steady flow of skilled workers. Entrepreneurs absorb that talent into homegrown solutions. Infrastructure and finance enable both to scale. The system is self-reinforcing: The more skilled people sub-Saharan Africa produces, the more ventures grow, the more adoption spreads, and the more productivity rises.

Lifting productivity growth without delay

The stakes could not be higher. Governments in sub-Saharan Africa face many competing priorities and need to make difficult choices about the path ahead. If the region acts decisively to upgrade skills and prepare the workforce for a new, tech-enabled future of work, it could lift productivity growth by more than one percentage point, raise wages, and create globally competitive industries that employ millions. All of this would act as an impetus for more long-term structural reforms. By contrast, hesitation in embracing automation adoption risks entrenching informality, widening inequality, and missing a chance to turn the region's youth bulge into a demographic dividend.

The future of work in sub-Saharan Africa is not a distant abstraction. It is being shaped now by the choices governments, businesses, and investors make today. Productivity is the lever that converts work into prosperity. Technology is the accelerator that can create entirely new avenues of employment. Sub-Saharan Africa has the people, and the world needs their talent.

1 SUB-SAHARAN AFRICA'S UNTAPPED LABOR FORCE: TURNING A DEMOGRAPHIC DIVIDEND INTO FUTURE GROWTH

SUB-SAHARAN AFRICA[1] is the youngest region in the world, with more than 60% of its 1.29 billion population under the age of 24 and only 3% over 65. Based on current demographic trends, it will represent about one-quarter of the world's population by 2050. This unique demographic profile means that the 49 diverse countries in sub-Saharan Africa collectively have the potential to be the next global source of labor, at a time when the workforce in many countries is stagnating or shrinking. Yet the dividend remains unrealized: Skills are often lacking; many existing jobs are low-quality, low-paying ones in the informal economy; and productivity growth is constrained. As technology reshapes work, future gains are expected to come less from expanding head count and more from moving people out of unemployment and the informal economy and into higher-value roles. Thus the region's central challenge is to convert its youth bulge into a competitive workforce through stronger skills, higher productivity, and faster technology adoption.

Sub-Saharan Africa is far from being a single story, and while the overriding challenges are similar, the starting points and dynamics vary substantially from country to country. Ethiopia, for example, has been growing at a strong 6 to 7% clip in recent years and posting annual productivity gains exceeding 5%. Cabo Verde, Côte d'Ivoire, Eswatini, Ghana, Kenya, and Rwanda have made distinct advances in education and venture activity and have some dynamic firms, which all point to rising productivity potential. Mauritius and South Africa start from much higher productivity bases, reflecting deeper human capital, relatively more formal employment, and stronger digital readiness. Amid these varied trajectories, all countries could learn from those that are best in region on various economic and labor-market-related dimensions.

This chapter examines the demographics of sub-Saharan Africa and the considerable challenges it faces in becoming more productive and prosperous. Given the diversity of the countries, the research segments the region into four categories of countries based on economic and social patterns.

SUB-SAHARAN AFRICA'S GROWING TALENT POOL HAS YET TO TRANSLATE INTO NEEDED PRODUCTIVITY GAINS

Sub-Saharan Africa today represents about 16% of the world's population. By 2050, that share is projected to grow to 23%, with the region adding another 880 million people, taking its population total to two billion. It is a very young region: 61% of the population is 24 or under, while another 25% falls squarely in the prime working years of 25 to 44 (Exhibit 1). This demographic profile is markedly different from those in East Asia, Europe, and North America, which have aging populations, as we have noted in previous editions of this labor market series.

The implications for the global labor force are highly significant: Sub-Saharan Africa will add roughly 650 million people to the global workforce (population aged 15–64) by 2050, accounting for nearly 80% of global new entrants. Sub-Saharan Africa's share of the world's working-age population will rise to 22% (Exhibit 2).

Economic growth and productivity have not kept pace with the growing population

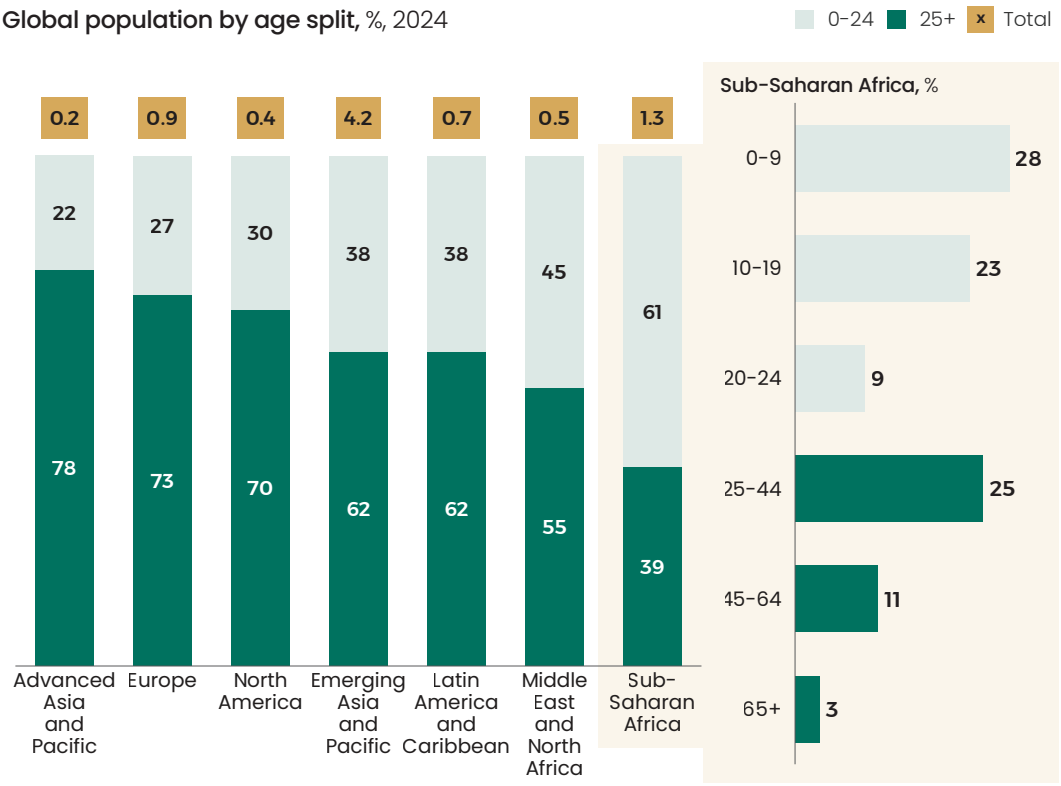
In the past 30 years, sub-Saharan Africa's GDP has tripled, expanding at an average rate of 3.9% per year. However, the region's share of global GDP has remained flat at around 2%, meaning that sub-Saharan Africa has grown in absolute terms but not captured any relative share. Moreover, the pace of expansion has slowed over time: GDP grew by 4.2% in 1994–2004 and by 5.0% in 2004–14 on the back of strong investment inflows and a commodities boom, but the growth rate slipped to 2.4% in 2014–24. This makes sub-Saharan Africa the slowest-growing major region globally. The slowdown in the 2010s exposed underlying vulnerabilities, such as overreliance on agriculture and extractive industries, susceptibility to commodity price swings, and political fragility.[2]

Economic growth, at its core, is driven by two forces: more people entering the workforce and each worker producing more output. Sub-Saharan Africa has benefited from the first but lagged behind in the second. The region's

1 Sub-Saharan Africa refers to all African countries except for the North African countries of Algeria, Egypt, Libya, Morocco, and Tunisia.

2 Wenjie Chen, "Pushed to the brink: Fragility and conflict in sub-Saharan Africa," International Monetary Fund, April 25, 2025.

Exhibit 1 **SUB-SAHARAN AFRICA HAS THE WORLD'S YOUNGEST POPULATION.**



Note: Figures may not sum to 100%, because of rounding. Advanced Asia includes high-income Asian and Pacific countries: Australia, Japan, New Zealand, Singapore, and South Korea. Emerging Asia includes remaining Asia and the Pacific. Europe includes 49 countries. Latin America and Caribbean includes 42 countries. Middle East and North Africa includes 18 countries. North America includes 3 countries. Sub-Saharan Africa includes 49 countries.
Source: United Nations World Population Prospects 2024

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demographic momentum has not yet translated into proportional gains in productivity. Indeed, nearly 75% of the growth since 1994 has come from more people working, not from improvements in how much each worker produces or in the quality of existing jobs. While employment grew 2.9% annually in the past 30 years, productivity gains have averaged just 1.0% per year since 1994. This is well behind the 1.4% productivity growth seen in advanced economies and only one-fourth of the 4.1% in other emerging markets in the same period (Exhibit 3). The recent period underscores the challenge: Between 2014 and 2024, productivity declined by about 0.6%, and the 2.4% growth in GDP was entirely explained by workforce growth of 3.0%.The outcome is a persistent productivity gap. Today, workers in sub-Saharan Africa generate only $6 of output per hour, behind their peers in Emerging Asia ($14) and Latin America ($21).[3] This underperformance has held back incomes, with average per capita GDP standing at just $1,600—roughly where India was a decade ago.

Head count–led growth does not raise living standards on its own. Achieving productivity gains remains crucial for economic growth in the region to translate into higher wages and household incomes and improved livelihoods.

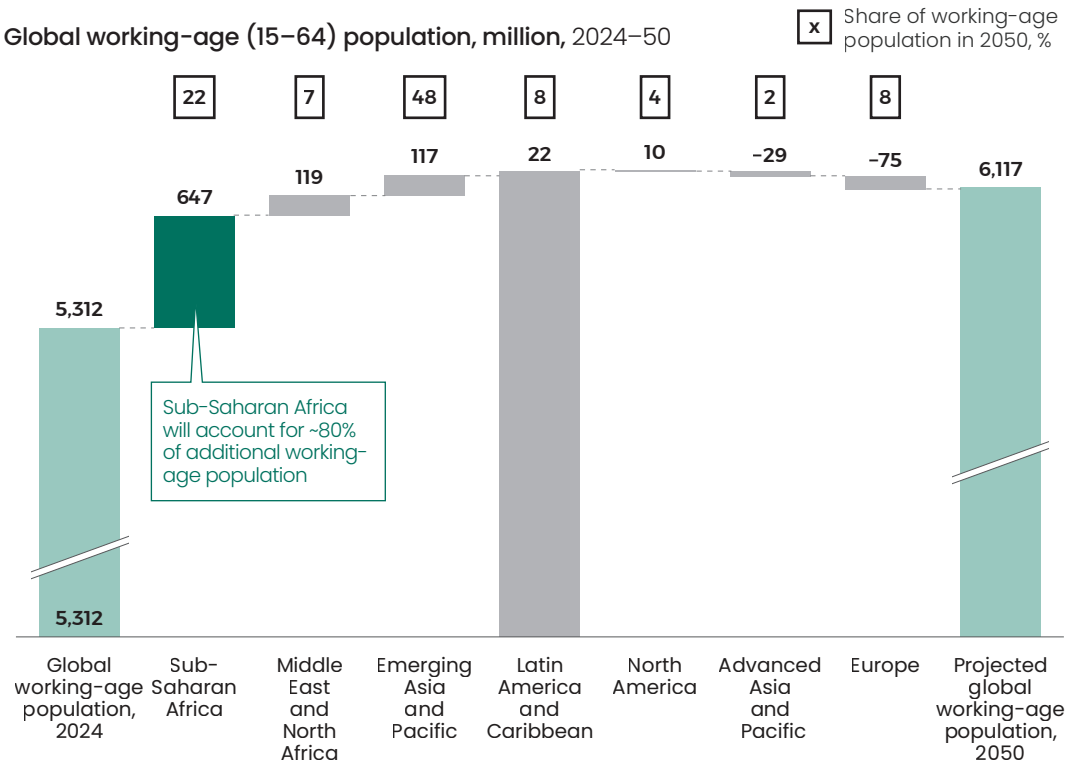
Informality dominates sub-Saharan Africa's labor market, often leaving workers in low-skill and low-wage jobs

A critical issue for the future of work concerns the high informality of the labor market (Exhibit 4).

3 Output per hour is expressed in constant 2021 US dollars, based on purchasing-power parity.

Exhibit 2

ABOUT 80% OF NEW ENTRANTS TO THE GLOBAL LABOR POOL WILL COME FROM SUB-SAHARAN AFRICA.



Note: Figures do not sum, because of exclusion of few small countries that are not part the regions mentioned here.
Source: United Nations World Population Prospects 2024

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An estimated 88% of jobs in sub-Saharan Africa are informal, according to the International Labour Organization. This is far above the already high 75% in Emerging Asia, 53% in MENA, and 51% in Latin America.[4]

Informality concentrates workers in small, low-capital activities[5] with few social safeguards. According to the United Nations, 82% of people in sub-Saharan Africa lack social protection, and workers in the informal economy constitute a significant share of those not covered.[6] Informal businesses also have limited access to finance and supply chains, limiting their growth prospects. This creates a low-skill, low-productivity constraint: Limited opportunities keep workers in low-wage activities, which in turn slows capability development and broader productivity growth. It also amounts to a lost opportunity, given that the density of micro and household enterprises could serve as a latent entrepreneurial base if it were able to scale with better access to finance, infrastructure, and markets. Average weekly working hours are high (38 hours compared with 32–37 in advanced economies[7]), suggesting many

4 "Informal employment rate by sex," International Labour Organization, November 2024.

5 Informal firms are much smaller and far less productive than even small formal firms (and especially large ones). Informal entrepreneurs tend to be less educated and operate very small, low-capital businesses that produce low-quality goods for low-income customers, adding relatively little value: Rafael La Porta and Andrei Shleifer, "The unofficial economy and economic development," *Brookings Papers on Economic Activity*, 2008, Volume 47, Number 1.

6 *Informality and social protection in Africa countries: A forward-looking assessment of contributory schemes*, UN Development Programme, February 1, 2021.

7 "Average hours worked per week per employed person, latest year," International Labour Organization, 2024.

people work long hours to make ends meet. Pressures are also visible among youth: Roughly ten million young people enter the labor market each year, but only about three million formal jobs are created[8]; about 60% of young workers are absorbed into low-productivity work in agriculture. In 2023, three in four people aged 25–29 were in insecure work such as temporary paid jobs or were self-employed, while 22% were not in education, employment, or training (a category of young person known by the acronym "NEETs").[9]

A LACK OF HUMAN AND FINANCIAL CAPITAL IMPEDES SUB-SAHARAN AFRICA'S EMPLOYMENT AND FUTURE OF WORK POTENTIAL

Work is changing as technology advances, reshaping tasks and shifting the skills that are valued. Productivity gains will increasingly come from moving people into higher-value-added roles and enabling firms to adopt new processes and scale. Sub-Saharan Africa has a demographic edge with a large, young workforce, but two interlinked constraints limit its ability to capture these gains: The first is lacking capabilities, namely the quality of human capital; the second is lacking capital, including both the pace and efficiency of investment. While access and entrepreneurial energy have expanded, an insufficiently skilled labor pool and weak investment momentum constrain the region's growth potential.

In terms of human capital, education quality and access put the region at a disadvantage

Human capital, which is an indicator of a population's educational, health, and employment outcomes, is a defining structural challenge. In the sub-Saharan region, primary education enrollment has expanded, reaching 80–95% in certain regions. Free-education policies in Angola, Ghana, Kenya, Nigeria, and Sierra Leone have sought to boost access, but hidden costs, such as uniforms, books, and transport, and overall low income for parents continue to burden households, making it difficult for children from poor households to attend school.[10] Layered on top are opportunity costs, gender norms,[11] and long travel distances,[12] which depress attendance.[13] Overall completion rates are low, with about 68% of students completing primary education and only about 30% completing upper secondary school.

Educational quality is also a significant challenge. Sub-Saharan Africa's harmonized learning scores trail the global average by about 12%,[14] and nearly nine in ten children aged ten cannot read a simple text.[15] Furthermore, poor infrastructure and low per-student spending also constrain outcomes; only about three out of ten primary schools in the region have electricity,

8 *Nasikiliza*, "Fostering skills development to improve job prospects in Sub-Saharan Africa," blog entry by Nathan Belete, World Bank, December 1, 2023.

9 "Global employment trends for youth 2024: Sub-Saharan Africa," International Labour Organization, August 2024.

10 The World Bank states that in Uganda, despite free primary education, families still pay for ancillary costs, spending about $168 in government schools and $420 to $680 in private schools each year: *Let's Talk Development*, "The high price of education in Sub-Saharan Africa," blog entry by Leora Klapper and Mansi Vipin Panchamia, World Bank, March 13, 2023.

11 In 2018, Sierra Leone introduced a policy of free education, abolishing school and exam fees and supplying learning materials. One study noted that persistent direct and indirect costs (fees in unapproved schools, exam charges, uniforms, transport, and teacher support), plus opportunity costs and gender norms, continue to exclude poor learners and sustain dropout despite fee abolition: Elena Samonova et al., "'An empty bag cannot stand upright': The nature of schooling costs in Sierra Leone," *International Journal of Educational Development*, November 2021, Volume 87.

12 In Ghana, children spend an average of 19 minutes traveling to school, and 90% travel on foot: Clifford Afoakwah and Isaac Koomson, "How does school travel time impact children's learning outcomes in a developing country?," *Review of Economics of the Household*, 2021, Volume 19.

13 Research has found that longer school travel times depress learning outcomes chiefly by increasing missed instructional hours and worsening student health: Clifford Afoakwah and Isaac Koomson, "How does school travel time impact children's learning outcomes in a developing country?," *Review of Economics of the Household*, 2021, Volume 19.

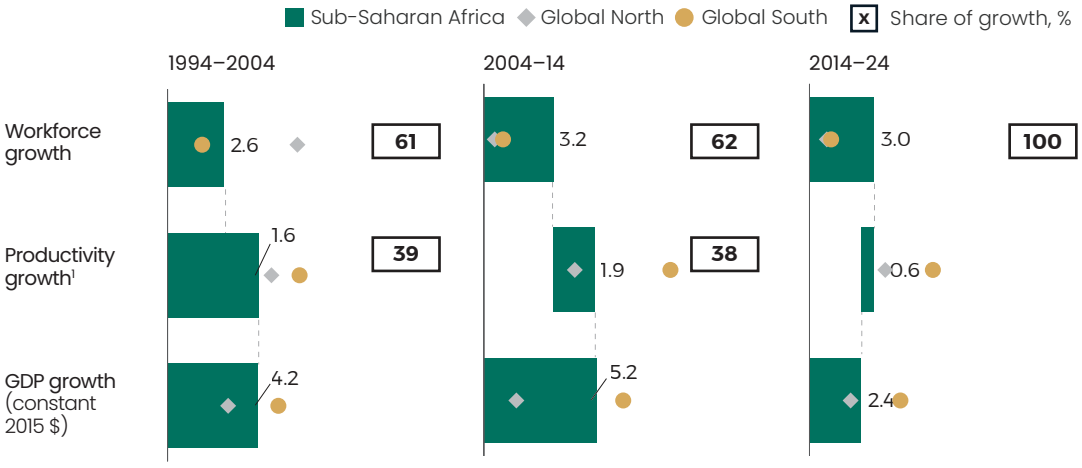
14 "Average harmonized test scores," World Bank, updated November 18, 2024. The World Bank reports harmonized test scores that capture student achievement across major international assessments, standardized for comparability. Scores are expressed in TIMSS-equivalent units equivalent to Trends in International Mathematics and Science Study scores, where 300 represents minimal attainment and 625 indicates advanced attainment.

15 *Africa Can End Poverty*, "To reduce poverty in Africa the focus must be on education and skills," blog entry by Andrew Dabalen and Diana Styvanley, World Bank, November 11, 2024.

Exhibit 3

SUB-SAHARAN AFRICA HAS THE HIGHEST WORKFORCE GROWTH, BUT ITS PRODUCTIVITY PERFORMANCE LAGS BEHIND THAT OF OTHER REGIONS.

Sub-Saharan Africa real GDP growth by components, % CAGR, 1994–24



Note: Twenty-six countries in sub-Saharan Africa, 44 in Global South, and 45 in Global North.
[1] Output per person employed (constant 2015 $). Regional figures are weighted averages based on total hours worked.
Source: The Conference Board

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and only half of primary schools have access to basic drinking water.[16] Even where investment has risen, outcomes diverge. For example, South Africa spends about $3,000 to $4,000 per student,[17] yet Kenya achieves stronger test scores at the lower cost of less than $1,000,[18] indicating some level of inefficient spending. Some countries in the region also have high student–teacher ratios, which can hamper teaching. In Malawi, for example, each primary school teacher has an average of 70 students per class.[19]

Tertiary education is the most likely path for gainful employment for millions of Africans; however, access to it is among the lowest globally: Gross enrollment in tertiary education is just 9%, while vocational enrollment is even lower, at less than 3%. Across the region, STEM graduates (an indicator of tech-ready human capital) account for just 65 of every 1,000 working-age people. That is six to 12 times below other regions. Furthermore, in surveys conducted as part of this research, 88% of youth highlight a gap between what schools teach and what companies demand.[20]

The landscape is shifting in higher education. Universities such as African Leadership University (ALU) in Rwanda and Mauritius and Ashesi University in Ghana are gaining international reputations,[21] while South African universities

16 Data as of 2023; *Transforming learning and skills development in Africa*, UNESCO, 2025.

17 Purchasing power parity in 2021 US dollars.

18 *Spark & Sustain: How all of the world's school systems can improve learning at scale*, McKinsey, February 2024.

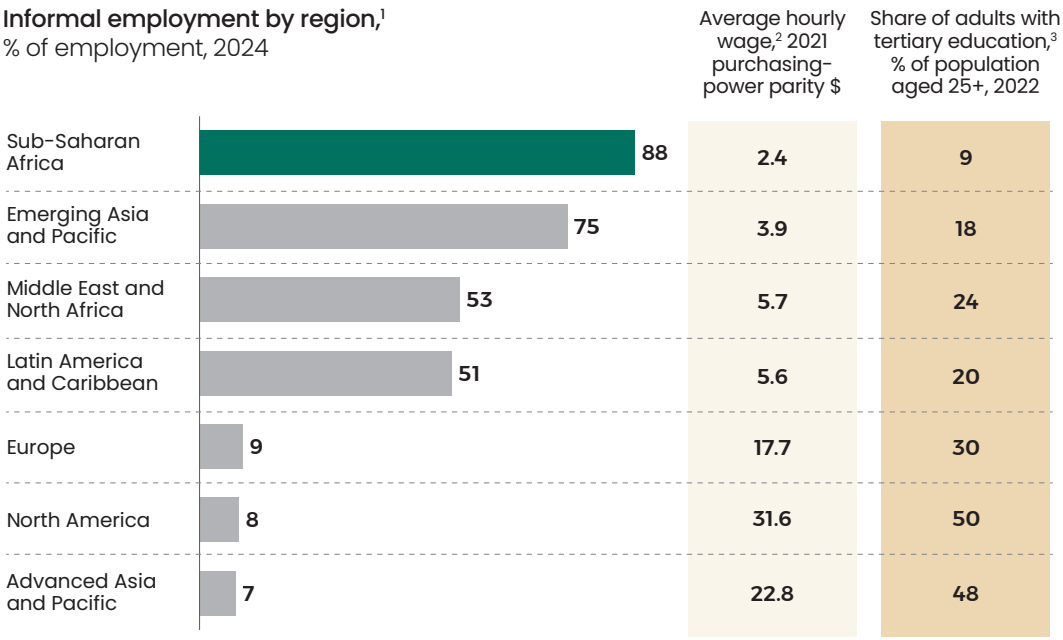
19 "Packed classrooms: a reality for educational planners in Malawi," UNESCO, February 26, 2020.

20 Two surveys conducted for this research asked 1,258 business executives and 916 youths in nine countries (Angola, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Nigeria, South Africa, Tanzania, and Uganda) for their views on employment and technology issues. For details, see the technical appendix.

21 ALU hosts about two dozen entrepreneurship events annually, with student projects often turning into companies in industries from telehealth to agriculture. *Times Higher Education* in 2018 referred to it as the "Harvard of Africa": Dara Melnyk, "A university where students define their social mission," University World News, December 4, 2024; Ashesi University, founded in 2002 as Africa's first liberal arts college, pioneered a multidisciplinary core curriculum that set a new standard for quality. The institution is widely recognized among the region's top universities, with more than 2,000 alumni. It recently expanded its offering with a new master's degree in mechatronics in partnership with ETH Zurich: Amy Marcott, "Ashesi University," *Berkeley Haas School of Business Magazine*, Spring 2023; Michael Walther, "Specialists for sustainable industry in sub-Saharan Africa," ETH Zurich, June 18, 2025.

Exhibit 4

AFRICA'S LABOR MARKET IS CHARACTERIZED BY INFORMALITY, DOMINATED BY LOW-WAGE AND LOW-SKILL EMPLOYMENT.



[1] Regional figures are weighted averages based on employment.
[2] Sub-Saharan Africa (9 countries), Emerging Asia and Pacific (13), Middle East and North Africa (4), Latin America and Caribbean (15), Europe (16), North America (2), and Advanced Asia and Pacific (1). Regional figures are weighted averages based on total hours worked.
[3] Share of adults (25+) with at least short-cycle tertiary education. Sub-Saharan Africa (16 countries), Emerging Asia and Pacific (13), Middle East and North Africa (8), Latin America and Caribbean (16), Europe (43), North America (2), and Advanced Asia and Pacific (3). Regional figures are weighted averages based on adult population.
Source: International Labour Organization; World Bank; The Conference Board

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are attracting growing intra-African mobility.[22] Outbound student flows have tripled since the late 1990s to more than 460,000 in 2021, with destinations diversifying beyond China, France, and the United States to Malaysia, Türkiye, and the United Arab Emirates. While some students may stay on after their studies, depending on immigration practices in these countries, others will return with their acquired knowledge.

While still limited, progress is also tangible in technical and vocational education and training (TVET) in some countries. Ghana, for example, has raised awareness through national campaigns, alumni showcase events, and new career-guidance centers. Enrollment in TVET there has risen from about 47,000 to more than 156,000 in roughly three years. Ethiopia decided to embed TVET in grades 11 and 12 so that graduates earn a Level-1 certificate and have clearer routes to university, TVET, or work. Nevertheless, challenges exist regarding curriculum misalignment, instructor shortages, and weak career-guidance support.[23]

Other barriers to productivity growth include declining capital investment and structural issues across sectors and firms

Declining capital investment is a second major obstacle to enhanced productivity. From 2004 to 2014, the growth of absolute GFCF averaged about 8% a year; in 2014, GFCF amounted to about

22 South Africa is the largest host country of students from sub-Saharan Africa: Stefan Trines, "The state of intraregional student mobility in sub-Saharan Africa: Prospects for greater regionalization?," WENR, October 9, 2023.

23 Deborah Delasi Akoto Tamakloe, "Reimagining education in Africa: Ethiopia leads with TVET integration," African Center for Economic Transformation, June 4, 2025.

23% of GDP.[24] Since 2014, however, GFCF growth has slowed to about 5%. In Kenya, GFCF growth declined from about 13% to just 2%, while in Angola, it slid from about 7% to nearly flat.

Several factors are driving this decline. First is the overall macroeconomic environment, marked by volatile commodity markets, heavy debt, higher borrowing costs, and the low efficiency of public investment. These together have crowded out both public and private investment, leaving the region vulnerable to external shocks. For example, after the 2014–16 commodity slump, governments in many resource-rich economies in the region cut or delayed capital projects because of lower revenues and thinner foreign exchange buffers.[25] At the same time, borrowing became more expensive: Interest payments in 2024 took about 12% of government revenues, with seven countries above 20%. In 2024, 20 countries paid more on debt service than on health and education combined, leaving less room for new public investment. Finally, public investment efficiency is low: Sub-Saharan Africa delivers only about half of the potential value from public projects, compared with about three-fourths in emerging markets in Europe.[26] This implies that, even when money is available, fewer projects are completed on time and on budget.

A second major set of impediments to productivity growth in the region involves the structure of local economies. Sub-Saharan Africa is undergoing a structural transformation in its sectors. Instead of following the classic agricultural-to-industry pathway, much of the region is shifting directly into services. Today, about 49% of employment is still in agriculture, 38% is in services, and only 13% is in industry—versus a more balanced mix in the rest of the Global South. Yet agriculture contributes only about 17% of GDP, much of it from smallholders and subsistence farmers (Exhibit 5).[27] Given the large employment share of agriculture, its disproportionately weak GDP contribution underscores the low level of labor productivity.

Finally, a third impediment to productivity growth is sub-Saharan Africa's disproportionate dependence on small companies. Large firms with more than 50 workers employ only 6% of the region's workforce,[28] below the 12–33% in other regions. Most big employers are based in South Africa, where about 150 firms generate more than $1 billion in revenue annually. A lack of large firms in other countries within the region limits the creation of stable, higher-paying jobs and the spillovers that raise productivity.[29] Global evidence shows that a small cohort of large, highly productive firms often drives a disproportionate share of productivity growth.[30] However, with so few of these standout firms, sub-Saharan Africa captures fewer gains. Informal, low-productivity employment remains the default option for most workers.

These productivity barriers and constraints are not insuperable. There are pockets of progress in education and in services, evidence of entrepreneurial energy. Some governments are innovating in transparency and efficiency. The challenge is to scale this anecdotal progress into systemic gains—especially in foundational education and skills, access to finance, and formal-sector job creation—so that the region's demographic dividend translates into broad-based, sustainable growth.

24 For 26 nations in sub-Saharan Africa based on data availability.

25 Between mid-2014 and early 2016, global oil prices fell by about 70%, driven by oversupply and slower demand growth.

26 Sub-Saharan Africa's efficiency score of 0.46 means it delivers about 46% of the infrastructure output that the best performers get from a similar amount of public capital: Karim Barhoumi et al., *Public investment efficiency in sub-Saharan African countries*, International Monetary Fund, July 6, 2018.

27 Most farms are small (often smaller than one hectare). Households prioritize food self-sufficiency. Few reach a living income, and off-farm work is essential for many: Ken E. Giller et al., "Small farms and development in sub-Saharan Africa: Farming for food, for income or for lack of better options?," *Food Security*, 2021, Volume 13.

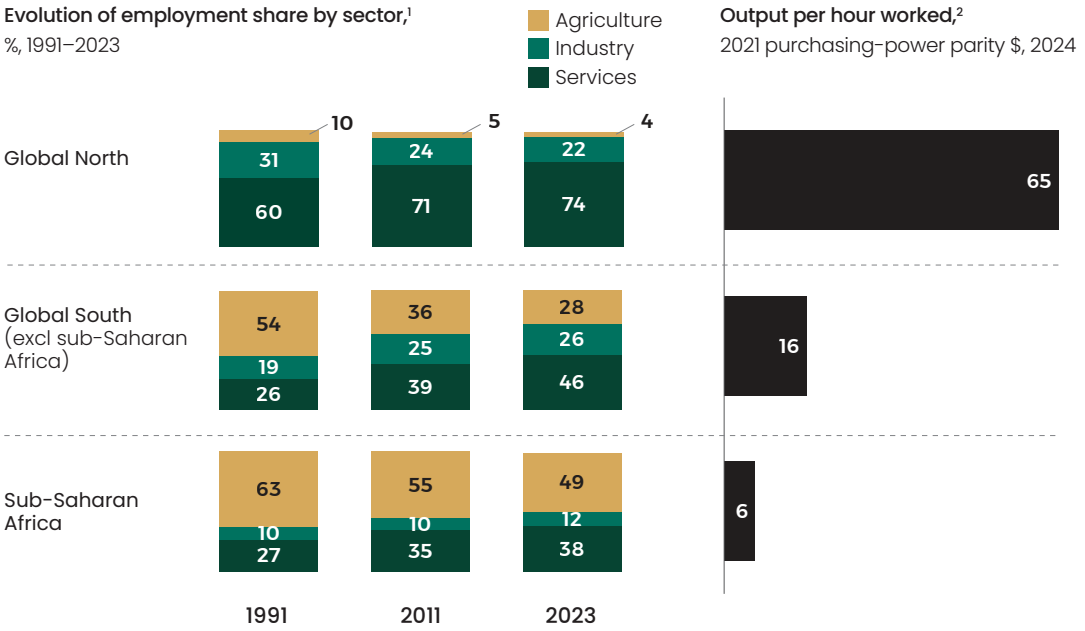
28 Estimation based on eight sub-Saharan African countries due to data availability.

29 Large firms invest more in assets, R&D, and training; pay higher wages; export at scale; and lift small and medium-size suppliers: "Outperformers: High-growth emerging economies and the companies that propel them," McKinsey Global Institute, September 11, 2018.

30 In a sample of 8,300 large firms in the Germany, the United Kingdom, and United States, fewer than 100 "standout" firms (those adding at least one basis point to national productivity growth) accounted for roughly two-thirds of productivity gains in each country: "The power of one: How standout firms grow national productivity," McKinsey Global Institute, May 6, 2025.

Exhibit 5

THE REGION IS TRANSITIONING FROM AGRICULTURE TO SERVICES WITHOUT BUILDING A STRONG MANUFACTURING BASE.



Note: Figures may not sum to 100%, because of rounding.
[1] Global North includes Advanced Asia and Pacific, North America, and Europe (45 countries), while Global South includes Emerging Asia and Pacific, Latin America, and Middle East and North Africa (44 countries). Sub-Saharan Africa includes 26 countries. Regional figures are weighted averages.
[2] Global North (46), Global South (46), and sub-Saharan Africa (27); regional figures are weighted averages.
Source: World Bank; The Conference Board

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SUB-SAHARAN AFRICA'S ECONOMIES VARY IN THEIR ECONOMIC AND SOCIAL DYNAMICS

While the 49 countries in sub-Saharan Africa share many characteristics, the region is far from being a monolith; indeed, the research suggests wide differences among countries in terms of their growth trajectories, labor outcomes, and entrepreneurial approaches, as well as the state of their infrastructure and the tech-readiness of their business communities and young people. Some economies have stronger human capital resources and have been able to create more jobs, expand digital access, and improve institutions more fully than others. Many still face gaps in basic infrastructure and institutional constraints. The future of work will therefore start from a wide array of baselines and follow different paths.

A segmented view of the countries[31] is more informative, and the research for other reports in this Future of Work series have also adopted this approach. For sub-Saharan Africa, four distinct segments are discernible, each with its own profile across human capital, governance and social stability, investment attractiveness, tech readiness, economic formality, and export

31 Segmentation covers 42 of 49 countries based on data coverage and risk considerations. Excluded countries are Central African Republic, Djibouti, Equatorial Guinea, Eritrea, São Tomé and Príncipe, Somalia, and South Sudan.

diversification.[32] Exhibit 6 compares and contrasts the four segments, which are described below[33]:

Decelerating frontrunners: Countries that are already ahead, with relatively high productivity and stronger future-of-work fundamentals compared with regional peers

Dynamic growers: Economies that have shown consistent productivity gains over the past decade, suggesting solid momentum

Underleveraged economies: Countries where productivity has remained stagnant or declined, indicating that existing potential is not being fully realized

States in transition: Economies with low baseline fundamentals and limited growth, requiring systemic reforms before advancing on future-of-work readiness

The four segments in more detail are as follows:

Decelerating frontrunners

This is a group of just six countries that together represent only about 6% of sub-Saharan Africa's population but account for about 20% of the region's GDP. They are Botswana, Gabon, Mauritius, Namibia, Seychelles, and South Africa. These are the most affluent countries in the region, with GDP per capita that is between three and ten times the regional average. Their labor productivity is three to six times higher. Gabon has the highest productivity, at about $35 per hour worked, followed by Mauritius ($32), Botswana ($23), and South Africa ($21).[34] However, despite these strong starting points, these countries also share a weakening growth momentum over the past decade: On average, GDP per capita fell by about 0.6% per year and productivity by about 0.1% per year. Mauritius is the only one of the six still seeing productivity growth (of about 2.2% a year), helped by steady diversification into higher-value services (such as finance, information and communications technology, and business services), strong institutions, and skills and infrastructure upgrades.[35] Compared with the average in sub-Saharan Africa, the countries in this segment score better on some of the fundamentals that matter for the future of work.

Human capital. A higher proportion of adults have attained tertiary education (12%)[36] than in countries in other segments. Schooling metrics are also stronger: For example, secondary enrollment is about double the regional average in most cases, and, with the exception of South Africa, harmonized test scores are in the 80th percentile, suggesting that the quality of schooling is relatively high. Nonetheless, across this segment, unemployment and NEET rates sit above regional averages; in South Africa, the unemployment rate is about 33% and the NEET rate is around 34%. High (youth) unemployment reflects limited job opportunities for youth relative to the number entering the labor market. This is compounded by a mix of income effects from social transfers that lift reservation wages, as well as high job-search and transport costs that make sustained search difficult.[37]

Governance and social stability. The countries in this segment are the most stable in the region: The grouping collectively posts the highest political stability scores on the World Bank's

32 Diversification and informality are considered together in the research because of their well-established correlation; greater economic complexity broadens product and firm networks, enabling specialization and scale, which raises formal-sector wages and standards and reduces the incentive to operate informally: Isaac Ketu, Arsene Mouongue Kelly, and Jules-Eric Tchapchet Tchouto, "Does economic complexity reduce the size of the shadow economy in African countries?," *SN Business & Economics*, 2024, Volume 4, Number 12; *Globalization and informal jobs in developing countries*, International Labour Organization and World Trade Organization, October 12, 2009. In much of sub-Saharan Africa, where agriculture remains the dominant employer and is largely informal, limited diversification tends to go hand in hand with high informality.

33 Because of the lack of available data, we do not include the states in transition in the performance comparison heat map.

34 Purchasing-power parity in 2021 US dollars.

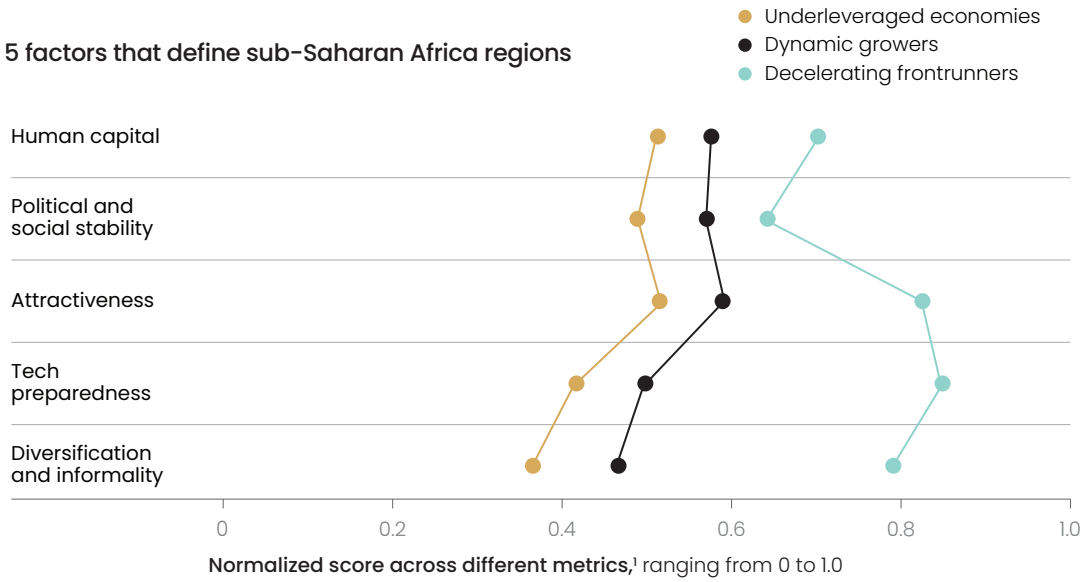
35 "The World Bank in Mauritius," World Bank, updated April 8, 2025.

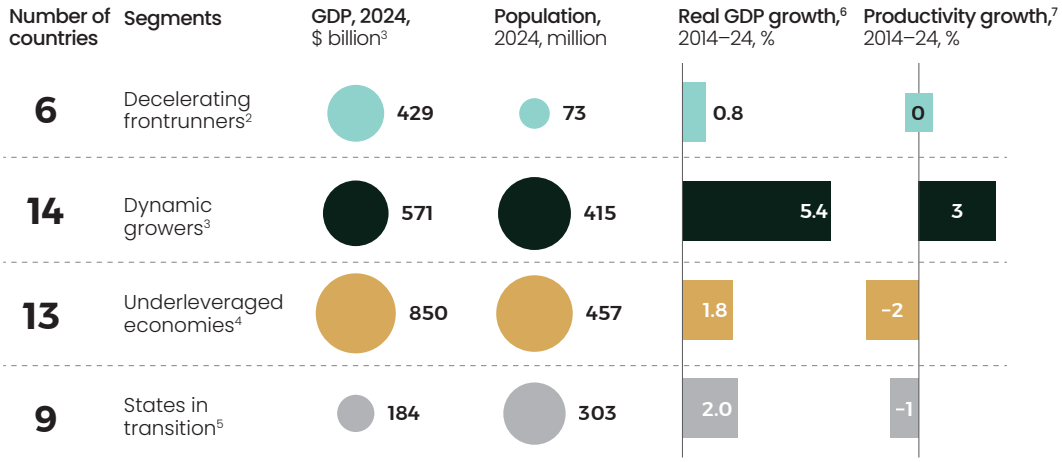
36 "Educational attainment, at least Bachelor's or equivalent, population 25+, total (%) (cumulative)," World Bank, February 2024.

37 There is a negative association between grants and employment (about seven percentage points for the youngest cohort who are indirect recipients). This effect is stronger when grant amounts are larger and among those with lower education; for low-income job seekers, out-of-pocket transport can approach 40% of after-tax labor income. Limited job opportunities for youth and lower skills or earnings potential amplify the income effect of grants: Ken Miyajima, "The link between social grant and employment in South Africa," International Monetary Fund, June 13, 2023.

Exhibit 6a

SEGMENTING COUNTRIES IN SUB-SAHARAN AFRICA BASED ON THEIR ECONOMIC AND SOCIAL PROFILES HIGHLIGHTS SIMILARITIES AND DIVERGENCES.





[1]These 5 factors are defined across different metrics. Human capital index is based on share of adults with at least bachelor's degree or equivalent, World Bank's Human Capital Index, and share of youth not in employment, education, or training. Social stability is based on the World Bank's Political Stability Index, poverty rate, and inflation rate. Attractiveness is based on gross fixed capital (% of GDP), average foreign direct investment inflow, and output per hour worked. Tech preparedness is based on internet penetration, R&D spending, and the International Monetary Fund's AI Preparedness Index. Diversification and informality is based on the Economic Complexity Index and share of informal employment. The data was normalized using a min–max scaling technique at the country level and taking the simple average of countries based on the segmentation. This approach adjusts the original values to a standardized range between 0 and 1, ensuring the minimum value in the data set corresponds to 0 and the maximum value corresponds to 1. [2]Includes Botswana, Gabon, Mauritius, Namibia, Seychelles, and South Africa. [3]In constant 2015 $. [4]Includes Angola, Comoros, Liberia, Lesotho, Malawi, Mozambique, Nigeria, Republic of the Congo, Senegal, Sierra Leone, Uganda, Zambia, and Zimbabwe. [5]Includes Burkina Faso, Burundi, Chad, Democratic Republic of the Congo, Guinea-Bissau, Madagascar, Mali, Niger, and Sudan. This cohort is not the focus of this report. [6]In constant 2015 $. [7]Output per worker (2021 purchasing-power parity $). Weighted average for segments.
Source: UNESCO; World Bank; UNCTAD; International Monetary Fund; United Nations World Population Prospect 2024; Harvard Growth Lab

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Political Stability index,[38] and four countries are included in the top five in the region. Poverty is lower than in other countries in the region, with households supported by broad transfer systems and pensions—although it is still 1.5 times the global average. Macroeconomic conditions are

38 World Bank's Political Stability and Absence of Violence/Terrorism indicator measures perceptions of the likelihood of political instability or politically motivated violence, including terrorism, reported as a standardized score between -2.5 and 2.5. The higher the score, the more stable and less violent the country.

Exhibit 6b

SEGMENTING COUNTRIES IN SUB-SAHARAN AFRICA BASED ON THEIR ECONOMIC AND SOCIAL PROFILES HIGHLIGHTS SIMILARITIES AND DIVERGENCES.

Better ■■■ Worse

		Decelerating frontrunners	Dynamic growers	Underleveraged economies
Human capital	Adult tertiary-education attainment,[1] %	12	6	3
	Human Capital Index score, 2020	0.43	0.41	0.37
	Share of youth in NEET,[2] 2024, %	34	20	18
Social and political stability	Poverty head count ratio at societal poverty line,[3] %	39	42	48
	Political Stability Index score, 2023	-0.5	-1.0	-1.2
	Inflation rate, 2019–24, average, %	5	12	30
Attractiveness	Gross fixed capital formation, 2024, % of GDP	16	23	24
	Foreign direct investment net inflow, 2018–23 average, % of GDP	3.0	2.0	1.2
	Output per hour worked, 2024, international $, 2021 prices	22	7	5
Tech preparedness	Individuals using the internet, 2023, % of population	75	32	35
	R&D expenditure,[4] % of GDP	0.6	0.5	0.3
	AI Preparedness Index score, 2023	0.49	0.34	0.33
Diversification and informality	Economic Complexity Index score,[5] 2023	-0.3	-0.9	-1.4
	Informal employment rate,[4] %	37	87	92

Note: All segment figures are weighted averages.
[1] Share of adults (aged 25+) who have at least completed bachelor's or equivalent, % of population aged 25+. Latest data available by country.
[2] Not in employment, education, or training. Youth is defined as individuals between the ages of 15 and 24.
[3] The societal poverty line is expressed in purchasing power–adjusted 2017 dollars and is defined as max ($2.15, $1.15 + 0.5 * median). This means that when the national median is sufficiently low, the societal poverty line is equivalent to the extreme poverty line ($2.15). Latest data available by country.
[4] Latest data available by country.
[5] Measures how diverse and sophisticated a country's export basket is. Higher scores mean more complex, knowledge-intensive economies.
Source: Harvard Growth Lab; UNCTAD; UNESCO; International Monetary Fund; World Bank

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steady: The five-year average inflation rate is 4.8%, below the global 5.4%.

Attractiveness. These countries display the strongest productivity record in the region and have relatively high net foreign direct investment (FDI) inflow (3.0% of GDP versus a global average of 1.6% between 2018 and 2023). However, capital investment remains limited at only about 17% of GDP (versus the regional average of 29%). South Africa has the lowest GFCF as a share of GDP in this segment (14%). This reflects fiscal crowding out, as public debt rose from 25% of GDP in 2008 to 74% in 2023 and ratings downgrades increased borrowing costs.

Tech preparedness. Various metrics for digital readiness, including internet usage, R&D, and AI preparedness, are also stronger, suggesting that these countries are relatively well positioned

in the region to adopt and benefit from AI and newer digital technologies. Digital infrastructure is widespread across this segment, but basic infrastructure, especially power, has not kept pace with demand. In South Africa, despite high connectivity, the grid fell short, with record load shedding in 2023. In Namibia, demand now outstrips domestic generation, and about 67% of electricity was imported as of October 2024. In Gabon, frequent power cuts disrupt firms and households, underscoring quality-of-supply issues even where access is relatively high.[39]

Diversification and informality. In diversified economies, lower informality supports formal job creation and capability diffusion. South Africa illustrates this dynamic: Informality is about 35% (less than half the regional average), while "economic complexity"—a metric compiled by Harvard Growth Lab to determine the level of knowledge in an economy[40]—is relatively high within the region (ranked fourth) yet still modest by global standards (77th out of 145 countries). The country hosts sub-Saharan Africa's largest base of big firms (about 147 with more than $1 billion in annual revenue). By contrast, Botswana and Gabon are concentrated on commodities (diamonds and oil), and Botswana has a high informality of 76%. These countries rely on capital-intensive extractives that generate few high-wage jobs and have weak spillovers into the rest of the economy.

Dynamic growers

This group of 14 countries represents about one-third of the population of sub-Saharan Africa and about 28% of GDP. While they collectively score moderately on most metrics, their economies are smaller than those of decelerating frontrunners and tend to be more dynamic in varying ways. Still, the patterns across the five dimensions used in our research suggest that sustaining productivity gains will require deeper skills, broader digital access, and stronger conditions for investment and firm growth.

This group has the fastest GDP and productivity growth in the region, albeit with a much lower starting point compared with the previous segment: Over the past decade, GDP per capita grew by about 2.7% annually and output per worker grew by about 2.9% annually. Average GDP per capita is 86% of the regional mean, but Côte d'Ivoire, Eswatini, Ghana, and Kenya sit between 1.2 times and 2.5 times above it. Ethiopia has posted the fastest gains in productivity (more than 5% annual growth) and GDP (which has grown at 7.5% annually in the last ten years), on the back of a state-led infrastructure push—but from a low base (Ethiopia's GDP per capita is still half that of the regional average).

Human capital. The faster economic growth in this group has not yet led to an upgrade in skills. Some economies, including Côte d'Ivoire, Guinea, Rwanda, and Tanzania, score below the sub-Saharan African average on the World Bank's Human Capital Index. The share of adults with tertiary education is low at 6%. The STEM pipeline is also small: In only one in five of these countries do STEM graduates account for more than 20% of total graduates.[41] Outcomes diverge across the cohort, with Cabo Verde and Ghana having the highest gross secondary enrollment (above 75%) and having tertiary enrollment above 20%. On learning quality, Eswatini and Kenya sit around the 88th percentile on harmonized test scores in the region (just behind three decelerating front-runners) while the Gambia, Ghana, and Rwanda are below the 38th percentile.

Governance and social stability. Political stability is low by regional standards; Cameroon and Ethiopia both face ongoing conflicts. Inflation is especially high in Ethiopia, averaging about 25% in 2019–2024, which could be attributed partly to monetary financing and fast credit growth.[42] Poverty in Rwanda remains high, at about 64% of

39 Of the population, 94% has access to electricity: "Access to electricity (% of population)," World Bank, 2023.

40 Economic complexity is a measure of the knowledge embedded in an economy, inferred from how diverse its exports are and how uncommon those products are worldwide. The data is compiled in an Economic Complexity Index by the Harvard Growth Lab's Atlas of Economic Complexity.

41 Of the 14 steady growers, ten report the STEM share of graduates, with varying reference years depending on availability.

42 The International Monetary Fund links persistence of inflation in part to earlier monetary financing of fiscal deficits and rapid credit growth. Since 2023, the central bank has limited direct advances and capped bank lending at 14%, which has helped bring inflation down from 37% in May 2022 to 17% by August 2024.

people living under the societal poverty line, and more than four in five residents live in rural areas.

Attractiveness. Over the past five years, the countries in this group recorded FDI net inflows of 2%, on average, between 2018 and 2023. The Gambia's FDI jumped from a ten-year average of about 3.8% of GDP in 2017 to a ten-year average of about 7.0% by 2024,[43] largely from manufacturing[44]; Mauritania likewise saw a post-2017 surge, concentrated in oil and gas.[45] Kenya and Rwanda, for their part, have notable venture activity. Kenya serves as a regional gateway to the East African Community's market of 330 million people, which supports cross-border scaling of digital finance and other tech services. Kenya's relative stability and infrastructure allow it to act as a magnet to African and non-African talent, effectively boosting the competitiveness of the market. However, external financing to governments in this segment has fallen while debt service rose; in Kenya, interest payments took about 30% of revenues in 2023, likely crowding out public capital spending from government budgets.

Tech preparedness. This segment has the lowest internet use in the region, despite R&D spending at about 0.5% of GDP. AI preparedness is broadly at par with the decelerating frontrunners. Most countries remain below 50% internet penetration—for example, in Ethiopia, the figure is about 17%; in Kenya, it is about 35%; and in Côte d'Ivoire, it is about 40%. Most countries also score below 50 on the GSMA Mobile Connectivity Index, signaling persistent gaps in infrastructure and affordability.

Diversification and informality. High informality (averaging about 87%) keeps unemployment lower via easy entry into low-value work. Several states benefit from fewer legacy constraints, enabling nimble reform once governance improves. But countries in this segment have been diversifying. Ghana and Kenya have shown notable complexity gains in the past five years, rising six and 14 places, respectively, in the Economic Complexity Index over the past five years.[46] Within the cohort, Eswatini appears to have higher-complexity exports (for example, chemicals).[47] Export concentration varies: The Gambia, Kenya, and Togo have more-diversified, less-concentrated baskets, while Guinea remains highly concentrated—dominated by bauxite (aluminum ore) and gold—and correspondingly low in complexity.

Underleveraged economies

This segment consists of 13 countries representing about 35% of sub-Saharan Africa's population and about 41% of GDP. Some of the region's largest countries are in this segment, but they are punching below their weight. Only three economies (Angola, Nigeria, and the Republic of the Congo) have GDP per capita above the regional average. Average labor productivity remains below the regional average, at about $5.0 per hour worked, with the highest in Angola (about $10.0) and the lowest in Liberia (about $1.5). Furthermore, over the past decade, GDP per capita has been shrinking by about 0.7% per year and productivity by about 1.8% per year. A few economies saw modest GDP-per-capita gains, including Comoros, Uganda, and Senegal. However, these gains were not productivity-led but stemmed from consumption (Comoros), commodity exports (Uganda), and a hydrocarbon investment boom (Senegal). The large, geographically dispersed countries also face stark intranational disparities; in Nigeria, for example, earning power, human capital, and

43 This has been largely driven by post-2017 democratic transition and reforms, expanded incentives, energy exploration deals, a broader investor base, and surging diaspora remittances (which increased fourfold between 2017 and 2023, accounting for a third of GDP), with some funds used for investment in business and real estate: *Report on the implementation of the Investment Policy Review of The Gambia*, UN Trade and Development, July 2, 2024.

44 More than half of all Special Investment Certificates issued to foreigners since 2017 were for projects in manufacturing: *Report on the implementation of the Investment Policy Review of The Gambia*, UN Trade and Development, July 2, 2024.

45 In 2022, the oil and gas sector accounted for 94% of FDI flows into Mauritania: "Report highlights impact of Mauritania's investment reforms and further potential," UN Trade and Development, December 19, 2023.

46 The Economic Complexity Index measures how advanced an economy's productive know-how is, inferred from the diversity and rarity of the products it exports competitively. For more, see "Country & Product Complexity Rankings," Harvard Growth Lab, accessed September 29, 2025.

47 High-complexity exports are products with high Product Complexity Index values: goods that require diverse, sophisticated productive know-how and are typically produced by a few highly diversified countries. The index is reported by Harvard Growth Lab's Atlas of Economic Complexity. For more, see "Country & Product Complexity Rankings," Harvard Growth Lab, accessed September 29, 2025.

digital infrastructure are concentrated in prime urban centers, far ahead of the periphery.

This cohort scores below the two previous country segments on core enablers for the future of work.

Human capital. Human capital faces challenges across this segment along the entire pipeline—educational access, progression, quality, and transition to work. Access remains uneven, with millions still out of school (Nigeria alone has more than 10.2 million primary-age children out of school[48]), and primary completion is low by global standards, with Malawi and Uganda at about 40–50% completion. Uganda's "learning poverty"—defined by the World Bank as a child unable to read and understand a simple story by the age of ten[49]—is about 82%.[50] In Nigeria, roughly 74% of people aged seven to 14 lack basic reading and numeracy skills.[51] School infrastructure is also lacking, with only about 14% of schools meeting basic safety standards, according to UNICEF.[52] Tertiary attainment is mostly below 5%, reflecting

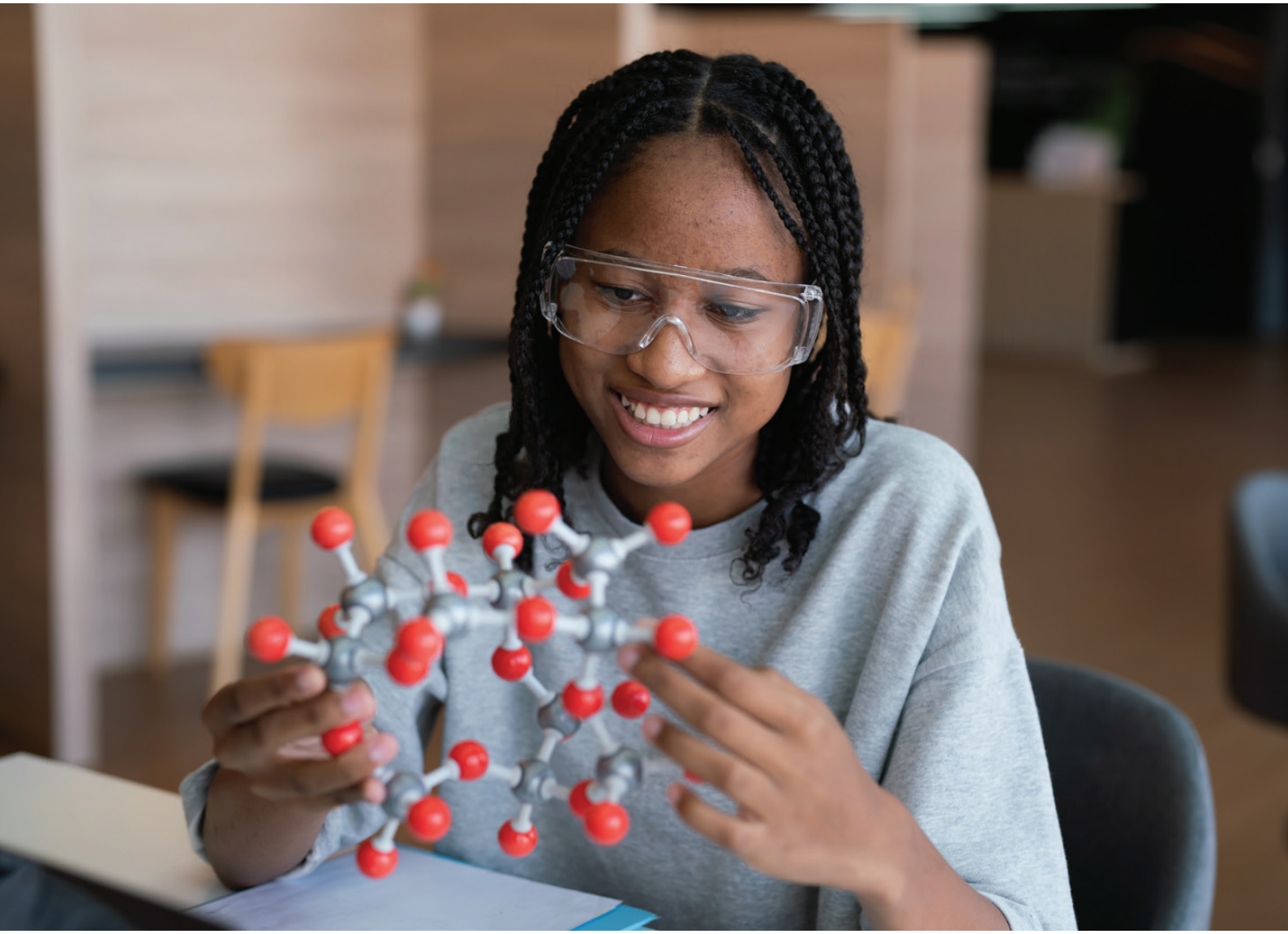
48 "Immediate action needed to protect Nigeria's children and schools," UNICEF, September 2024.

49 The World Bank defines learning poverty as "being unable to read and understand a simple text by age ten": "What is learning poverty?," World Bank, April 28, 2021.

50 "Uganda learning poverty brief," World Bank, April 1, 2024.

51 "Immediate action needed to protect Nigeria's children and schools," UNICEF, September 2024.

52 "Immediate action needed to protect Nigeria's children and schools," UNICEF, September 2024.



a narrow top of the pipeline. Systems are also underresourced: Spending on public education hovers around 1.7% of GDP for this segment, versus 5.0% in decelerating frontrunners and 4.0% in dynamic growers. In Nigeria, public spending on education is even falling. Finally, the share of youth in NEET is relatively low at 18%; however, this likely masks the precarity of the work given the high level of informality.

Governance and social stability. Poverty is high, at 48%, even by comparison with the region as a whole, and a large share of workers are in low-pay, precarious work with little social protection. Inflation is far above other segments (averaging 30%), driven largely by hyperinflation in Zimbabwe, where prices rose by more than 400% on average between 2019 and 2024. Other countries—Angola, Nigeria, and Sierra Leone—have also struggled with high inflation. In Angola, price pressures followed a sharp currency depreciation and food-supply frictions tied to import licensing and substitution policies.[53] In Nigeria, fuel-subsidy removal and higher electricity tariffs, together with a currency depreciation, increased transport and food costs.[54] In Sierra Leone, global food shocks and a weaker currency were compounded

53 *Angola: 2024 Article IV consultation-press release; staff report; and statement by the executive director for Angola,* International Monetary Fund, March 5, 2025.

54 *Angola: 2024 Article IV consultation-press release; staff report; and statement by the executive director for Angola,* International Monetary Fund, March 5, 2025.

by large, regulated price hikes and rapid money growth, which kept inflation higher and more persistent than for peers.[55]

Attractiveness. GFCF at 27% of GDP is higher than for the decelerating frontrunner countries, but investments are often skewed toward extractives and large public works, with less spillover into diversified, productivity-raising private activity that could create jobs. Some of the economies in this segment are still heavily exposed to certain commodities and have faced recent economic hurdles as a result. FDI also has been closely tied to extractive industries, with growth peaking in 2014 before falling sharply and turning negative in 2016.

Tech preparedness. Internet use is low across the cohort; Senegal is the exception, at about 60% (about 1.8 times the regional average), reflecting broad mobile-broadband coverage, falling data costs, and strong uptake of digital services, including mobile money.[56] Furthermore, electricity access remains highly uneven across the members in this cohort: In 2023, 61% of households had electricity access in Nigeria, while in Uganda, the total was just over 50% and was even lower in Mozambique and Malawi, at 36% and 16%, respectively.[57] This disparity hampers digital adoption and sustained usage, slows the shift to tech-enabled work and learning, and widens inclusion gaps.

Diversification and informality. Most countries in this segment have concentrated export baskets, with Nigeria and Angola among the most concentrated in the region. Senegal stands out with lower concentration and a broader mix. However, recent export growth and new product entries have been led mainly by lower-complexity goods, such as precious metals (gold, zircon, and titanium minerals), fruits and vegetables, and fish and related products. As such, greater breadth has not yet translated into higher economic complexity.[58] Informality is very high, at 93%: Angola, Mozambique, Nigeria, Sierra Leone, and Uganda each exceed 90%. Two structural patterns may be driving this. First, agricultural employment is very high, often at 65% or more, which is the case for Mozambique and Uganda, where work is predominantly informal.[59] Second is the extent of resource dependence. In the case of Angola, Nigeria, and Sierra Leone, this creates capital-intensive enclave sectors with oil or minerals that have limited spillovers into formal wage jobs.[60]

States in transition

The final grouping consists of states undergoing sociopolitical challenges and conflicts. These are Burkina Faso, Burundi, Chad, Democratic Republic of the Congo, Guinea-Bissau, Madagascar, Mali, Niger, and Sudan. They together have a population of about 300 million (23% of the regional population) and account for 9% of the regional GDP. Given the often highly challenging conditions in the countries, they have the lowest productivity, with limited stability, and are not in a position to address many of the major future-of-work challenges covered in this report. For this reason, and given a lack of reliable data, this research does not break out their performance across the five dimensions.

55 "Inflation and macroeconomic policy in Sierra Leone," International Monetary Fund, November 22, 2024.

56 Mobile money adoption in Senegal reached about 67% in 2024, compared with about 33% in Nigeria.

57 "Access to electricity (% of population)," World Bank, 2023.

58 *Senegal: 2021 Article IV consultation, fourth review under the policy coordination instrument, first reviews under the stand-by arrangement and the arrangement under the standby credit facility, and request for modification of performance criteria and quantitative targets*, International Monetary Fund, January 14, 2022.

59 Almost 100% of employment in agriculture is informal in Uganda and Mozambique: "Employment by sex, informal / formal economy and economic activity," International Labour Organization, updated September 18, 2025.

60 Weak forward and backward linkages from primary exports and Dutch-disease pressures limit broad-based creation: Charlotte J. Lundgren, Alun H. Thomas, and Robert C. York, *Boom, bust, or prosperity? Managing sub-Saharan Africa's natural resource wealth*, International Monetary Fund, August 27, 2013.

2 IN A TECHNOLOGY-FIRST ERA, SUB-SAHARAN AFRICA HAS AN OPPORTUNITY TO LEAPFROG

AROUND THE WORLD, advanced robotics, AI, and digital platforms are transforming industries ranging from manufacturing and logistics to healthcare and financial services. In developed economies, these shifts have fueled productivity gains but also triggered concerns about large-scale job displacement, widening inequality, and social disruption. Emerging markets, too, are increasingly embracing digital transformation to enhance competitiveness and integrate new technologies into global value chains, although the relatively lower cost of labor in many of these countries might mean there is less labor market disruption. A study by the McKinsey Global Institute finds that AI has the potential to boost the global economy over the next ten years by as much as $25.6 trillion and lift productivity growth by 1.75 percentage points.[61]

For sub-Saharan Africa, AI presents an opportunity to leapfrog stages of technological development, provided the region can overcome existing challenges related to human capital, infrastructure, and investment. Staying at the forefront of certain technologies will be essential. The continent has already demonstrated its ability to leapfrog in the digital space; for instance, with mobile money. If it can continue to develop its entrepreneurial flair and address structural barriers, sub-Saharan Africa could well be home to additional success stories.

The potential is exciting, but the challenges may appear daunting. Technology adoption can help boost productivity and limit the widening gap with other regions. But technology alone is not a magic bullet. Major structural interventions—such as effective governance, strong and scalable education systems, sound industrial policies, increased regional integration, and political stability—are prerequisites for successful tech adoption. Upgrading human capital is key: Reskilling and upskilling the workforce in technology, digital, and AI-related capabilities are urgently needed if the gap is to be bridged.

As with past technology-driven shifts, adoption will likely be uneven both across and within countries. Some regions will rapidly scale new technologies, while others may struggle with structural, financial, or skills-related constraints that slow progress. This divergence carries profound implications for competitiveness, employment, and the distribution of economic opportunities.

SEVERAL SCENARIOS HIGHLIGHT THE POTENTIAL IMPACT OF AUTOMATION AND AI ADOPTION IN SUB-SAHARAN AFRICA

Sub-Saharan Africa's economic structure makes it unique in the global debate on automation and the future of work. With a large share of employment concentrated in agriculture, informal services, and low-wage professions, the immediate exposure to advanced automation technologies is limited. Unlike in advanced economies, where manufacturing and services are becoming highly automated, sub-Saharan Africa's jobs are less vulnerable in the short term. This gives the region some insulation against immediate, large-scale job losses.

Based on current projections in our research, three scenarios emerge for AI adoption at a regional level: early, mid, and late adoption. The range of scenarios represents uncertainty regarding the availability of technical capabilities, based on interviews with experts and survey responses.

Several factors could affect the timing and pace of adoption. For example, ease of integration can vary for solutions requiring different technologies. It also takes time to integrate capabilities into current technical platforms and combine them. The four parameters used in the model for this research are technical potential for automation, integration timeline, economic feasibility, and regulatory and public adoption. For these parameters, the early scenario makes more-aggressive assumptions. The midpoint adoption scenario, which we mainly use in the following narrative, is the average between the early and late scenarios. A faster scenario of adoption could be unlikely for sub-Saharan Africa, which has lagged behind more developed economies in technology investments. (For details of these scenarios, see the technical appendix.)

This analysis indicates that, in a midpoint scenario, up to 9% of current full-time equivalent employees (FTEs) could be displaced by automation in sub-Saharan Africa by 2030. That is considerably less than the share of FTEs that could

61 *The economic potential of generative AI: The next productivity frontier,* McKinsey, June 2023.

be displaced in other regions examined in this series: 29% in the United States, 27% in Europe, 20% in Latin America, and 19% in MENA (Exhibit 7). In the case of slow adoption of technology, this displacement could be negligible.

This projected short-term immunity to the effects of automation creates a paradox. While sub-Saharan Africa would avoid the painful waves of job displacement that advanced economies may experience, it would also risk missing the productivity and efficiency gains that automation brings. If the adoption of technology remains slow, the continent could fall further behind global peers, widening the competitiveness gap. Not acting now would provide respite in the short term but could evolve into a liability over time. Our analysis indicates that if automation adoption reaches 9.0% at the midpoint, sub-Saharan Africa's productivity growth could increase by 1.3%. Under a slow adoption scenario, however, these gains would be negligible, leaving the region at risk of falling further behind.

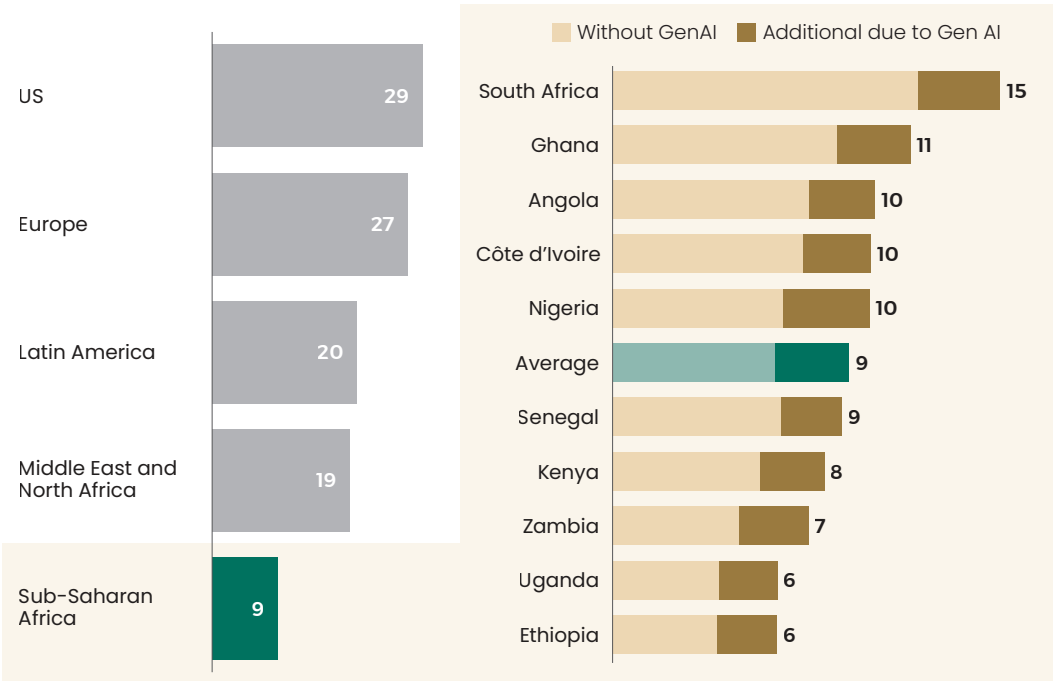
This limited exposure to automation is reflected in a survey[62] of business executives that was part of the research. This shows that scaled usage of tech is not a top priority or concern of the executives. "Scaled usage of technology" appears as the fourth largest trend affecting businesses in sub-Saharan Africa, with only 31% of executives citing it as a key trend; that is 18 percentage points lower

62 Dynata conducted two surveys in September 2025, targeting business executives and youth. The business executive survey had a sample size of 1,258 respondents across nine countries in sub-Saharan Africa (Angola, Côte d'Ivoire, Ethiopia, Ghana, Kenya, Nigeria, South Africa, Tanzania, and Uganda). The youth survey had a sample size of 916 respondents, covering the same nine countries. For details, see the technical appendix.

Exhibit 7

SUB-SAHARAN AFRICA IS LESS SUSCEPTIBLE TO JOB DISPLACEMENT THROUGH AUTOMATION THAN OTHER REGIONS.

Expected automation adoption rate by 2030 at midpoint scenario,
% of full-time equivalents



Source: McKinsey automation analysis based on employment data, measured by the number of employees by sector (ISIC Rev.4) and 1-digit ISCO-08 occupations for the year 2022 as well as wage data, measured by average yearly wages, by 1-digit ISCO-08 occupations for the same year; data was sourced from the International Labour Organization and Statistics South Africa; we collected the productivity data, measured by real gross value added per labor by sector (ISIC Rev.4), from the IHS Markit database

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than in MENA, 13 points lower than in the United States, six points lower than in Latin America, and four points lower than in Europe (Exhibit 8). In most of these other regions, it emerges as a top-three business trend. Even within sub-Saharan Africa, notable disparities exist. For instance, 42% of executives in Kenya identify scaled use of technology as a key trend, compared with only 20% of executives in Côte d'Ivoire.

Decisive and rapid action will be needed to capture potential jobs, productivity gains, and other benefits

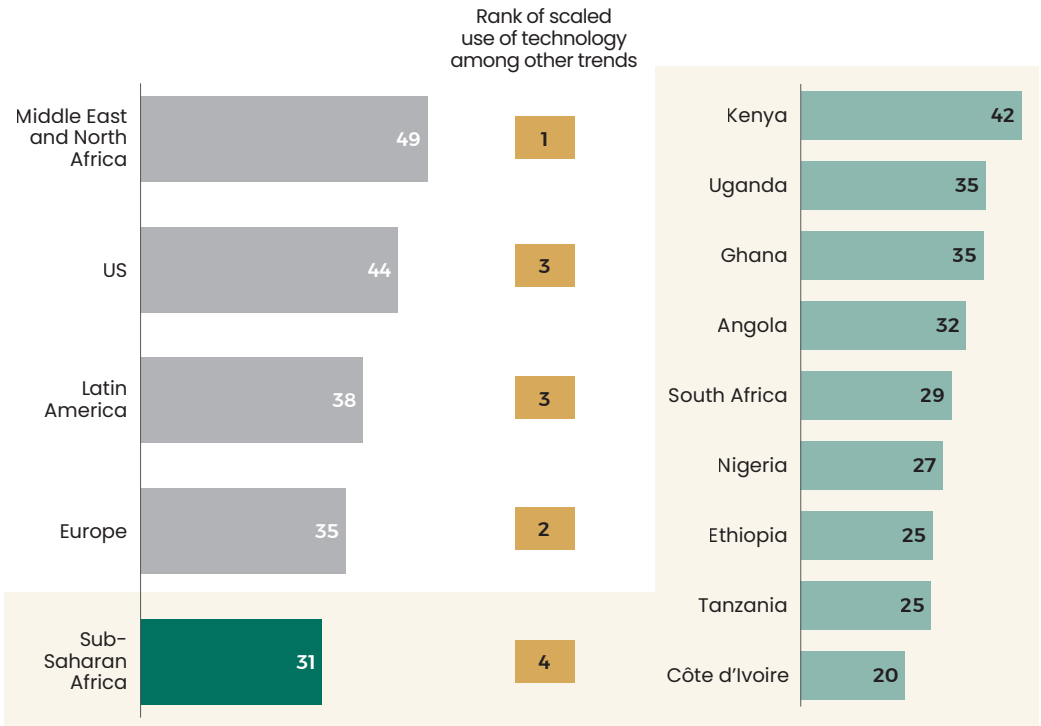
Acting decisively now could transform the structural gaps in sub-Saharan Africa into opportunities. Embracing advanced technologies such as AI offers the potential to stimulate new industries, improve efficiency, and create high-value jobs. Rising demand for AI specialists, data scientists, software developers, and cybersecurity experts can provide pathways for Africa's young workforce to participate in and benefit from the global digital economy. The region has already shown its ability to leapfrog ahead in some technologies (see Box 1, "Sub-Saharan Africa has shown it can leapfrog when conditions align").

Rapid adoption of AI and digital technologies could position the region at the forefront of tech-intensive sectors—sectors that stand to gain from both the global technology revolution and sub-Saharan Africa's inherent strengths, namely competitive wages and a vibrant youth dividend. While reshoring is an ongoing trend, sub-Saharan Africa can carve out a role by focusing on opportunities that are difficult to reshore and where its comparative advantages will endure. The priority should be to identify and secure these areas early, moving fast to establish

Exhibit 8

SCALED USE OF TECHNOLOGY RANKED AS THE FOURTH-LARGEST TREND AFFECTING BUSINESSES IN SUB-SAHARAN AFRICA, THE LOWEST AMONG ALL REGIONS.

What are the top trends affecting your business?,
% of respondents who replied, "scaled use of technology" (n = 1,258)



Source: Future of Work Survey for Sub-Saharan Africa, 2025

leadership in the next wave of industries, much like semiconductors today, that will increasingly benefit from automation.

Speed matters: Countries that quickly build AI capabilities can improve their productivity and potentially develop new comparative advantages (for example, using AI to excel in precision agriculture or customized manufacturing), whereas slow adopters could see existing advantages disappear. To remain competitive, firms and workers in sub-Saharan Africa will need access to modern AI tools and know-how—or risk missing opportunities as global value chains evolve. This urgency is prompting calls for African governments and businesses to treat AI as a strategic priority and invest now in talent and infrastructure so they can catch and direct the wave of AI-driven productivity, rather than being submerged by it.

Embracing AI could help sub-Saharan Africa turn its demographic advantage into a true dividend, creating millions of dignified, future-ready jobs that not only meet today's needs but also shape the next generation of AI solutions. Failing to do so, however, risks deepening the continent's underemployment challenge. With the youngest workforce in the world, the region stands to gain immensely if it can harness AI for inclusive growth.

Youth are excited and optimistic about emerging technology

Across sub-Saharan Africa, young people are showing remarkable enthusiasm for the adoption of AI and machine learning. Our survey shows that 60% of youth express strong interest in these technologies; that is 14 percentage points more than Latin America, five points more than Europe, and three points more than the United States (Exhibit 9). Nearly half of respondents are confident that AI will create or transform jobs. By contrast, only 37% fear that jobs will be eliminated, underscoring a prevailing optimism about AI's potential to reshape the future of work. This view is mainly expressed by surveyed youth who are expected to take formal-sector jobs. These statistics thus do not represent the view of young people in informal jobs, who are likely to have a different exposure to technology.

LACK OF TECH SKILLS, TECH READINESS, AND FINANCE FOR INNOVATION PREVENT THE REGION FROM LEAPFROGGING AHEAD

Structural challenges weigh heavily on technology adoption in the region. Lack of a trained workforce, weak infrastructure (including limited broadband penetration), unreliable power supply, and inadequate logistics slow down diffusion. Fragmented markets and regulatory environments further constrain scale. Three constraints stand out: skill gaps, technological readiness, and access to finance for innovation.

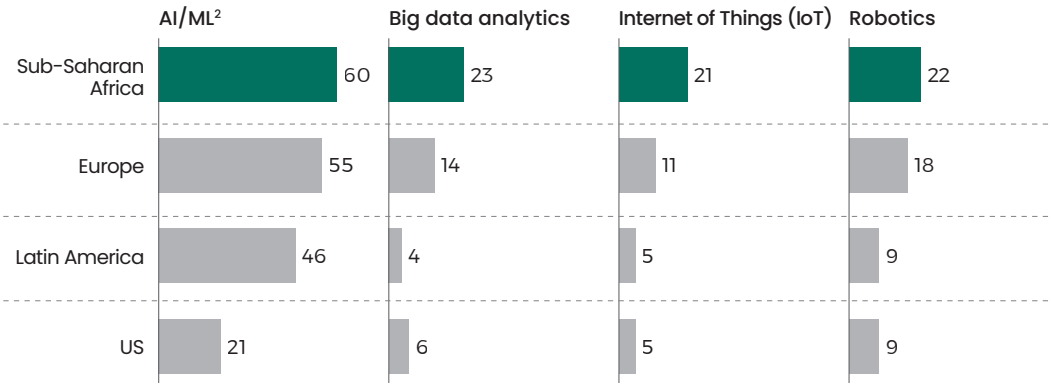
Surveys of both business executives and youth highlight prominent tech skill gaps across sub-Saharan Africa

Sub-Saharan Africa continues to face significant mismatches between the skills graduates possess and those that businesses

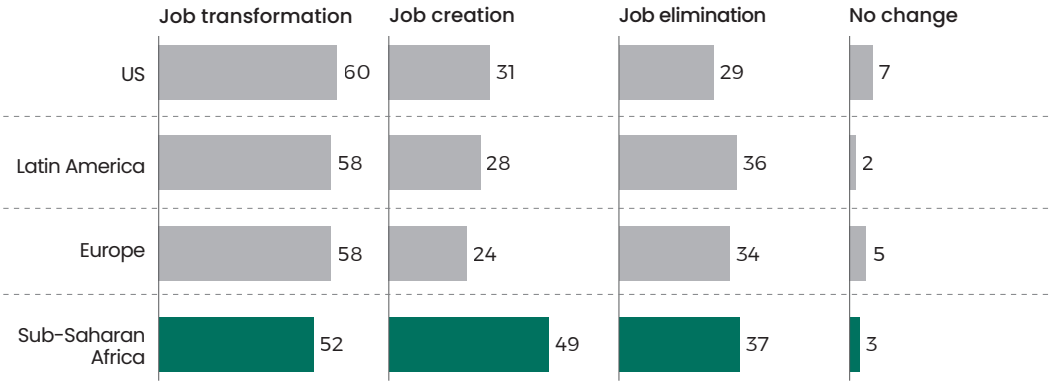
Exhibit 9

YOUTHS IN SUB-SAHARAN AFRICA ARE ENTHUSIASTIC ABOUT EMERGING TECHNOLOGIES.

Youths: Which emerging technologies interest you the most?,[1] % of respondents, n = 916



Youths: How do you think technology and automation will affect jobs in your country or region?,[3] % of respondents, n = 916



[1] Possible responses: AI/ML (60%), big data analytics (23%), robotics (22%), IoT (21%), 3D printing (18%), cloud computing (18%), blockchain (15%), augmented reality and virtual reality (14%), autonomous vehicles (11%), image recognition (10%), none of the above (3%). Percentages reflect responses from sub-Saharan Africa.
[2] AI and machine learning.
[3] Possible responses: job transformation (existing jobs will change), job creation (new jobs will emerge), job elimination (workers or jobs will be displaced), and no change.
Source: Future of Work Report Survey for Sub-Saharan Africa, 2025

urgently need. As highlighted in chapter 1, this disconnect is especially acute in technology-related capabilities. In our surveys, only 34% of business executives feel that employees have the right tech skills to meet their business strategy. Executives also say that technology skills being taught in schools are lacking. This is in line with findings from the youth survey, in which only 34% of respondents highlight learning basic digital skills in their academic curriculum (Exhibit 10).

Despite growth in internet access, sub-Saharan Africa lags behind on many technological fronts

Internet access, the backbone of digital solutions, has roughly doubled in sub-Saharan Africa, from 9% in 2012 to 36% in 2023, yet this is still significantly lower than the global average of 68% (Exhibit 11).[63] While some front-runners, including Botswana and South Africa, have emerged as leaders in achieving internet

63 "Individuals using the internet (% of population)," World Bank, accessed September 30, 2025.

Box 1

SUB-SAHARAN AFRICA HAS SHOWN IT CAN LEAPFROG DEVELOPMENT STAGES WHEN CONDITIONS ALIGN

Despite limitations in investments, infrastructure, and skills, sub-Saharan Africa's spirit of innovation flourishes on a foundation of frugality and pragmatism—vividly demonstrated through leapfrogging success stories.

Mobile money is one standout innovation. Mobile money refers to digital wallets that are not linked to traditional bank accounts. It has risen rapidly in this region, allowing countries to bypass the process of building a brick-and-mortar retail banking system.[1] Sub-Saharan Africa now accounts for 53% of active mobile money accounts globally[2] and 70% of global transactions (exhibit). Adult ownership of mobile money accounts rose from about 12% to about 40% between 2012 and 2022, one of the fastest global adoption curves. In Kenya, for example, which pioneered the M-PESA mobile money service, the service now reaches over 90% of households despite modest formal R&D.

Adoption varies by segment: Steady climbers such as Kenya and Ghana average mobile-money penetration of 80–90% of adults thanks to early adoption and dense agent networks; front-runners average about 32% because they already have higher formal bank and card penetration. In Nigeria, the largest country in the underleveraged economies segment, mobile money adoption stands at 33%; its agent saturation per 100,000 adults is nearly 50 times lower than Kenya's and more than 100 times lower than Ghana's, limiting financial inclusion in remote areas.

Another notable example is the use of AI in agri-tech. AGRA (Alliance for a Green Revolution in Africa) has teamed up with Atlas AI, which uses satellite imagery, remote sensing, and predictive analytics to predict agricultural trends, food security risks, and economic outcomes more accurately. This helps governments and organizations make evidence-based decisions on where to direct inputs such as seeds and fertilizers and how to anticipate crises.[3]

With little legacy infrastructure, many sub-Saharan African countries offer a "digital blank slate" for innovation. Rwanda illustrates this agility: Its pioneering drone regulations made it a global test bed, enabling services such as Zipline's medical deliveries and inspiring neighbors to follow. Zipline operates a fleet of autonomous drones that deliver essential medical supplies—such as blood, vaccines, and medicines—to remote and underserved areas with speed and precision.[4] Such openness to disruption positions African markets to leapfrog directly into AI-driven solutions.

At least eight countries in sub-Saharan Africa have adopted national AI strategies in the past few years, and about five more are currently in the drafting stage. This underscores a regionwide resolve to harness emerging technologies. For example, Kenya and Rwanda both released national AI policies outlining investments in AI skills, research, and ethical guidelines to spur innovation.

Beyond the latest innovations, the region is endowed with intrinsics that can help it play a role in the development of AI. With more than 2,000 languages and deeply varied cultural contexts, sub-Saharan Africa is an ideal test bed for multilingual AI, neuro-language programming, and inclusive design—areas in which Western and Asian models often underperform.

1 Mobile money does not include mobile banking apps linked to traditional bank accounts (such as Apple Pay, Google Pay, and Samsung Pay). In this data set, an account is considered active if it has completed at least one mobile money transaction within the past 90 days.

2 *The state of the industry report of mobile money*, GSMA, 2025.

3 Temina Madon, "AGRA and Atlas AI partner to promote food security and agricultural transformation," AGRA, April 30, 2019.

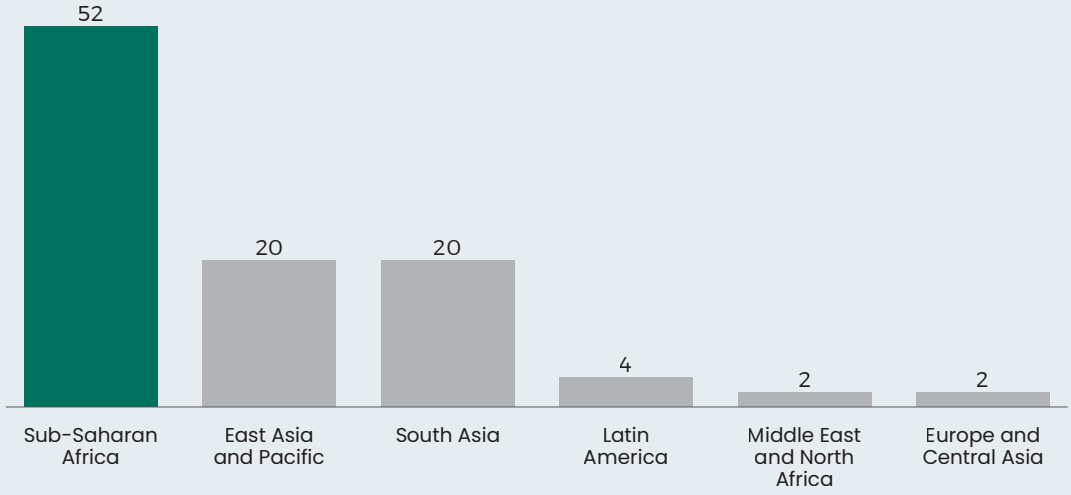
4 "How drones are bridging the medical supply gap in Rwanda," Health Tech Africa, May 15, 2025.

Box 1 (continued)

Exhibit

SUB-SAHARAN AFRICA IS LEADING GLOBAL ADOPTION OF MOBILE MONEY.

Active mobile money accounts,[1] regional share of adoption across selected regions, %, 2023



[1] Mobile money means using a cell phone to make financial transactions such as sending or receiving money, paying bills, or buying goods and services. It does not include mobile-banking apps linked to traditional bank accounts (eg, Apple Pay, Google Pay, Samsung Pay). In this data set, an account is considered active if it has completed at least one mobile money transaction within the past 90 days of the year.
Source: GSM Association

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Finally, sub-Saharan Africa's mineral wealth, including reserves of cobalt, rare earths, and lithium, can serve to underpin AI hardware supply chains. This gives the region strategic leverage in negotiations and potential for downstream AI manufacturing ecosystems. In return, the region is seeking to become more integrated through Pan-African initiatives such as the African Continental Free Trade Area (AfCFTA), which seeks to build a common market with 1.4 billion people.

penetration of about 80%, the record in other regions is highly variable. Angola and Kenya now have 35–45% internet penetration rates, propelled by mobile broadband rollouts and affordable smartphones. However, in countries such as Ethiopia, Tanzania, and Uganda, less than one-third of the population has access to internet. This is largely due to a combination of issues relating to infrastructure, affordability, governance, and social barriers. Large rural populations in these countries face limited broadband coverage and unreliable electricity, making it difficult to support widespread connectivity. High data costs relative to income and low rates of smartphone ownership further restrict access, while a lack of locally relevant content reduces demand. Governance challenges—including some monopolistic telecom sectors, restrictive regulations, and in some cases internet shutdowns or taxes—have also slowed adoption. Moreover, connectivity is largely concentrated in a few urban areas within a given country; hundreds of millions of people in sub-Saharan Africa remain offline. Gaps in basic infrastructure exacerbate the challenge.

For instance, roughly 600 million people (43% of Africa's population) lack access to electricity, underscoring that improvements in power and affordability are as crucial as telecom investments if sub-Saharan Africa is to make an inclusive digital leap.[64]

Another example of lacking infrastructure relates to data centers. Sub-Saharan Africa currently has about 200 data centers operating across the region, about 60 of which are in South Africa alone. Together, they account for less than 1% of the world's capacity,[65] which limits

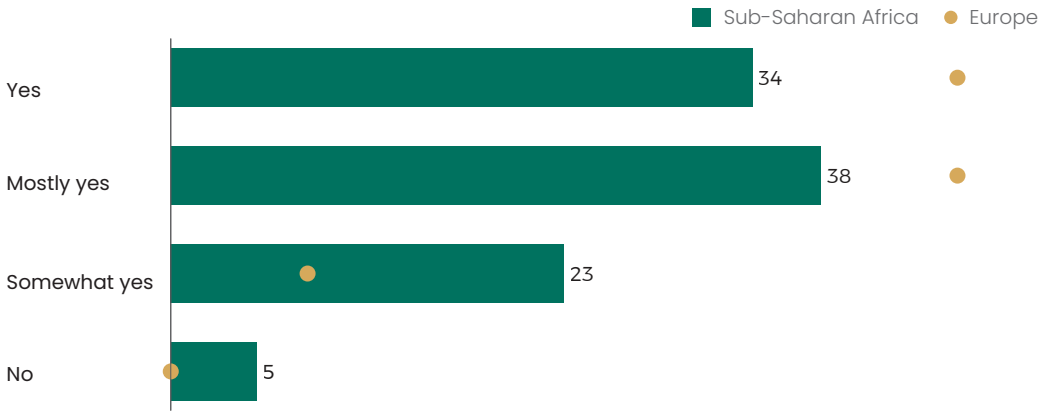
64 Africa energy outlook 2022, IEA, June 2022.

65 "Africa data centers," Data Center Map, accessed September 30, 2025.

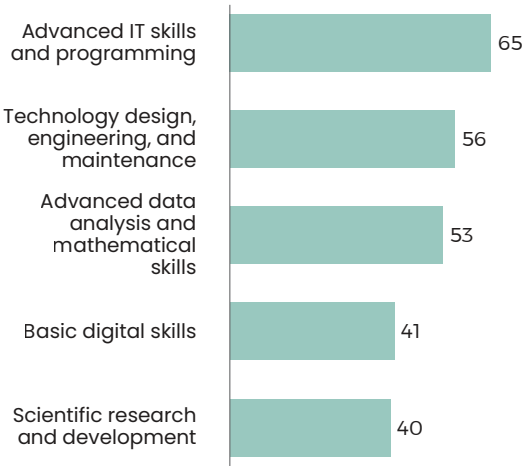
Exhibit 10

SURVEY RESULTS SHOW THE PERSISTENCE OF SKILL GAPS IN SUB-SAHARAN AFRICA'S WORKFORCE.

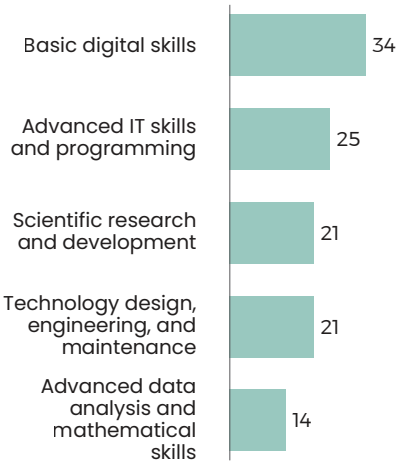
Does your workforce have the right tech skills to meet your business strategy?,
% of respondents, n = 1,258



Business executives: What are the top technology skills that youth need to learn in schools, colleges, and universities?
% of respondents, n = 1,258



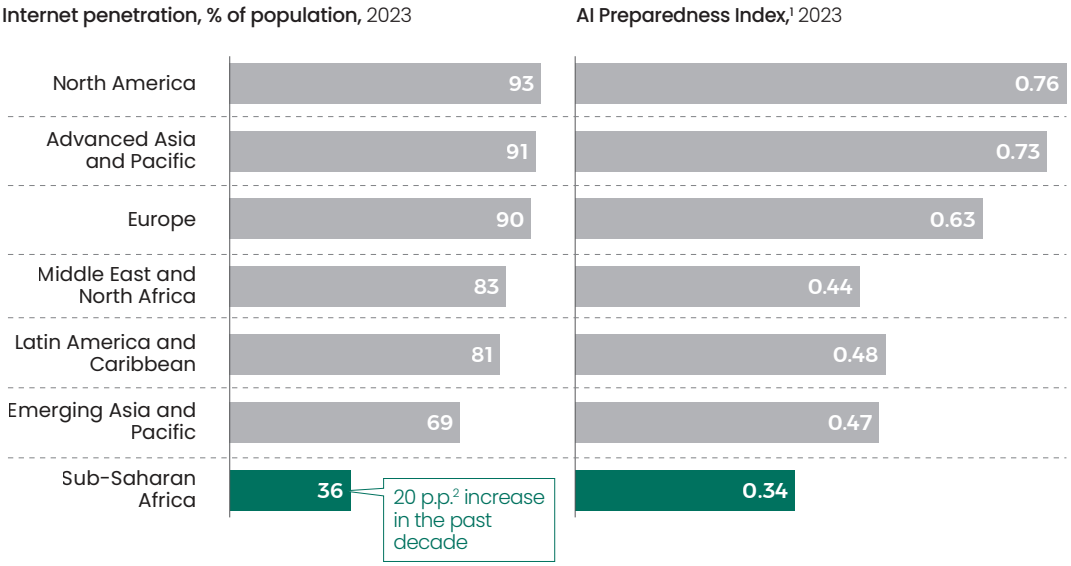
Youth: What are the top tech skills you are currently learning or have learned in your academic journey?
% of respondents, n = 916



Source: Future of Work Survey for Sub-Saharan Africa, 2025

Exhibit 11

SUB-SAHARAN AFRICA IS SIGNIFICANTLY BEHIND OTHER REGIONS ON INTERNET PENETRATION AND AI PREPAREDNESS.



[1] The International Monetary Fund's AI Preparedness Index accounts for countries' digital infrastructure, human capital and labor market policies, innovation and economic integration, and regulation and ethics. Scale is from 0 to 1 with higher values representing more favorable AI preparedness.
[2] Percentage points.
Source: IMF; World Bank

the availability of local computing and storage solutions. This both leaves businesses exposed to global prices that would be costly and affects the practicality of certain solutions that require low latency, enhanced security, and data sovereignty.

In broader terms, digital technology adoption in sub-Saharan Africa also lags behind (Exhibit 12). Only 50% of executives in Africa report use of AI in their companies—24 percentage points lower than in Latin America, 20 points lower than in Europe, and six points lower than in MENA.[66] The uptake varies widely. Kenya, Nigeria, and South Africa report the highest utilization of AI and machine learning, at above 60%, while in Côte d'Ivoire, utilization is just 12%. Small businesses with fewer than 100 employees report AI adoption rates that are eight percentage points lower than those of large businesses with more than 1,000 employees. Since more than 95% of businesses in sub-Saharan Africa are small and medium-size enterprises (SMEs), they are more likely to face financial and data availability challenges preventing them from higher uptake. This shows in the AI readiness score for sub-Saharan Africa of 0.34, compared with 0.50–0.75 in other regions.[67] Some places do not even have basic cellular coverage.

Access to finance remains limited for entrepreneurs and firms seeking to adopt new technologies

Underinvestment stifles innovation. It slows digital adoption and limits sub-Saharan Africa's ability to fully participate in the global technological revolution. High operating costs act as a barrier, specifically for economically weaker countries. Just over half the business executives surveyed say they expect funding support from government for skilling programs, highlighting the financial constraints facing companies.

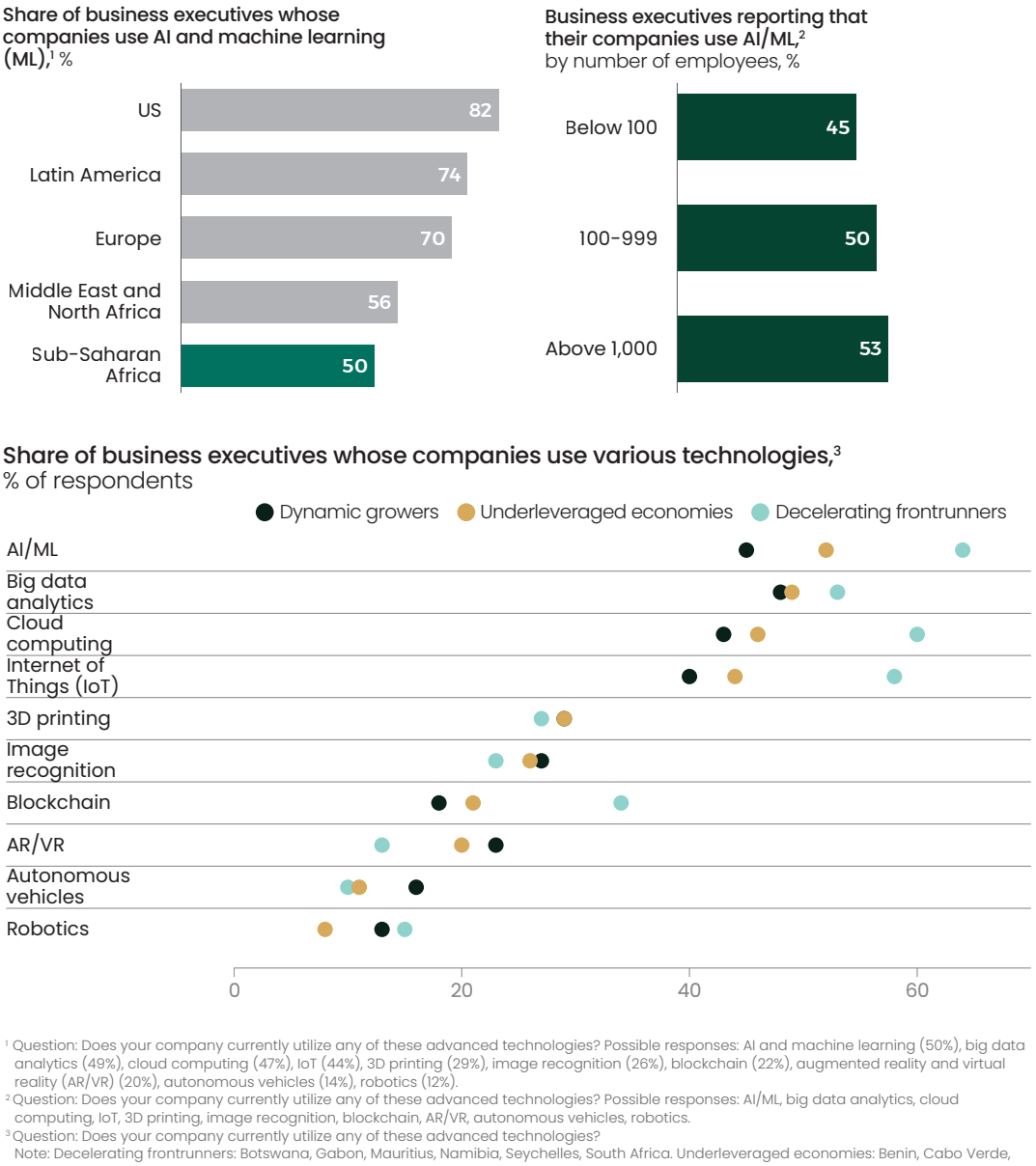
Today, around 1.5% of global tech investment is flowing into sub-Saharan Africa. While this is only a small share of the total, it also underscores the

66 Future Investment Initiative Institute Future of Work Survey 2025.

67 "AI Preparedness Index," International Monetary Fund, April 2024.

Exhibit 12

SUB-SAHARAN AFRICA LAGS BEHIND OTHER REGIONS IN AI ADOPTION AND SHOWS WIDE DISPARITIES ACROSS SEGMENTS.



[1] Question: Does your company currently utilize any of these advanced technologies? Possible responses: AI and machine learning (50%), big data analytics (49%), cloud computing (47%), IoT (44%), 3D printing (29%), image recognition (26%), blockchain (22%), augmented reality and virtual reality (AR/VR) (20%), autonomous vehicles (14%), robotics (12%).
[2] Question: Does your company currently utilize any of these advanced technologies? Possible responses: AI/ML, big data analytics, cloud computing, IoT, 3D printing, image recognition, blockchain, AR/VR, autonomous vehicles, robotics.
[3] Question: Does your company currently utilize any of these advanced technologies?
Note: Decelerating frontrunners: Botswana, Gabon, Mauritius, Namibia, Seychelles, South Africa. Underleveraged economies: Benin, Cabo Verde, Cameroon, Ethiopia, Eswatini, the Gambia, Ghana, Guinea, Ivory Coast, Kenya, Mauritania, Rwanda, Tanzania, Togo. Dynamic growers: Angola, Comoros, Lesotho, Liberia, Malawi, Mozambique, Nigeria, Republic of the Congo, Senegal, Sierra Leone, Uganda, Zambia, Zimbabwe.
Source: Future of Work Survey for Sub-Saharan Africa, 2025, n = 1,258 business executives

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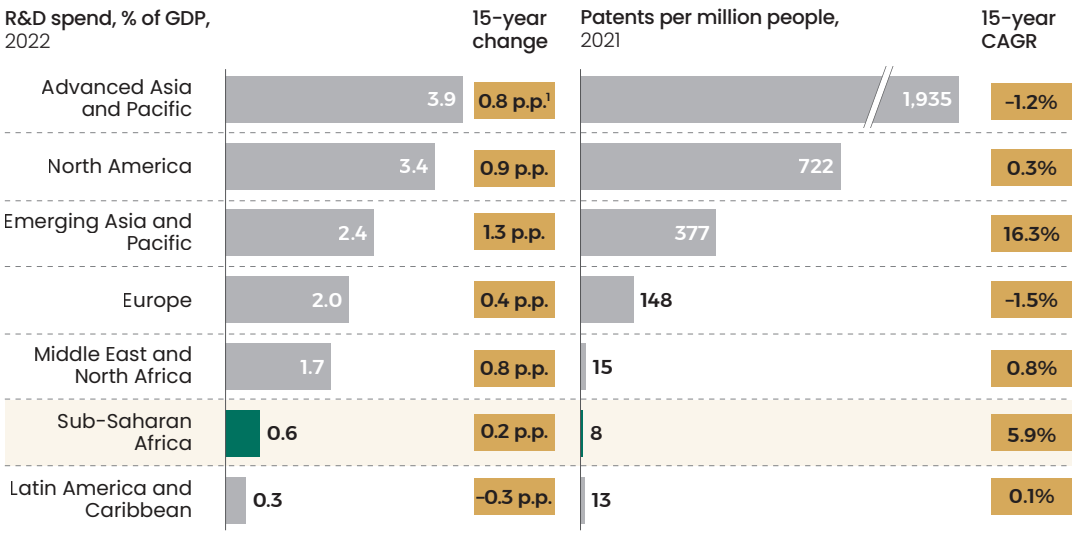
potential for growth. The lack of funding not only restricts the scaling of promising start-ups but also hampers the development of ecosystems that foster innovation, research, and talent retention. For instance, innovators in sub-Saharan Africa often struggle to secure early-stage funding, face infrastructural bottlenecks, and encounter limited access to high-performance computing resources.

Over the past decade, sub-Saharan Africa has been steadily increasing its investment in innovation, but its intensity still lags far behind that of global peers. R&D spending has gradually been increasing as a share of GDP since 2007, but at just 0.5% of GDP, it remains far below the 3.5–4.0% levels of North America and advanced Asia (Exhibit 13).

Exhibit 13 **SUB-SAHARAN AFRICA HAS MUCH ROOM TO MAKE UP IN INNOVATION.**



[1]Percentage points.
Source: Eurostat; national statistical offices; UN Population Division; UN Statistics Division, via World Bank (2025); World Bank; World Intellectual Property Organization (WIPO), via World Bank (2025)

A few countries, such as Namibia and South Africa, are edging slightly higher at 0.60–0.65%, but the gap remains wide.[68]

Patent applications have doubled from 948 in 2000 to 1,834 by 2020, growing at 3.5% annually. Yet, on a per capita basis, sub-Saharan Africa files only eight patents per million people, compared with 377 in Emerging Asia. Within the region, South Africa leads with 1,800 resident filings in 2021, followed at a distance by Kenya with around 160.[69]

Tech[70] VC funding expanded sharply, from $1.8 billion in 2019 to a peak of $5.7 billion in 2022, before falling back to $3.1 billion in 2023, reflecting both rapid ecosystem growth and exposure to global market downturns (Exhibit 14).[71] Investment remains highly concentrated in a few hubs—Kenya, Nigeria, and South Africa—which together have captured about 40–50% of total funding in the past few years. Despite this progress, sub-Saharan Africa accounts for about 1% of global tech VC flows.[72] Other emerging markets attract far more capital: Latin America raised nearly $15.7 billion in 2021 and $8.0 billion in 2022, while Southeast Asia secured about $34 billion in 2022. On a per-start-up basis, Africa lags behind as well, with about 700 tech start-ups raising any venture capital in 2021, compared with much deeper pools elsewhere. This undercapitalization is especially acute in deep tech and AI, where sub-Saharan African start-ups secured just $641 million across 103 deals in 2022–23[73]—a fraction of the billions of dollars flowing globally—highlighting the structural funding gap that continues to limit the region's ability to build globally competitive innovation ecosystems.

Operating and implementation costs also appear as a key challenge in uptake of AI in an

68 "Research and development expenditure (% of GDP)," World Bank, accessed September 30, 2025.

69 "Patent applications, residents," World Bank, accessed September 30, 2025.

70 Tech includes usage of tech in multiple industries: healthcare, agriculture, connectivity, logistics, education, insurance, marketing, entertainment, finance, and enterprise.

71 Marie Benrubi et al., *2024 Africa tech venture capital*, Partech, 2024.

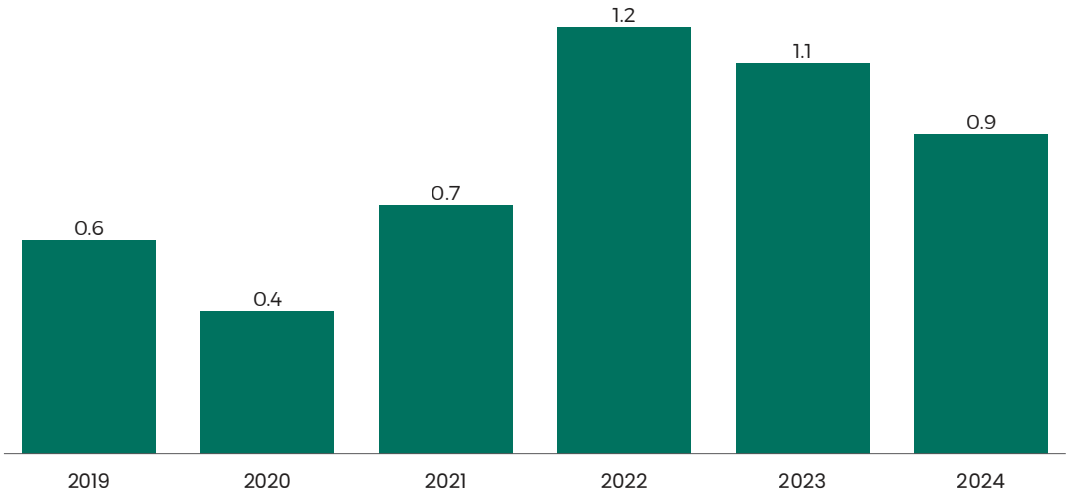
72 "The state of global VC," Dealroom.co, accessed September 30, 2025.

73 *Venture capital in Africa report 2022*, AVCA, April 2023.

Exhibit 14

VENTURE CAPITAL FUNDING IN SUB-SAHARAN AFRICA HIT A PEAK IN 2022 BUT HAS LEVELED OFF SINCE.

Sub-Saharan Africa's share of global tech venture capital funding,[1] %, 2019–24



Source: Partech Africa

economically weaker region such as sub-Saharan Africa. AI systems require substantial financial commitments for infrastructure, including high-performance computing hardware, cloud storage, and reliable energy supply—all of which come at a premium in many parts of the region. These may need to be outsourced from foreign firms in hard currency. Additionally, recurring costs such as software licensing, data acquisition, and continuous model training further strain already limited budgets. Compounding the issue, the cost of electricity and internet connectivity in many African countries remains disproportionately high relative to average income levels. This makes sustaining large-scale AI operations not only challenging but, in many cases, economically unfeasible for start-ups, governments, and SMEs. In our survey, 50% of business executives cited implementation costs as a key challenge to adoption of advanced technology.[74]

74 Future Investment Initiative Institute Future of Work 2025 Survey.

3 PATHS TO BUILDING A YOUTHFUL, PRODUCTIVE, AND AI-ENABLED WORKFORCE

THE ANALYSIS in the two previous chapters suggests that the key challenge for sub-Saharan Africa is not to avoid disruption but to prepare for transformation. Three major constraints stand out that stakeholders could try to address: the availability of future-ready gainful employment—jobs that expand the quantity and quality of work through higher productivity, better pay, and improved conditions[75]; a shortage of job-ready, tech-trained talent; and untapped innovation potential. The talent pipeline narrows steeply: Only about 9% of adults (those aged 25 and over) complete tertiary or technical or vocational education (Exhibit 15). Even within this small cohort, learning outcomes and digital skills are uneven, and unemployment among those with advanced degrees is high. On the demand side, too few founders are building solutions for African use cases, so there is insufficient local demand pulling technology into firms and public services. Without that demand pull, companies underinvest in adoption; without adoption, learners see fewer clear pathways into gainful jobs. The result is a loop that keeps productivity low and keeps many young people on the margins of the economy.

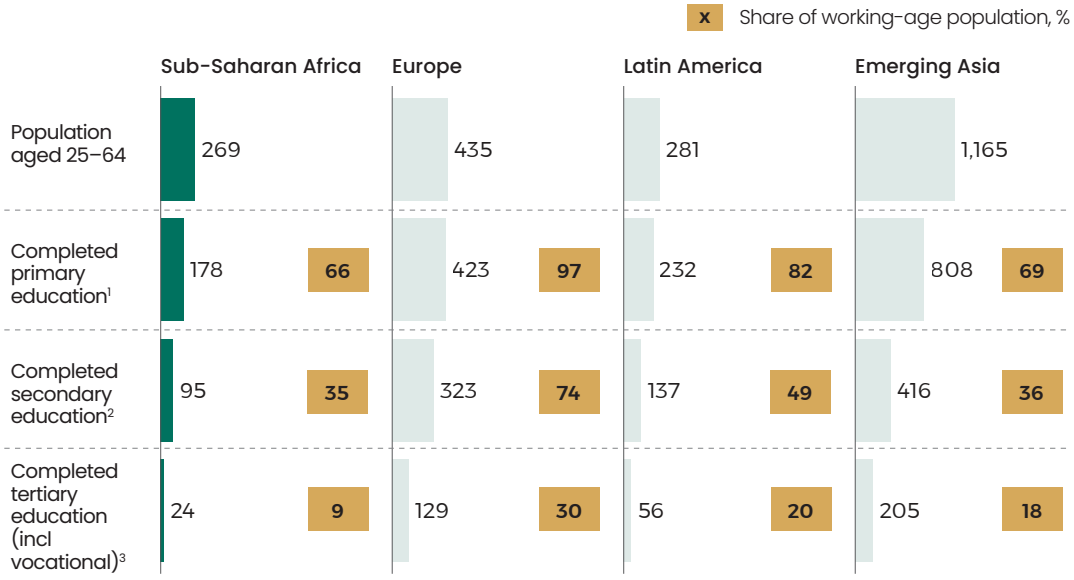
One of the uncertainties that sub-Saharan Africa faces is whether the traditional development model that has enabled other regions in the Global South to grow rapidly and raise living standards still applies in a world of AI (see Box 2, "Are traditional models of development still relevant in an AI era?"). In any case, sub-Saharan Africa has nothing to lose and everything to gain by overcoming the structural constraints noted

75 Lola Woetzel, Anu Madgavkar, and Shishir Gupta, "A new emphasis on gainful employment in India," McKinsey Global Institute, June 13, 2017.

Exhibit 15

SUB-SAHARAN AFRICA HAS FEWER HIGHLY TRAINED YOUNG PEOPLE COMPARED WITH OTHER REGIONS.

Workforce supply by region and qualification by 2022, million people



[1] Completed at least primary school. Regional figures are weighted averages. Analysis includes 23 countries in sub-Saharan Africa, 18 in Latin America, 45 in Europe, and 19 in Emerging Asia and Pacific.
[2] Completed at least upper-secondary school. Analysis includes 23 countries in sub-Saharan Africa, 18 in Latin America, 44 in Europe, and 19 in Emerging Asia and Pacific.
[3] Completed at least short-cycle tertiary. Analysis includes 16 countries in sub-Saharan Africa, 16 in Latin America, 43 in Europe, and 16 in Emerging Asia and Pacific.
Source: UN World Population Prospects 2024; World Bank

in the previous chapter, especially upgrading workforce skills and boosting productivity.

This final chapter is not an exhaustive summary of all the measures countries in sub-Saharan Africa might consider as they seek to raise their game. Rather, it looks at a few specific skill-focused solutions to tackle the region's labor market challenges, along with the enabling conditions that could help accelerate future work readiness. These include building the right skills for talent in sub-Saharan Africa through multiple pathways, catalyzing tech adoption, and nurturing homegrown solutions.

Box 2

ARE TRADITIONAL MODELS OF DEVELOPMENT STILL RELEVANT IN AN AI ERA?

The developmental playbook[1] for many fast-growing Asian economies has been a classical path to higher productivity. Workers moved from farms to factories, which used a wage advantage to win export orders. They learned by doing and then upgraded to more complex products. Vietnam drew in garments and footwear and then scaled phone and electronics assembly. Singapore built a manufacturing base to drive an export-led economy and attract foreign capital, first emphasizing labor-intensive industry to reduce unemployment and then using manufacturing as a springboard to a more complex economy. In each case, low wages enabled entry, but sustained growth came from building supplier depth, improving infrastructure, upgrading skills, and tightening links to global buyers.

That ladder is now changing with AI and automation and with the way production is organized across global value chains. As machines take over routine tasks, labor costs make up a smaller share of total costs. Rising fragmentation, new trade barriers, changing geopolitics, and security concerns are pushing firms to diversify suppliers and markets, at times shortening value chains by reshoring or nearshoring production at home or nearby. Trade is increasingly taking place within regions and trusted blocs. For example, ASE Technology (Taiwan) has expanded its chip packaging and testing facility in Penang, Malaysia, deepening chip supply in Southeast Asia hubs,[2] while Morocco has emerged as a nearshore base for Europe's auto and battery supply chains.[3] Location choices now hinge on dependable power, ports and roads, digital connectivity, skills, and predictable rules. In short, success depends less on being cheaper and more on being connected, innovative, and capable.

It remains uncertain what this could mean for sub-Saharan Africa. There are still markets for its products and services, despite the shifting nature of globalization. Outcomes may well depend on being seen as reliable, well-integrated partners in regional value chains and on whether entrepreneurs and workers can deliver consistent quality and value at prices that remain competitive in an AI-driven world.

1 As Vietnam deepened its integration into global value chains, its export basket shifted from agriculture and commodities in the 1990s to low-tech light manufacturing (such as textiles and footwear) in the 2000s. Over the past decade, it has shifted toward higher-tech exports such as electronics and machinery: *Viet Nam 2045: Trading up in a changing world*, World Bank, November 17, 2024; China used coastal zones to attract labor-intensive assembly before climbing into higher-value products: Douglas Zhihua Zeng (editor), *Building engines for growth and competitiveness in China: Experience with special economic zones and industrial clusters*, World Bank, September 7, 2010; Singapore initially promoted labor-intensive export manufacturing in the 1960s to absorb unemployment, and as labor tightened in the 1970s, the country pivoted to skill- and capital-intensive activities (electronics and precision engineering): "Made in Singapore: 60 years of manufacturing," EDB Singapore, August 11, 2025; Malaysia used export-oriented free industrial zones to attract labor-intensive electronics assembly and upgraded via supplier and skills institutions (such as the Penang Skills Development Centre) and dedicated high-tech parks (Kulim), and the country is now moving into higher-value semiconductors: Rajah Rasiah, *The industrial policy experience of the electronics industry in Malaysia*, WIDER working paper, number 2015/123, 2015.

2 "ASE expands its chip packaging and testing facility to enable next-gen applications," ASE Holdings, February 18, 2025.

3 Vladislav Vorotnikov, "Leaps and bounds across the strait: How Morocco has become the new hub driving exports to Europe," Automotive Logistics, October 31, 2024.

THREE CORE INTERVENTIONS COULD HELP PREPARE SUB-SAHARAN AFRICA TO BECOME THE FUTURE LABOR POWER-HOUSE OF THE WORLD

Beyond the much larger issue of how to upgrade entire education and infrastructure systems in the region—a topic that is out of scope for this report but covered elsewhere[76]—three core interventions could already make a difference. The first is building a visible pipeline of job-ready talent by anchoring training in real demand through employer offtake agreements for micro-credentials that offer upskilling in future of work skills. Second is igniting entrepreneurship for sub-Saharan Africa use cases. A stronger venture and SME ecosystem can help spur homegrown solutions. As these solutions scale, they create the demand pull that accelerates tech adoption and absorbs newly trained talent. Scaling these strategies depends on the third set of interventions—enabling conditions. These include reliable, affordable digital infrastructure (devices, connectivity, and dependable power); adequate financing (blended and catalytic financing); and support for learner persistence (micro-rewards, fee waivers, and recognition).

Embedding workers in sub-Saharan Africa into the global tech value chain

Sub-Saharan Africa's young, multilingual population represents a vast but underused pool of global talent. Even if only a fraction of this population were to be equipped with AI and tech skills, connecting them to international demand could unlock millions of jobs. The aim is not just placement but progression that helps move people up the value chain into higher-complexity, better-paid roles over time.

One potential pathway is the use of mass offtake agreements, in which global technology firms commit up front to hiring and training local talent at scale. Rather than relying solely on unpredictable labor market dynamics, these agreements could create steady demand pipelines that absorb skilled workers. In doing so, they might simultaneously address two persistent challenges: the scarcity of quality jobs and the need to cultivate a more productive workforce.

Firms often anchor such commitments in local capability centers, combining training with employment (see Box 3, "Case study: Mass offtake agreements in South Africa"). For this to deliver the intended results, design matters. Governments could seek to target firms with clear hiring needs and innovation depth, remove practical barriers to recruitment, and structure incentives—tax relief, wage support, and access to land and infrastructure—to be time-bound and milestone-triggered, with clawbacks to prevent free riding. Contracts could specify a mix of roles and progression ladders alongside fair-pay floors.

Several firms already run multiyear, apprenticeship-style programs for entry-level roles that combine paid work with structured training to employer standards (see Box 4, "Case study: An employer-anchored apprenticeship pipeline in Kenya"). Their results can encourage firms to explore mass offtake agreements and also offer practical lessons on design and delivery for these firms. Existing apprenticeship programs provide a ready reference point to start quickly, as well as a pipeline of skilled talent. In fact, survey evidence suggests that many companies in sub-Saharan Africa are already investing in their workforces: About half run in-house retraining, and 67% prioritize upskilling and retaining existing workers to close tech-driven gaps.[77]

Mass offtake agreements can create a self-reinforcing system: Global firms secure reliable, cost-competitive talent pipelines backed by clear incentives, while local economies build a skilled workforce productively integrated into global value chains.

Building a tech-ready talent pipeline

Besides offtake agreements, another pathway for stakeholders to consider consists of platforms that can help upskill local talent for remote and

76 For broad discussions of employment, education, and infrastructure issues in the region, see, for example, Jieun Choi, Mark A. Dutz, and Zainab Usman (editors), *The future of work in Africa: Harnessing the potential of digital technologies for all,* World Bank, June 1, 2020; "Global employment trends for youth 2024: Sub-Saharan Africa," International Labour Organization, August 2024; Aidar Abdychev et al., *The future or work in sub-Saharan Africa,* International Monetary Fund, December 17, 2018.

77 Future Investment Initiative Institute Future of Work Survey: 1,258 company executives were asked, "What actions does your company take to upskill its workforce?" and "Today, which of the following actions do you take to address skill gaps in your workforce caused by advanced technology?"

Box 3

CASE STUDY: MASS OFFTAKE AGREEMENTS IN SOUTH AFRICA

South Africa illustrates how mass offtake incentives can anchor large-scale job creation. In 2019, the government launched the Global Business Services (GBS) Incentive, signaling to outsourcing firms that if they committed to hiring South Africans for offshore delivery, the state would underwrite part of the cost. Companies had to create at least 50 new jobs, meet wage and inclusion standards, and set up operations within six months. Firms that expanded further, either by scaling up their workforce or moving into more-complex services, qualified for bonus payments.[1]

Industry bodies such as BPESA and CapeBPO[2] partnered with the government to channel these commitments into viable delivery hubs, providing subsidized facilities, connectivity, and workforce support. The incentive has since been credited with driving the bulk of new job creation in South Africa's outsourcing sector, contributing to about 80% of employment growth in the GBS sector.[3]

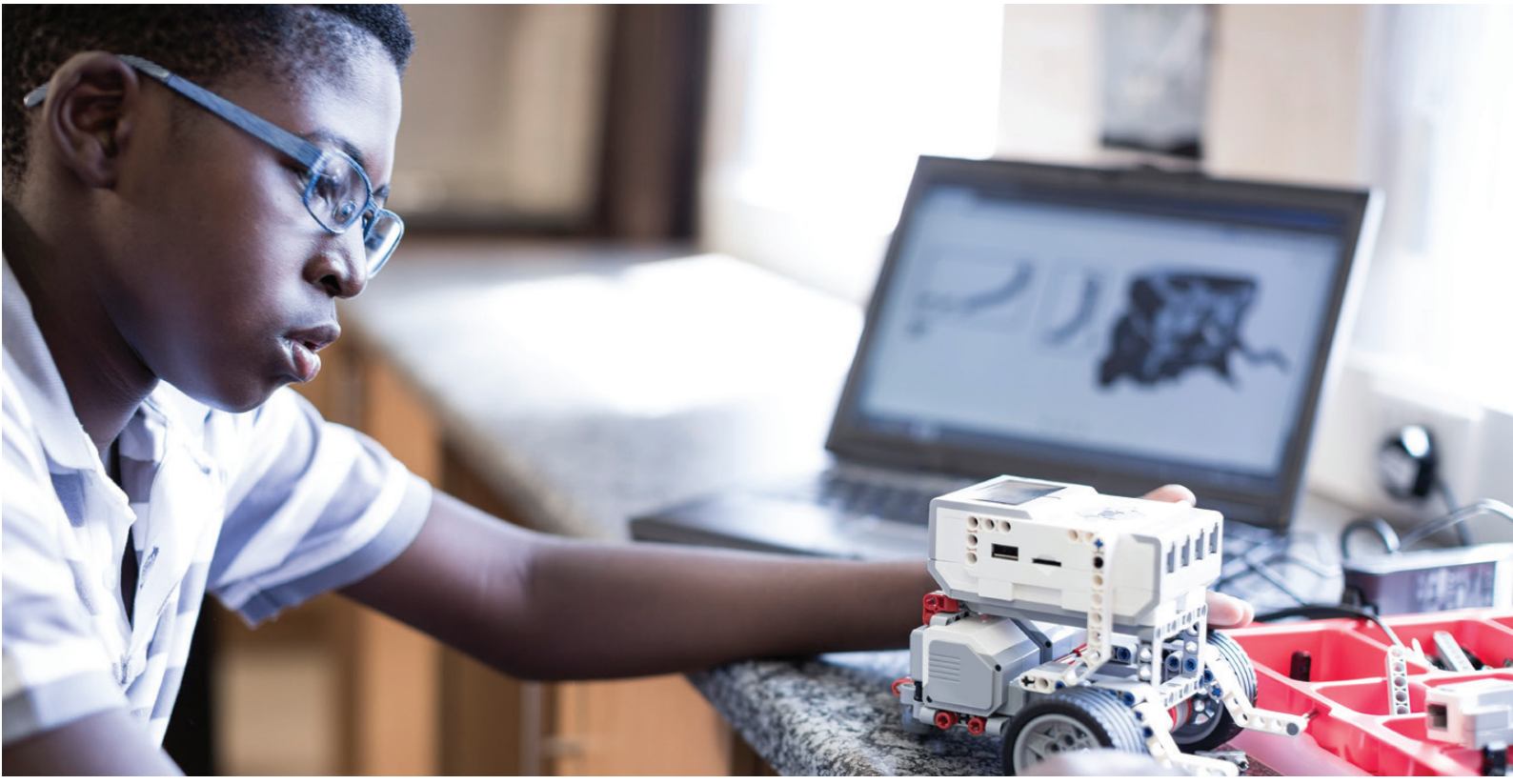
While the program successfully expanded employment, jobs are concentrated in entry-level contact center roles.[4] These offer limited mobility and are increasingly exposed to automation risk. Guardrails such as linking incentives to structured career ladders, digital skills training, and pathways into higher-value services can help ensure that job creation translates into sustainable livelihoods rather than short-term placements.

1 "Programme guidelines: Global Business Services Incentive," South Africa Department of Trade and Industry, December 2018.

2 BPESA (Business Process Enabling South Africa) is South Africa's national industry body for the global business services and business process outsourcing (BPO) sector; CapeBPO is the provincial industry body for BPO in Cape Town.

3 "The GBS incentive: A shot in the arm for growing youth employment in South Africa," Deloitte, October 20, 2021.

4 Most positions (71%) were frontline, voice-based contact center roles in 2024: *GBS sector report: Financial year quarter three—October to December 2024*, BPESA, May 2025.



hybrid jobs. These platforms should ideally solve two persistent barriers for learners: cost and employability. Traditional e-learning models, with high fees and limited labor market integration, leave many excluded or underserved.

Micro-credentials codesigned with industry for specific roles that align to their most needed skills could be one way to turn learning into a demand-led path to work. Because employers help set the bar, these credentials can become a signal they recognize. Accordingly, graduates may gain priority visibility in the hiring pipelines of these companies, opening windows of opportunity for gainful employment. Furthermore, designing these short-term credentials to carry academic credit that can later count toward a degree could help preserve pathways to formal qualifications that still carry weight in the job market.

Such efforts are already emerging in sub-Saharan Africa, combining affordability, industry links, and large-scale placement (see Box 5, "Case study: Digital training platforms"). Several considerations are needed to scale these credentialing efforts. Financing is fragile when programs depend on grants that are time-limited and hard to renew at volume. Recognition remains limited because many employers prefer formal degrees. Completion may also be an issue without mentoring, career services and referrals, and learner supports such as devices and data bundles.

Igniting the entrepreneurship engine

Mobilizing AI demand in sub-Saharan Africa may depend on moving beyond isolated pilot programs toward a broader cycle of adoption. Without a critical mass of buyers—governments, businesses, or sector associations—AI risks remaining a promising technology that fails to scale in the region. Building trust often begins with small trials to reduce adoption risks and by integrating AI into existing workflows and budgets. Over time, momentum grows as successes decrease the perception of risk, peers adopt proven models, and financing or regulatory signals embed adoption more deeply.

Box 4

CASE STUDY: AN EMPLOYER-ANCHORED APPRENTICESHIP PIPELINE IN KENYA

Sama pairs a short, free training boot camp with paid entry-level employment to create a demand-linked talent pipeline. AI 101 is a ten-day classroom program (five hours per day) covering digital skills as well as skills needed for business process outsourcing and job searches. Graduates pursue roles at Sama or vetted partners. Between 2015 and 2020, 4,134 trainees graduated. The Sama Delivery Center then hires some graduates into data work such as image tagging and annotation, classification, and data set creation for machine learning, providing structured on-the-job training in a formal office.

Tying learning directly to a job pathway (via a referral or hiring channel and a paid apprenticeship phase) translated training into tangible gains. Graduates earned about 40% more and experienced a ten-percentage-point reduction in unemployment, sustained over time. Effects were especially strong for women, with earnings advantages most pronounced during the COVID-19 pandemic as remote work options kept incomes resilient. Having such employment and earning prospects in itself increased motivation, with higher attendance when a referral was available. By contrast, stand-alone training without a job route showed slower early traction in digital work.[1]

1 David Atkin, Antoinette Schoar, and Kiara Wahnschafft, "Evaluating Sama's training and job programs in Nairobi, Kenya," MIT Poverty Action Lab, May 12, 2021.

Box 5

CASE STUDY: DIGITAL TRAINING PLATFORMS

One example is ALX,[1] a Pan-African company that addresses the youth employment challenge in sub-Saharan Africa by offering digital training at a flat fee of just $5 per month, often heavily subsidized through partnerships with the Mastercard Foundation. To support learners, ALX operates tech hubs in eight African countries, providing reliable electricity, high-speed internet, and co-working spaces that foster networking and peer support.

The program targets a wide range of young adults, including university graduates, nontraditional learners without tertiary education, and youth from underserved backgrounds, with a strong emphasis on soft skills that remain valuable amid the rapidly changing world of work. Since 2021, ALX says, it has graduated about 320,000 learners. Around 67% secure employment within six months and 90% within a year, while others pursue freelance or entrepreneurial paths, contributing further to job creation. Most graduates are employed locally in professional roles such as software engineering, data science, and cloud computing and earn two to three times the average university graduate salary.

A peer-driven community and AI-enabled tools for grading, coaching, and job matching help sustain motivation and outcomes.

Other examples of digital learning include Andela, a Nigerian company that showed how learning converts to income but at a smaller scale. It launched in Lagos in 2014 with a highly selective program that paired six months of paid on-the-job training with three and a half years of remote client work funded by employer contracts. The firm expanded across the region and by 2019 had more than 1,000 developers serving over 200 companies, with fellows earning about 87% more than before joining. As demand shifted toward more-senior engineers, it evolved into a marketplace connecting more than 150,000 technologists to global employers.[2]

In 2024, Microsoft and Gebeya launched the Talent Cloud, an AI-enabled platform that trains and certifies developers in Microsoft Cloud and AI. The program gives certified talent visibility across Microsoft's partner network and offers access through a $99 annual subscription (with some cohorts receiving scholarships). It is seeking to upskill 300,000 developers across eight countries for remote and hybrid roles.[3]

1 Based on expert interviews. For more, see the ALX website.

2 Juliette Powell and Art Kleiner, "Andela," International Finance Corporation, June 16, 2022.

3 "Microsoft and Gebeya join forces to take 300,000 African software developers to the cloud with AI," Gebeya, November 3, 2023.

More broadly, there is an opportunity to consider measures that will ignite the entrepreneurship engine in sub-Saharan Africa. For example, entrepreneurial support could be strengthened by linking founders to real demand and helping them bridge the gap from idea to paid deployment. This could involve building a wider network of incubation and mentorship hubs across the continent. Pairing local founders with experienced entrepreneurs and corporate leaders, while using regional cohorts to share lessons, can sharpen business models and surface new opportunities. Expanding beyond Kenya, Nigeria, Rwanda, and South Africa into underrepresented regions could help diversify and deepen the pipeline of investable start-ups. Best-practice examples of how ideas can be turned into products can be found in some other regions, including Saudi Arabia (see Box 6, "Case study: Converting ideas into products").

Successful scaling of such incubation programs could face several constraints. Access

Box 6

CASE STUDY: CONVERTING IDEAS INTO PRODUCTS

Saudi Arabia offers a working model for turning ideas into paying products. The Garage (KACST[1]) co-locates founders with labs, mentors, and demo events so teams can prototype and meet buyers in one place; by the end of 2023, it had launched more than 230 start-ups, created more than 850 jobs, and generated SAR 67 million ($18 million) in profits.[2] The inspireU program (stc) is a corporate accelerator that pairs start-ups with stc's customers and channels, turning pilots into paid deployments. It has more than 90 start-ups enabled and more than SAR 700 million ($187 million) raised by founders to date.[3] TAQADAM gives start-ups nonequity funding, pairs them with expert coaches, and lets them use KAUST's[4] labs to build and test their products. The program has supported 270 start-ups, generated $297 million in funding, and created more than 3,500 jobs.[5]

Together, these programs show the working model: early R&D and mentoring to get from idea to prototype, then corporate access to convert pilots into revenue, producing measurable jobs, revenue, and follow-on capital rather than one-off pilots.

1 King Abdulaziz City for Science and Technology.

2 Ghada Ismail, "KACST: The Garage incubates 30 companies, half of them global," Sharikat Mubasher, October 21, 2024.

3 "InspireU from stc enables over 90 startups that succeeded in getting total investments for more than SAR 700 million," Saudi Press Agency, May 24, 2023.

4 King Abdullah University for Science and Technology.

5 "TAQADAM announces its latest startup cohort to receive US$1 million," KAUST, February 12, 2025.

to affordable computing capacity and secure data can be limited, which slows build cycles. Overreliance on grants can make programs fragile when funding cycles end. Thin evidence about results can weaken buyer trust and investor interest. Differing regulations across borders could discourage innovation in countries that have small domestic markets because these limit the scale at which solutions can be deployed.

Enablers that could support the scaling of core strategies

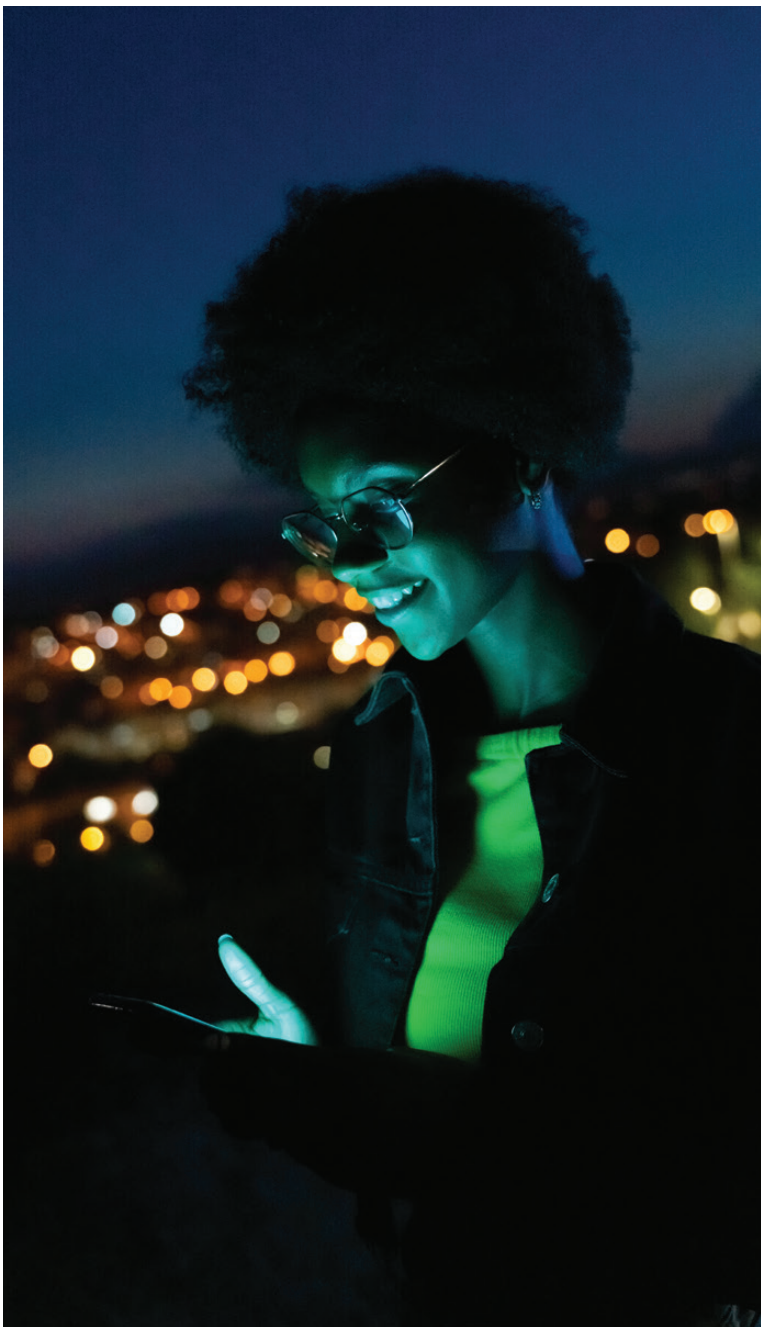
Enablers are the cross-cutting conditions that let core strategies work at scale. They ease friction, improve reliability, and make capital and capability show up where needed. Human capital, infrastructure, and financing are some of the region's binding constraints, so improvements here could help raise the effectiveness of efforts related to the future of work. Of course, governments in the region face a wide range of competing demands for funding and focus and will need to set priorities, given the wide range of challenges they face. As they do so, they may want to consider enablers for a more productive workforce. These could include the following:

Foundational education. Expanding the talent pipeline may begin with early investments in foundational learning and greater access to higher-quality education. More effective use of education finance could help ensure that resources translate into stronger learning outcomes and higher completion rates, allowing more learners to progress through full educational journeys. Tech and AI could play a supportive role by equipping teachers with adaptive learning tools, planning aids, and feedback systems that work even offline or with limited data. Building coalitions that bring together teachers, parents, providers, funders, and government might foster buy-in, accountability, and the capacity to scale promising approaches. Regularly assessing whether tools are improving reading and numeracy could help identify what works and what does not.

Infrastructure and access. As AI and digital tools spread, reliable electricity, internet, and computing matter more. Progress could start with regulations becoming flexible enough to accommodate innovative approaches such as satellite links and off-grid power supply, helping new entrants extend coverage. In parallel, more-affordable end-user devices such as phones, laptops, and tablets could expand uptake; for example, targeted subsidies for excluded groups could help close gaps. Last, growing government and enterprise demand suggests a case for localized data center capacity. Data sovereignty and latency may make permanent reliance on external hubs impractical. Given the high capital spending needed and the risks associated with data centers, one approach could be to start small with modular sites tied to dedicated off-grid power.

Financing. Finance has proved to be a bottleneck for many initiatives in sub-Saharan Africa. The region is heavily exposed to philanthropy and development finance, which can create a perception that some inflows amount to "charity" rather than investment. The capital base could broaden beyond philanthropy and development finance by drawing in private sector investment (both domestic and FDI). Donor funds would then be used to catalyze and derisk private capital rather than as the primary source of investment. Clear demand signals such as advance market commitments and offtake agreements could help stimulate private investment in targeted products and services. Domestic pools could be created by enabling pension funds and insurers to invest via risk-tiered vehicles—for example, funds for which public or donor capital takes the first losses—or by channeling savings from the diaspora of people from the region living elsewhere through well-governed bonds or funds. Support could also be time-limited, so concessional money helps crowd in private capital early and then steps back as markets mature.

Taken together, these examples suggest that sub-Saharan Africa has possibilities to ride the AI and tech wave. The aim is to absorb a fast-growing working-age population into productive work. That means preparing people for the jobs that are coming—not only training more people but also building the right skills that employers value and that can adapt as technology shifts. The mix will vary by country and should evolve with evidence. As demand, skills, and infrastructure come together, this transition can drive structural transformation by moving firms and workers up the value chain and lifting productivity and wages.



TECHNICAL APPENDIX

THIS APPENDIX PROVIDES an overview of the methodologies used in the report. It comprises the following sections:

1. Scope and country coverage
2. Clustering methodology
3. Talent pipeline analysis
4. Automation model methodology
5. Primary research and survey design

1. SCOPE AND COUNTRY COVERAGE

The research for this report examines 42 countries in sub-Saharan Africa. While there are 49 countries in sub-Saharan Africa, we exclude seven countries—Central African Republic, Djibouti, Equatorial Guinea, Eritrea, São Tomé and Príncipe, Somalia, and South Sudan—due to risk concerns and poor data availability.

2. CLUSTERING METHODOLOGY

To compare the unique and shared features of the 42 African countries, the research evaluated them across five themes, each measured by a set of indicators. These indicators were selected based on their availability and comprehensiveness to ensure a clear understanding of each country's landscape. For every theme, we calculated a simple average of its constituent indicators, as defined below.

1. **HUMAN CAPITAL: 1.1.)** Variables: Human Capital Index; educational attainment, at least bachelor's or equivalent (% of population aged 25 or older, cumulative); share of youth (aged 15–24) not in education, employment, or training (NEET) (% of youth population) **1.2)** World Bank, 2020; World Bank, latest data available by country; World Bank, 2024 **1.3)** Weighted average based on population; weighted average based on adult population (aged 25 or older); weighted average based on youth population
2. **POLITICAL AND SOCIAL STABILITY: 2.1)** Poverty head count ratio at societal poverty line (% of population); political stability: estimates; inflation rate (average 2019–24, %) **2.2)** World Bank, latest data available by country; World Bank, 2023; IMF **2.3)** Weighted average based on population for all three indicators
3. **PRODUCTIVITY AND ATTRACTIVENESS: 3.1)** Output per hour worked (GDP constant 2021 international $ at purchasing-power parity [PPP]); GFCF (% of GDP); FDI net inflow (average 2018–23, % of GDP) **3.2)** The Conference Board, 2024; World Bank, 2024; World Bank **3.3)** Weighted average based on hours worked; ratio of absolute GFCF (in constant 2015 US $) to GDP (in constant 2015 US $); segment figures are calculated as weighted average based on GDP, and then a simple average of 2018–23 was calculated
4. **TECH PREPAREDNESS: 4.1)** AI Preparedness Index; individuals using the internet (% of population); research and development expenditure (% of GDP) **4.2)** International Monetary Fund, 2023; World Bank, 2023; World Bank, latest data available by country **4.3)** Weighted average based on population for the first two indicators; weighted average based on GDP
5. **DIVERSIFICATION AND INFORMALITY: 5.1)** Informal employment rate by sex (% of employment); Economic Complexity Index (ECI) **5.2)** International Labour Organization, latest available data by country; Harvard Growth Lab, 2023 **5.3)** Weighted average based on employment; weighted average based on population

The data was normalized using a minimum-maximum scaling technique, as outlined in the formula below, applied at the country level. The minimum and maximum values represent the smallest and largest values of each indicator

across the 19 countries. This method adjusts the original values to a standardized range from 0 to 1, ensuring that the minimum value in the data set is 0, while the maximum value is 1.

$$normalization\ value = \frac{\text{actual } value - \min value}{\max value - \min value}$$

Four distinct segments of sub-Saharan African countries emerged from this exercise:

- **Decelerating frontrunners:** Botswana, Gabon, Mauritius, Namibia, Seychelles, South Africa
- **Dynamic growers:** Benin, Cabo Verde, Cameroon, Côte d'Ivoire, Eswatini, Ethiopia, the Gambia, Ghana, Guinea, Kenya, Mauritania, Rwanda, Tanzania, Togo
- **Underleveraged economies:** Angola, Comoros, Lesotho, Liberia, Malawi, Mozambique, Nigeria, Republic of the Congo, Senegal, Sierra Leone, Uganda, Zambia, Zimbabwe
- **States in transition (not the focus of this report):** Burkina Faso, Burundi, Chad, Democratic Republic of the Congo, Guinea-Bissau, Madagascar, Mali, Niger, Sudan

3. TALENT PIPELINE ANALYSIS

3.1. WORKING-AGE SUPPLY: 3.1.1) Population aged 25–64 in 2050 **3.1.2)** UN Population Prospect, 2024 **3.1.3)** Regional figures are calculated as the sum of individual country populations within each region (49 countries in sub-Saharan Africa, 42 countries in Latin America, 49 countries in Europe, 29 countries in Emerging Asia and Pacific)

3.2. COMPLETED PRIMARY EDUCATION: 3.2.1) Share of adults (25 and older) that have at least completed primary education **3.2.2)** World Bank, 2022 **3.2.3)** Regional figures are calculated as weighted average based on total adult population (aged 25 and older) (23 countries in sub-Saharan Africa, 18 countries in Latin America, 45 countries in Europe, 14 countries in Emerging Asia and Pacific)

3.3. COMPLETED SECONDARY EDUCATION: 3.3.1) Share of adults (25 and older) that have at least completed upper secondary education **3.3.2)** World Bank, 2022 **3.3.3)** Regional figures are calculated as a weighted average based on total adult population (aged 25 and older) (23 countries in sub-Saharan Africa, 18 countries in Latin America, 44 countries in Europe, 14 countries in Emerging Asia and Pacific)

3.4. COMPLETED TERTIARY EDUCATION (INCLUDING VOCATIONAL): 3.4.1) Share of adults (25 and older) who have completed at least upper secondary education **3.4.2)** World Bank, 2022 **3.4.3)** Regional figures are calculated as weighted average based on total adult population (aged 25 and older) (14 countries in sub-Saharan Africa, 13 countries in Latin America, 41 countries in Europe, ten countries in Emerging Asia and Pacific)

4. AUTOMATION MODEL METHODOLOGY

Automation model

The model for expected rate of automation adoption includes the following data and assumptions:

Base data. The analysis is based on employment data, measured by the number of employees by sector (ISIC Rev.4) and one-digit ISCO-08 occupations for the year 2022, as well as wage data, measured by average yearly wages, by one-digit ISCO-08 occupations for the same year. This data was sourced from the International Labour Organization and Statistics South Africa. We collected the productivity data, measured by real gross value added per labor by sector (ISIC Rev.4), from the IHS Markit database.

Archetyping approach. The countries were benchmarked based on the similarity of sectoral productivity across all countries in the sample. For African countries, the model compares productivity in each sector against a cohort of more than 20 countries for which granular occupational and wage data is available. For example, if the productivity of Mexico's construction sector is most similar to that of Zambia, then the granular occupational employment and wage distribution for Zambia's construction sector should follow that of Mexico. While ideally the estimation should be done based on actual granular occupational distribution specific to the country, an archetyping approach was chosen because of data unavailability.

Automation potential and adoption scenarios. To analyze the impact of automation on work

activities, the model breaks down some 850 occupations into about 2,100 constituent activities using data from O*NET OnLine. Each activity was further mapped to a set of 18 capabilities required to perform that activity. For all 18 capabilities, the research assessed the current availability of technology and scenarios for future availability across required proficiency levels. This helps assess the automation potential for an activity today and in the future. This potential at an activity level is further aggregated by time spent on those activities in an occupation to calculate occupation-level automation potential. These occupational estimates are then aggregated at the sector and country levels by a weighted average of employment in respective occupations to estimate overall impact.

Scenarios for automation adoption. Several factors can hinder or support the timing and pace of adoption. Solutions requiring different technologies have varying levels of ease of integration. It takes time to integrate capabilities into current technical platforms and combine them into an organic entity. Further, these solutions need to be economically feasible relative to the labor cost or wages to allow organizations to implement at scale. Barriers also exist on the organizational side. Human talent and organizational structures might act as bottlenecks to implementation. Policies and regulations can also affect the pace of technology innovation and adoption. Finally, depending on their preferences, consumers might have varying levels of acceptance for automated solutions that could affect the pace of adoption. To incorporate all these factors, the research used the mathematics of the Bass diffusion model, a well-known and widely used function in forecasting, especially for new-product sales forecasting and technology forecasting. F(t) is the installed base fraction (that is, adoption of a given technology or product), and f(t) is the corresponding rate of change.

$$\frac{f(t)}{1 - F(t)} = p + qF(t)$$

Two scenarios were then simulated for historical technology adoption curves. The fitted values of parameters p and q are consistent with historical adoption curves for multiple technologies. It takes about ten years to reach 50% adoption in the earliest scenario and approximately 40 years in the latest scenario. The range of scenarios represents uncertainty regarding the availability of technical capabilities, based on interviews with experts and survey responses. The early scenario makes more-aggressive assumptions for all key model parameters (technical potential, integration timeline, economic feasibility, and regulatory and public adoption). The midpoint adoption scenario is the average between the early and late scenarios.

Impact of automation on productivity. In the model, GDP per FTE was used as the measure of productivity. To measure automation's effect on productivity, FTEs affected by automation were calculated by multiplying the number of FTEs in 2022 by the estimated automation adoption rate in 2030. To maintain consistency with other data sources, several additional assumptions were made. Only job activities that were currently available and well defined as of the date of this report were considered. Also, to be conservative, automation was assumed to have a labor substitution effect but no other performance gains. Finally, a scenario was created in which FTEs displaced by automation rejoin the workforce at 2022 productivity levels. Under the assumptions outlined above, the additional GDP impact of FTEs rejoining the labor force after the defined automation adoption scenario was calculated as follows: Additional GDP from displaced FTEs rejoining the economy equals FTE impact of automation adoption times productivity of 2022. The additional GDP was then added to 2022 GDP to derive the productivity impact and its growth over 2022–30.

5. PRIMARY RESEARCH AND SURVEY DESIGN

To inform this report's findings and ground its recommendations in lived experience, two dedicated surveys were conducted across sub-Saharan Africa: one targeting business leaders and another focused on youth. These complementary research efforts provide insights from both the demand and supply sides of the labor market—capturing employer perspectives on technology adoption, macroeconomic trends, youth skills

readiness, and reskilling efforts, as well as young people's views on digital transformation, employment opportunities, job preparedness, and the education and training systems meant to support them.

Business executive survey

The Future of Work Business Executive Survey gathered responses from 1,258 business leaders across nine African countries. The respondents were distributed as follows:

- Nigeria (202)
- Kenya (201)
- South Africa (201)
- Ghana (200)
- Ethiopia (99)
- Uganda (96)
- Tanzania (92)
- Côte d'Ivoire (85)
- Angola (82)

Respondents represented a wide range of industries, including professional, scientific, and technology services; finance; healthcare; manufacturing; education; agriculture; construction; media and entertainment; and logistics.

Companies surveyed varied in size, with 27% employing fewer than 100 workers, 25% employing between 100 and 1,000 workers, and 47% representing large enterprises with more than 1,000 employees. The survey was directed toward senior leaders, with 36% of participants serving as CEOs, 28% as other C-level executives, 31% as senior managers, and 5% as board-level executives.

The survey consisted of approximately 40 questions, covering topics such as talent shortages, hiring challenges, technology adoption, workforce upskilling, and the alignment between education systems and employer needs. The insights formed a core empirical input for understanding regional workforce constraints and opportunities.

Youth survey

The Future of Work Youth Survey captured the voices of 916 young people aged 18 to 26 from nine countries, offering a rich view into how Africa's next generation of workers perceive their preparedness for employment in an increasingly technology-driven economy:

- Kenya (105)
- Nigeria (105)
- South Africa (102)
- Uganda (102)
- Angola (101)
- Tanzania (101)
- Côte d'Ivoire (100)
- Ethiopia (100)
- Ghana (100)

The survey captured a balanced gender split (53% male, 47% female) and included respondents currently studying full-time (31%), studying with part-time work (28%), employed full-time after graduation (18%), unemployed but seeking work (22%), and not currently seeking work (2%).

Comprising about 35 questions, the survey focused on perceived job preparedness, digital and vocational training access, interest in emerging technologies, and barriers to employment.

Together, the executive and youth surveys provide a 360-degree perspective on the future of work across sub-Saharan Africa—grounded in the views of those shaping and entering the workforce today.

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