Building an AI-Ready South Africa: Education, Industrial Policy and Fiscal Incentives for Inclusive Productivity Growth

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1. Introduction

Artificial intelligence (AI) offers South Africa an opportunity to improve productivity through automation, lower production costs and greater operational efficiency. This is particularly important given that labour productivity growth averaged −0.29% annually between 2010 and 2024 (Productivity SA, 2025).

However, automation may also reduce demand for workers performing routine tasks, intensifying South Africa's employment challenges. This is concerning as unemployment reached 33.6% in the second quarter of 2026 (Statistics South Africa, 2026). The policy challenge is therefore to harness AI's productivity benefits while managing potential job displacement.

South Africa's ability to benefit from AI is constrained by unequal digital infrastructure, weaknesses in foundational education and limited technological capacity, particularly among smaller firms. Furthermore, productivity gains do not automatically generate employment. Without intervention, larger firms may capture disproportionate benefits, while young people, lower-skilled workers and SMEs face greater adjustment costs.

This paper argues that South Africa should pursue a coordinated AI strategy built on three complementary policy pillars. Education reform must strengthen foundational learning, digital literacy and workforce reskilling; industrial policy must enable firms, particularly small and medium-sized enterprises (SMEs), to adopt AI productively; and fiscal incentives must encourage domestic innovation and additional investment while supporting worker transitions. Together, these reforms should raise productivity, manage displacement and ensure that AI-driven gains contribute to more inclusive economic growth.

2. Empirical Evidence

International and South African evidence suggests that AI can raise productivity, although its employment effects depend on how firms adopt technology and reorganise production. Three mechanisms are important: efficiency gains, worker displacement and employment creation through business expansion.

First, AI can improve productivity by enabling firms to complete tasks more efficiently. Aldasoro et al. (2026), studying more than 12,000 firms in Europe and the United States, found that AI adoption increased labour productivity by approximately 4%, without reducing short-term employment. However, gains were greater among medium-sized and large firms, indicating that firms' capacity to adopt and integrate new technologies influences the benefits they receive. Similarly, a Bank of Korea (2025) study found that generative AI reduced task completion time by 3.8%, suggesting further potential for productivity improvements.

Second, automation can displace workers when technology replaces tasks previously performed by humans (Acemoglu and Restrepo, 2019). However, AI adoption does not necessarily result in immediate net job losses. In Sweden, Hellsten et al. (2025) find that firms receiving AI subsidies experienced increased job postings but no statistically significant change in overall employment. In the United States, Brynjolfsson, Chandar and Chen (2026) find

weaker employment and hiring outcomes among workers aged 22–25 in AI-exposed occupations. This suggests that although overall employment may remain stable, certain groups could face adjustment pressures, reinforcing the need for workforce training and transition support.

Third, productivity gains can support employment when lower production costs enable firms to expand output and enter new markets. South African evidence from conventional automation illustrates this possibility. Kilumelume et al. (2025) found that manufacturing firms adopting automation doubled production and value added within four years. Value added per worker increased by approximately 86–97%, alongside increases in employment and average wages. Although conventional automation differs from generative AI, these findings demonstrate that technological investment can coincide with employment growth when productivity improvements support business expansion. However, such outcomes depend on firms expanding production and cannot be assumed.

AI can also strengthen human capabilities through education. A World Bank-supported Nigerian study found that six weeks of AI-assisted English tutoring improved proficiency by 0.23 standard deviations (De Simone et al., 2025). Similarly, an evaluation of Ghana's Rori mathematics tutor recorded learning gains of approximately 0.36 standard deviations (Henkel et al., 2024). These findings highlight AI's potential to improve learning, although longer-term benefits depend on whether acquired skills meet labour-market needs.

South African business evidence further highlights differences in firms' adoption capacity. Absa's use of Microsoft Copilot illustrates how AI can support administrative activities (Microsoft, 2024). However, an ITWeb–Incasu survey of 144 business respondents in 2025 found that many firms were still exploring potential applications (ITWeb and Incasu, 2025). This suggests that adoption requires more than access to technology; firms also need financing, technical expertise and organisational capacity.

Overall, although AI offers productivity and learning benefits, employment gains are uncertain, while displacement can impose immediate costs on workers. For South Africa, where alternative employment opportunities are limited, managing displacement must be central to ensuring that AI-driven productivity growth supports inclusive economic development.

3. Assessing South Africa’s AI Readiness

South Africa's ability to harness AI depends on three related factors: exposure, adoption and readiness. Exposure refers to AI's potential impact on occupational tasks, adoption concerns whether firms and institutions implement these technologies, and readiness reflects their capacity to use AI effectively. Exposure does not necessarily result in job losses, nor does adoption guarantee productivity gains.

3.1 Education and digital readiness

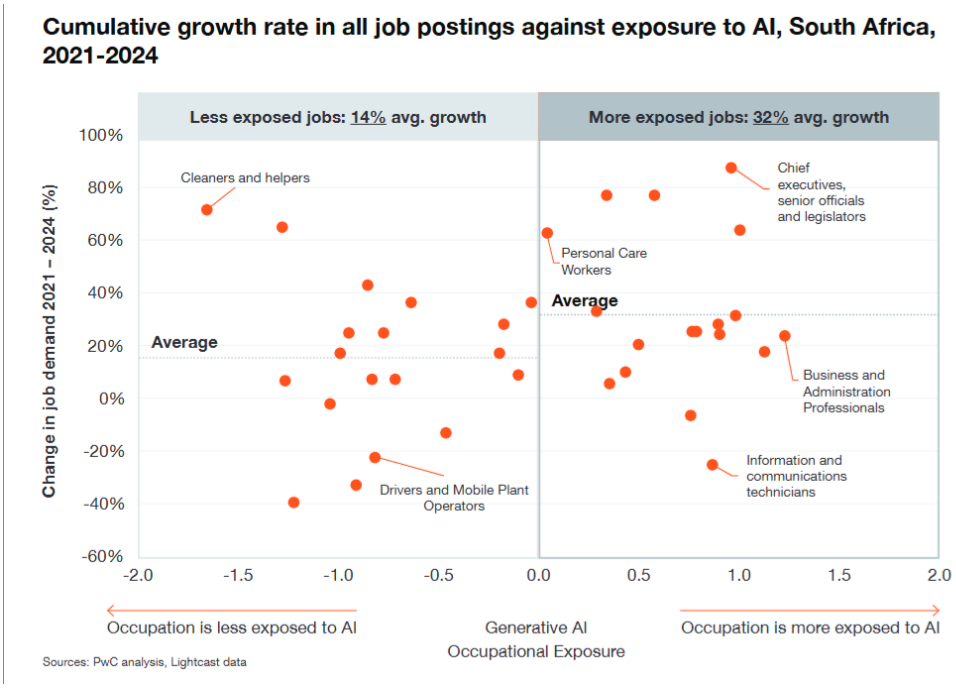
South Africa's readiness is constrained by unequal digital access and weaknesses in foundational learning. The Department of Basic Education's 2022 School Monitoring Survey found that 67% of schools had internet connectivity, compared with 56% in 2017. However, provincial disparities remained significant: connectivity reached 98% in the Western Cape and 97% in the Free State, compared with 54% in the Eastern Cape and 40% in KwaZulu-Natal (DBE, 2024). Furthermore, the 2021 Progress in International Reading Literacy Study found that 81% of South African Grade 4 learners could not read for meaning. These weaknesses limit learners' ability to interpret information, evaluate AI-generated content and develop advanced skills.

Teacher capacity is equally important. OECD TALIS 2024 findings indicate that 48% of South African teachers had used AI professionally, compared with an OECD average of 36%. However, among non-users, 75% identified inadequate infrastructure and 57% lacked the necessary knowledge and skills (OECD, 2025). This suggests that teacher engagement alone is insufficient without the infrastructure and skills required for effective adoption. Government initiatives, including Microsoft's TVET AI training partnership (2025) and Google's 5,000 digital-skills scholarships (2026), provide a foundation for addressing these constraints. However, broader investment in foundational, digital and practical skills remains necessary.

3.2 Labour-market vulnerability and changing skills demand

AI readiness must also be considered against high unemployment and changing labour-market requirements. Statistics South Africa recorded an unemployment rate of 33.6% in the second quarter of 2026, rising to 47.4% among people aged 15–34 (Statistics South Africa, 2026). While AI may create new opportunities, it could also reduce demand for workers performing automatable tasks, worsening existing labour-market pressures.

Illustration 1: Job numbers in GenAI exposed occupations have grown 32% since 2021 - including growth in virtually every type of occupation



Source: PwC analysis, Lightcast data

PwC's (2025) Global AI Jobs Barometer: South Africa Analysis found that between 2021 and 2024, the share of job postings requiring AI skills increased from 4.9% to 8.5% in education, 5.5% to 7.9% in information and communication technology, and 2.91% to 3.68% in agriculture. Job postings in occupations more exposed to generative AI also grew by 32%, compared with 14% in less-exposed occupations. Although these figures indicate changing skills demand, they do not establish that AI caused employment growth or that vacancies translated into actual jobs. Moreover, displaced workers may struggle to access emerging opportunities due to skills gaps and limited employment opportunities. This could make AI-related displacement particularly costly in South Africa, especially for young and lower-skilled workers, highlighting the need for accessible reskilling and alternative employment pathways.

3.3 Industrial and technological readiness

Firm-level adoption remains uneven. An ITWeb–Incasu survey of 144 business respondents in 2025 found that 43% were exploring AI, 24% had limited operational applications, 19% were conducting pilot projects and only 13% had integrated AI into core business processes (ITWeb and Incasu, 2025). As the survey is not necessarily nationally representative, these findings should be treated as indicative. Reported barriers included security and compliance concerns (52%), insufficient internal expertise (47%) and difficulties integrating AI with existing systems (42%).

Infrastructure weaknesses involving electricity, water, freight logistics and digital connectivity further constrain investment (National Treasury, 2026; Department of Planning, Monitoring and Evaluation, 2025). These barriers are particularly significant for SMMEs, which often lack the finance and technical capacity to recruit specialists, upgrade systems and train employees. The International Finance Corporation (2023) identifies limited access to finance and shortages

of managerial and technical capacity as important constraints on SMME development. Consequently, firms require more than access to AI tools; they need complementary investment, expertise and support to achieve sustained productivity gains.

Overall, South Africa's AI readiness is constrained by educational inequalities, changing skills requirements and limited firm-level capacity. Addressing these challenges requires preparing workers to adapt while enabling firms, particularly SMMEs, to adopt AI productively. The next section explores how policy can address these constraints.

4. Redesigning Education for an AI-Ready South Africa

South Africa must prepare learners and workers for an AI-driven economy by strengthening foundational literacy, numeracy, digital confidence and responsible AI use. Government should integrate AI literacy across education, address unequal technology access and align post-school training with labour-market needs.

4.1 Integrating AI literacy across learning

The Department of Basic Education's Coding and Robotics CAPS, gazetted in 2024, provides a starting point, but AI affects occupations beyond technology. Government should integrate age-appropriate AI literacy into existing subjects, supported by curriculum materials and teacher training (UNESCO, 2024). Estonia's AI Leap initiative provides a useful model, prioritising teacher training to support the effective integration of AI into classroom learning (Government of Estonia, 2025). From the foundation phase, learners should develop digital confidence, problem-solving skills and an understanding that online information must be questioned. In later grades, Mathematics could explore data and algorithms; Economics and Accounting, economic indicators and transactions; Business Studies, demand forecasting; and Agriculture, Geography and Life Sciences, crop monitoring and environmental data. Languages and History should teach learners to verify claims, recognise bias and assess AI-generated information.

Government should pilot AI-integrated learning in at least 10% of public schools by 2028, providing a manageable initial scale to test implementation across different school contexts before expanding nationally. The pilot should prioritise underserved communities, with AI literacy extended nationally by 2030.

4.2 Expanding equitable access to AI-supported learning

AI-integrated education requires reliable electricity, functional devices, affordable connectivity and maintenance. Investment should prioritise underserved schools to avoid widening inequalities. Building on Nigeria's AI tutoring results (Section 2), South Africa could integrate an AI tutor into the existing Mindset Network app, offering curriculum-aligned explanations, exercises and personalised feedback. The tutor could also help address Grade-4 literacy gaps by providing additional reading practice and personalised feedback to learners struggling with comprehension.

Given infrastructure inequalities across public schools, government should prioritise low-data and offline AI learning tools, teacher oversight and learner-data safeguards. It should fund their development and pilot testing by 2028, with national expansion by 2030 subject to independent evaluation of learning outcomes. To support adoption, government should target reliable internet access in at least 90% of public schools by 2030, with annual progress reporting.

4.3 *Connecting practical learning to post-school training and work*

India's Atal Tinkering Labs had established 10,000 laboratories and engaged more than 11 million students by 2025 (Atal Innovation Mission, 2025). South Africa could adapt this model by designating suitable existing public schools as municipal science and technology hubs, building on Gauteng's Schools of Specialisation. Provincial departments would select accessible schools with suitable facilities; government would fund equipment, connectivity and teacher training. Each hub would serve neighbouring schools through scheduled sessions and holiday workshops, supported by universities, TVET colleges and industry partners providing mentors and projects in coding, robotics and AI. Government should target hubs in 25% of municipalities by 2028 and all by 2031, subject to funding and evaluation.

AI readiness must also include TVET and university students, employed workers and unemployed adults. Government should work with employers, SETAs and colleges to identify skills needs and provide accredited training in AI-assisted data analysis, agricultural technology and industrial maintenance. Expanded SETA grants could help employers retrain workers whose tasks are changing and support redeployment, while shared training should reduce costs for small firms. The 2025 DHET–Microsoft agreement provides a basis for expanding AI and digital-literacy training through TVET colleges (DHET, 2025). Publicly funded programmes should report completion, placement and employment outcomes within six months.

4.4 *Accountability*

Given these skills and infrastructure constraints, government should publish annual provincial progress on connectivity, teacher training, learner participation and employment outcomes. Independent evaluation should guide expansion and ensure that education reform translates into a workforce capable of supporting productive AI adoption by firms.

5. Redesigning Industrial Policy to Harness AI for Productivity Growth

Industrial policy should address the infrastructure, financing and technical constraints limiting productive AI adoption, particularly among SMEs, while supporting workforce transitions.

First, government could integrate industrial AI adoption into infrastructure reform and establish shared facilities that help firms overcome technical barriers. Operation Vulindlela Phase II provides an existing framework for addressing constraints in electricity, water, freight and digital connectivity (The Presidency and National Treasury, 2025). Building on these reforms, the Department of Trade, Industry and Competition (DTIC), universities and TVET colleges could establish shared industrial AI centres in key sectors such as automotive manufacturing, mining and agro-processing. These centres would provide firms, particularly SMEs, with access to technical expertise, testing facilities and implementation support for applications such

as predictive maintenance, automated defect detection and production planning. They could also help firms assess which tasks may be automated and identify opportunities to retrain or redeploy affected employees.

Second, financing constraints can prevent firms, particularly SMEs, from undertaking productivity-enhancing investments. Government could establish an Industrial Machinery and AI Upgrading Facility by expanding existing manufacturing support programmes. The facility would co-finance investments in robotics, sensors, modern machinery, industrial software and AI-enabled production systems. South Korea's Smart Manufacturing Innovation Initiative, which supported more than 32,000 projects across approximately 24,000 firms, demonstrates the potential of targeted assistance for industrial upgrading (OECD, 2026). South Africa could prioritise financing-constrained SMEs, requiring firms to contribute a reasonable share of investment costs and submit a business case outlining expected productivity improvements and workforce implications.

Third, an AI Productivity and Worker Transition Grant could be introduced through relevant SETAs and TVET colleges. The grant would co-finance accredited employee training and a portion of paid training time. Participating firms would assess affected tasks, identify skills gaps and provide training in areas such as robotics, equipment maintenance and industrial data analysis. Where possible, firms could redeploy affected employees into alternative roles rather than rely solely on external recruitment. Germany’s dual vocational training system, which combines classroom instruction with practical workplace training, offers a useful model for strengthening collaboration between employers and training institutions**.** South Africa could similarly link substantial industrial support to credible employee training and transition plans.

Finally, industrial support requires evaluation to establish whether public expenditure generates additional economic benefits. Germany's AI Service Centres provide an international precedent for shared facilities, offering SMEs access to AI expertise, computing infrastructure and technical support (OECD, 2024). Building on this approach, government could pilot shared centres and upgrading support in selected industrial clusters before considering national expansion. Annual evaluations could measure labour productivity, production costs, defect rates, SME participation, private investment, employment, wages and worker-training outcomes. Where data permit, supported firms could be compared with similar unsupported firms to estimate the additional impact of public funding. Effective interventions could be expanded, while underperforming programmes could be redesigned or discontinued.

6. Redesigning Fiscal Incentives for South Africa's AI Economy

Fiscal incentives should complement industrial policy by reducing the cost of additional AI research and productive investment. However, indiscriminate subsidies risk supporting expenditure that firms would have undertaken without government assistance. A differentiated approach could therefore encourage domestic innovation, accelerate productive adoption and ensure that public funding contributes to workforce development.

Table X: Proposed AI fiscal incentive framework

Incentive tier	Target	Proposed policy mechanism
Tier 1: AI research and development	Firms conducting qualifying AI R&D	Existing Section 11D R&D tax incentive (150% deduction).
Tier 2: Productive AI adoption	SMEs and larger firms adopting AI	Proposed capped, incremental 5–7% AI investment tax allowance.
Tier 3: AI machinery and equipment	Firms investing in AI-enabled machinery	Proposed Industrial Machinery and AI Upgrading Facility to co-finance eligible investments.
Tier 4: Workforce development	Firms training employees affected by AI adoption	Proposed AI Productivity and Worker Transition Grant to co-finance accredited training and paid training time.

Source: Author's proposed policy framework.

6.1 Redirecting incentives towards domestic innovation

AI research and development involves high costs and uncertainty, while the benefits of innovation can extend beyond the firms undertaking the research. This can discourage private investment in locally developed technologies. Government could address these constraints by strengthening support for qualifying AI research under Section 11D of the Income Tax Act, with clearer guidance distinguishing genuine technological advancement from routine software purchases and implementation. The Department of Trade, Industry and Competition (DTIC) could also introduce an AI-focused stream within the Support Programme for Industrial Innovation (SPII) and strengthen university–industry collaboration through the Technology and Human Resources for Industry Programme (THRIP).

International evidence supports combining these instruments. Canada's Scientific Research and Experimental Development (SR&ED) programme provides tax incentives for qualifying business R&D, while OECD evidence indicates that tax incentives and direct funding can complement one another. South Africa could apply this approach by using tax relief to encourage private R&D and competitive grants to support innovative projects facing financing constraints. Priority could be given to locally developed technologies addressing challenges in manufacturing, agriculture and industrial production. Support should be evaluated against additional research activity, local technology development and subsequent commercialisation or adoption.

6.2 Accelerating productive AI adoption

Firms face different financial constraints and therefore require differentiated support. National Treasury could introduce a capped, incremental AI investment tax allowance, allowing firms

to deduct an additional portion of qualifying AI investment expenditure from taxable income, thereby reducing their tax liability. The allowance could initially provide an additional deduction of 5–7% of eligible expenditure, subject to fiscal costing and consultation. Eligible investments, the baseline against existing deductions and incentives, and a sunset clause should be clearly specified to ensure that the allowance encourages new investment rather than subsidising expenditure that would have occurred anyway. The rate should be reviewed against additional investment generated and its fiscal cost.

However, tax allowances may offer limited assistance to SMMEs with insufficient taxable income or cash flow to finance initial adoption. Targeted grants and vouchers could therefore help eligible smaller firms access AI software, computing capacity, technical consultancy and systems integration. Singapore's Enterprise Compute Initiative, supported by up to S$150 million, illustrates the value of combining access to computing resources with implementation expertise. South Africa could adapt this approach through targeted assistance and shared facilities, within its fiscal capacity.

The proposed Industrial Machinery and AI Upgrading Facility in Section 5 could remain the primary mechanism for co-financing eligible productive machinery, rather than creating a separate, overlapping subsidy. Clear eligibility rules and coordination between programmes would help prevent firms from receiving duplicate support for the same expenditure.

6.3 Making worker development a condition of support

Since AI adoption can change occupational tasks and skills requirements, substantial public support should be linked to credible workforce transition plans. Firms receiving such support could be required to identify occupations affected by automation, assess skills gaps, consult employees and outline accredited training and feasible redeployment opportunities. The AI Productivity and Worker Transition Grant proposed in Section 5 would help finance implementation by covering eligible training costs and part of employees' paid training time. Funding could be released in stages, subject to verified training completion and compliance with agreed transition plans.

Participating firms should report on training completion, occupational changes, redeployment and employee retention after six and twelve months, alongside productivity and employment outcomes. Where displacement cannot reasonably be avoided, firms should demonstrate that affected employees were informed and offered appropriate transition support. This is particularly important in South Africa, where high unemployment can make it difficult for displaced workers to secure alternative employment. SMMEs could receive simplified reporting requirements and access to shared training through TVET colleges and SETAs. The DTIC should coordinate support with existing SETA funding and applicable Section 12H learnership allowances to avoid duplication. Failure to meet agreed conditions could trigger proportionate corrective action or recovery of support.

6.4 Enforcing accountability and equitable access

Effective implementation requires transparent eligibility criteria, programme-level fiscal limits, beneficiary reporting and independent evaluation. National Treasury and the DTIC could jointly oversee these arrangements. Support should prioritise firms facing documented financing or capability constraints, including eligible black-owned enterprises and SMMEs with limited access to technological investment.

Evaluation should establish whether public support generated investment and innovation that would not otherwise have occurred. Baseline data, beneficiary monitoring and, where feasible, comparisons with similar unsupported firms could be used to estimate additional effects on private investment, R&D, productivity, output, wages, employment and worker-development outcomes. Government should also report programme costs and how benefits are distributed across firm sizes and eligible beneficiaries. Programmes should be assessed not only on productivity gains but also on their employment and workforce-development outcomes. Those that fail to demonstrate additional economic benefits could be redesigned or discontinued, while effective interventions could be expanded within available fiscal resources.

7. Conclusion

South Africa's ability to harness AI for inclusive growth will depend on coordinated reforms across education, industrial policy and fiscal incentives. This paper proposes integrating AI literacy into school curricula, expanding AI-supported learning, establishing municipal science and technology hubs and strengthening accredited workforce training. Industrial adoption would be supported through shared AI centres, an Industrial Machinery and AI Upgrading Facility and an AI Productivity and Worker Transition Grant. Complementary fiscal reforms would encourage domestic AI research, additional investment and technology adoption while linking public support to measurable productivity and workforce outcomes.

Ultimately, AI adoption should not be measured by technological investment alone, but by its contribution to productivity, employment and the development of domestic industrial capacity. These interventions must therefore be phased, fiscally sustainable and independently evaluated to ensure that technological progress translates into broader economic opportunities and more inclusive growth.

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