Harnessing artificial intelligence for productivity growth in South Africa: Assessing the role of education, industrial policy, and fiscal incentives in labour market transformation

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1. Introduction

South Africa's productivity growth challenge is becoming more urgent as firms face intensifying competition, cost pressures, and rapid technological change (OECD, 2025). South Africa faces a persistent structural challenge, including high unemployment, skill shortages and limited technological capabilities among some businesses, particularly small, medium and macro-enterprises (SMMEs). According to the Productivity SA (2024), South Africa's labour productivity growth declined by 2.3% in 2023, meaning that output per worker decreased by this percentage. Productivity SA (2025) shows that the long-run picture is no better as average annual labour productivity growth has been negative, at -0.29%, since 2010, compared with a 2001–2024 average of just 0.19%. While South Africa's productivity growth challenge is becoming more urgent as firms face intensifying competition, cost pressures, and rapid technological change (OECD, 2025). Artificial intelligence (AI) offers a potential path to raise productivity by improving decision-making, automating routine tasks, and enabling more efficient processes across industries (Filipacchi, et al., 2024). However, AI adoption can also reshape job content and disrupt labour markets, therefore, South Africa must redesign education, industrial policy, and fiscal incentives to harness AI while limiting labour displacement and protecting workers.

The scale of the gap becomes clear in comparison. Studies reviewed by the OECD put the annual boost that AI could add to aggregate labour productivity at between 0.3 and 2.9 percentage points, against recent United States productivity growth of roughly 1% a year (Filipacchi, et al., 2024). South Africa is therefore not merely growing more slowly than the frontier; it is starting from a position where output per worker is shrinking. Exposure to AI also differs sharply by income level, the International Monetary Fund (IMF) estimates that about 60% of jobs in advanced economies are exposed to AI, compared with about 40% in emerging markets and 26% in low-income countries (Cazzaniga, et al., 2024). Lower exposure is not an advantage in itself, because it reflects weaker digital infrastructure and skills, which limit a country's ability to capture AI's gains. On the IMF's AI Preparedness Index, South Africa scores 0.50, the highest in Africa but well behind Singapore (0.80), the United States (0.77) and China (0.63), and only just ahead of India (0.49) (IMF, 2024).

The labour market that must absorb this transition is already under severe strain. Official unemployment rose to 33.6% in the second quarter of 2026, or about 8.5

million people, while the expanded rate reached 46.3% (StatsSA, 2026). Any AI strategy that raises output per worker but destroys entry-level jobs would therefore deepen an existing social crisis.

This essay argues that AI-led productivity growth will not emerge from market forces alone. It first reviews the international evidence on AI and productivity, then compares South Africa's labour market and AI readiness with those of its peers. It then proposes reforms to education, industrial policy and fiscal incentives, sets out measures to protect workers during the transition, and concludes with policy recommendations.

2. AI and Productivity: What the International Evidence Shows

The strongest evidence for AI-driven productivity gains comes from the task level. Brynjolfsson et al., (2023) found that customer-support agents using a generative AI assistant resolved about 14% more issues per hour, with gains of roughly one-third among the least experienced workers. Noy and Zhang (2023) reported that professionals using ChatGPT completed writing tasks about 40% faster while output quality rose by about 18%. Across the literature surveyed by the OECD, worker-level effects of generative AI range from 10% to 56%, while pre-generative AI firm-level studies find effects between 0% and 11% (Filipacchi, et al., 2024). The pattern matters for South Africa: AI appears to compress the skill gap between novices and experts, which is valuable in an economy where many workers enter employment with weak foundational skills.

The OECD review reports estimate from less than 1% cumulative productivity growth over a decade to about 1.5 percentage points a year. The spread reflects a basic dependence on adoption speed, continued technological improvement and, above all, complementarity between AI and human skills (Filipacchi, et al., 2024). Economic theory explains why complementarity is decisive. Acemoglu and Restrepo (2019) distinguish a displacement effect, where machines take over tasks, from a reinstatement effect, where technology creates new labour-intensive tasks. Autor (2015) similarly argues that automation has historically raised demand for the tasks that remain, provided workers can perform them. Whether AI displaces or complements labour is therefore a policy outcome shaped by skills, incentives and institutions, not a technological given.

Global firm data is reassuring on the headline question of jobs. PwC (2026) finds that companies most exposed to AI record productivity growth about 40% higher than the least exposed, wage growth of 24% against 17%, and headcount growth of 52% against 36%. However, the OECD cautions that generative AI places knowledge-intensive occupations at risk, especially at entry level, and that AI skills and development are concentrated in a few large employers and countries (Filipacchi, et al., 2024). The evidence suggests that AI raises productivity where firms, skills and infrastructure are ready, which is precisely where South Africa is weakest.

3. South Africa's Labour Market and AI Readiness in Comparison

South Africa's position relative to other economies is summarised in Table 1. The comparison shows a country that is moderately prepared for AI by African standards, but weak on the capabilities that convert AI into productivity: research intensity, foundational education and firm-level technology adoption.

Indicator	**South Africa**
IMF AI preparedness index (0-1, 2024)	0.050
Share of jobs exposed to AI	Emerging-market average about 40%
Annual labour productivity growth	-0.29% (average since 2010)
Research and development spending (% of GDP)	0.61% (2022/2023)
Grade 4 learners unable to read for meaning	81% (2021, up from 78% in 2016)

Table 1: *Sources: Hypertext (2024); IndiaAI (2024); Cazzaniga et al. (2024); Productivity SA (2025); Filippucci et al. (2024); HSRC (2025); Mustapha et al., (2024); Daily Maverick (2023).*

Three features of the comparison stand out. First, research and development spending of 0.61% of GDP is about one-third of Czechia's 1.99% and well below Malaysia's 0.95%, although the years differ slightly (Mustapha et al., 2024; HSRC, 2025). The number of researchers also fell from 63,122 in 2021/22 to 61,457 in 2022/23 (HSRC, 2025), which weakens the domestic base for adapting AI to local conditions. Second, the education data is alarming: 81% of Grade 4 learners cannot read for meaning, and South Africa recorded the largest decline in reading outcomes among the 33 countries

with data in both 2016 and 2021. Third, the productivity trend is negative while the frontier is positive, which means the gap is widening even before AI diffuses.

The local labour market evidence is mixed, the PwC, (2026) reports that the share of South African job advertisements requiring AI skills almost doubled from 1.8% in 2024 to 3% in 2025. However, postings in the most AI-exposed quartile of occupations fell from about 524,000 to 314,000, a drop of roughly 40%, and AI-user roles grew by 4.2% while AI-developer roles shrank by 8.3% (PwC, 2026). South Africa is therefore adopting AI as a user but not building the capability to develop it. Strategy and PwC estimate that AI could raise South Africa's real GDP by an additional 6% by 2035 if access and skills become more equal, but only by 1.2% under business as usual, because high inequality and a dual economy with a marginalised informal sector limit diffusion. The gap between 6% and 1.2% is the size of the policy opportunity.

4. Redesigning Education and Skills for an AI Economy

Education is the foundation of any strategy that seeks to make AI complement rather than replace workers. The OECD finds that generative AI delivers its largest gains to less experienced workers, but only where they can read, reason and evaluate machine output (Filippucci et al., 2024). With 81% of Grade 4 learners unable to read for meaning (Maverick, 2023), the binding constraint is not a shortage of coding classes but weak foundations. A redesign should therefore proceed in four layers.

The first layer is foundational literacy and numeracy. Spending on advanced AI curricula will be wasted if learners cannot interpret a paragraph or a graph. Early-grade reading programmes, structured lesson plans, mother-tongue instruction and sustained teacher coaching should receive priority funding in the basic education budget, with learning outcomes measured and published regularly. The decline recorded between 2016 and 2021 shows that progress cannot be assumed (Daily Maverick, 2023).

The second layer is AI and data literacy in the school curriculum. Learners in the senior phase should be taught how AI systems work, how to verify their outputs and how to use them responsibly. This depends on teacher development, since teachers who are unsure of the technology cannot teach it. A national teacher-training programme, delivered with universities and technology firms, should accompany any curriculum change.

The third layer is technical and vocational education. Technical and Vocational Education and Training (TVET) colleges and the Sector Education and Training Authorities (SETAs) should be realigned to the occupations that AI complements: data technicians, maintenance and automation technicians, digital marketing, bookkeeping with analytics tools and AI-assisted customer service. The PwC (2026) finding that AI-user roles are growing while AI-developer roles are shrinking indicates that most South African jobs will involve using AI, not building it, so broad applied skills deserve as much attention as elite research degrees.

The fourth layer is lifelong learning for adults already in work. Because the exposed workers are today's employees, reskilling cannot wait for a new generation of graduates. Portable learning accounts, funded partly from the Skills Development Levy and co-funded by employers, would let workers choose accredited short courses and micro-credentials. Postgraduate and research capacity must also be rebuilt, since the number of researchers declined between 2021/22 and 2022/23 (HSRC, 2025). Singapore, which scores 0.80 on the IMF's AI Preparedness Index and is the highest of the economies compared here (IndiaAI, 2024), illustrates what sustained investment in human capital and digital infrastructure can achieve, and it is the benchmark that South Africa's 0.50 should be measured against.

5. Industrial Policy: Building the Capability to Adopt and Adapt AI

Industrial policy must address a prior question: whether the economy can run AI at scale at all. The OECD (2025) identifies a reliable electricity supply, rail and port bottlenecks and a restrictive regulatory environment as the main brakes on growth and job creation in South Africa. AI is energy- and connectivity-intensive, so these constraints determine where data centres, automation and AI-enabled services can be located. Industrial policy for AI therefore begins with infrastructure and regulatory reform, not with AI-specific subsidies.

Second, policy needs a credible national framework, In April 2026 the Minister of Communications and Digital Technologies withdrew the draft National AI Policy, which had been gazetted for public comment on 10 April, after it emerged that its reference list contained fictitious sources, most plausibly AI-generated citations that were not verified ((IMF, 2026). The draft prioritised AI that augments rather than replaces human work and proposed reskilling for displaced workers, with implementation

expected in 2027/28 (ITWeb, 2026). The episode carries a lesson for institutions: a policy designed to govern AI cannot itself rest on unverified AI output. The reissued policy should be built on an auditable evidence base, include an employment-impact assessment, and carry binding implementation targets.

Third, industrial policy should target sectors where South Africa already has productive capacity and where AI can raise productivity quickly, namely mining, agriculture, manufacturing, logistics and financial services. Public support should favour applications that complement workers, such as predictive maintenance, precision agriculture and AI-assisted credit assessment for thin-file borrowers, rather than pure labour substitution. Procurement by state-owned entities and municipalities can create early demand for local AI firms.

Fourth, policy must close the dual-economy gap. Strategy and PwC attribute much of South Africa's weaker AI payoff to the isolation of the informal sector and SMMEs. Shared digital infrastructure, such as common data platforms, subsidised cloud and compute vouchers, and SMME technology hubs, would let small firms adopt AI without carrying the fixed costs alone.

Finally, the national innovation system needs more private-sector R&D. Business research spending fell below half of total R&D by 2020, whereas it exceeded half in the early 2000s. Czechia, with R&D of 1.99% of GDP and a business share of 61% in 2020, shows how business-led R&D can scale (Mustapha, et al., 2024). South Africa's own figure of 0.61% (HSRC, 2025) indicates how far there is to go.

6. Fiscal Incentives: Rewarding Adoption That Keeps Workers Employed

South Africa already has fiscal tools that bear on technology and jobs: the section 11D research and development incentive, the section 12H learnership allowance, the Employment Tax Incentive (ETI) for hiring young workers, and the Skills Development Levy. The R&D incentive has been subject to repeated extensions and reviews, including a proposal to extend it for ten years beyond its original 2023 sunset, a pattern that creates planning uncertainty for firms that invest over long horizons. The weakness of these instruments is not that they are absent but that they are not coordinated around a single objective: adopting technology while retaining and upgrading labour.

Acemoglu and Restrepo, (2020) showed that tax systems can favour capital over labour, lowering the effective tax rate on automation equipment relative to workers and encouraging firms to automate even when the productivity gain is small. If South Africa subsidised AI investment without safeguards, it could reproduce this bias in an economy with a 33.6% unemployment rate (EWN, 2026). Incentives must therefore reward productivity gains that keep workers in jobs.

Three reforms follow. First, an AI-adoption allowance should provide an enhanced or accelerated deduction for qualifying AI and digital investment, conditional on a certified training and redeployment plan for affected workers. Firms that cut headcount sharply after claiming the allowance would face partial clawback. Second, SMMEs, which face the largest capability gap, should receive refundable credits or vouchers rather than deductions, because many have too little taxable income to use a deduction. Third, the learnership allowance, the ETI and the Skills Development Levy should be linked so that a firm hiring a young worker and funding AI-related training receives a combined, simple benefit, with the ETI reoriented towards entry-level roles that the OECD identifies as most exposed to generative AI (Filippucci et al., 2024).

Fiscal space is limited, so these measures must be budget conscious. The first step is to publish a tax-expenditure assessment of the existing incentives and to reallocate funding from those that show weak employment or productivity effects. Every new incentive should carry a sunset clause, annual performance reporting and an evaluation after three years, using data on productivity, employment and wages. International comparators point in the same direction. Singapore's lead on the AI Preparedness Index (0.80 against South Africa's 0.50) shows how large the readiness gap is (IndiaAI, 2024; Hypertext, 2024), which reinforces the case that fiscal policy works best when it is predictable and tied to capabilities rather than one-off subsidies.

7. Limiting Labour Market Disruption and Protecting Workers

Productivity gains will only be socially sustainable if displaced workers are supported. South Africa's safety net is thin: the Social Relief of Distress (SRD) grant of R370 a month has been extended to the end of March 2027 with no increase in value and it offers no link to training or job search. As unemployment rises to 33.6% and the expanded rate to 46.3% (StatsSA, 2026), a transition policy should combine income support with pathways back to work.

The first measure is an early-warning and transition system. Government, employers and unions should use the Quarterly Labour Force Survey and job-advertisement data, such as that analysed by PwC (2026), to identify occupations where AI exposure is rising. Sector dialogues at the National Economic Development and Labour Council (NEDLAC) can then agree transition plans before retrenchments occur, rather than after.

The second measure is short-time work and training-layoff support. Short-time work schemes, most notably Germany's Kurzarbeit, helped preserve employment during the 2008–09 recession by allowing firms to reduce hours instead of dismissing workers (Hijzen & Venn, 2011). A comparable arrangement within the Unemployment Insurance Fund, tied to mandatory retraining, would let firms adopting AI redeploy staff rather than retrench them.

The third measure is to reform the SRD grant into an activation tool. Recipients could receive a modest training stipend or priority access to learnerships and public employment programmes, so that income support also builds skills. This would respond directly to the concern that AI will reduce opportunities most sharply at entry level (Filippucci et al., 2024).

The fourth measure is worker voice. Worker participation in adoption decisions builds trust and helps firms identify the tasks that AI should complement rather than replace, so consultation requirements should be built into the incentive conditions proposed in Section 6. Finally, the transition needs measurement. Annual public reporting on AI adoption, job creation and loss, and wage effects, by sector and by age, would let policymakers adjust before problems become entrenched. The draft AI policy's stated aim of using AI to augment rather than replace human work will only be credible if such indicators exist.

8. Policy Recommendations

Recommendations are follows:

- **Fix the foundations of learning.** South African education system must prioritise early-grade literacy and numeracy, teacher training and AI literacy, and realign TVET and SETA programmes to occupations that AI complements.

- **Create lifelong learning accounts.** Use part of the Skills Development Levy and employer co-funding to give workers portable credits for accredited reskilling.
- **Reissue a credible national AI policy.** Base it on verified evidence, with an employment-impact assessment, binding targets and a sector focus on mining, agriculture, manufacturing, logistics and finance, supported by reliable electricity, logistics and shared digital infrastructure.
- **Introduce a conditional AI-adoption allowance.** Tax support must be linked to training and redeployment plans, give SMMEs refundable credits, and apply sunset clauses and evaluations to every incentive.
- **Protect workers through the transition.** Establish early-warning systems, a short-time work and retraining facility within the Unemployment Insurance Fund, and an SRD grant that connects recipients to training and work. Taken together, these measures would allow South Africa to adopt AI as a complement to its workforce. The aim is not to slow technological change but to ensure that productivity gains translate into jobs, higher wages and inclusive growth.

9. Conclusion

AI can raise productivity, but South Africa starts from a weak position where labour productivity has fallen by an average of 0.29% a year since 2010 (Productivity SA, 2025), an AI Preparedness Index score of 0.50 sits well below Singapore's 0.80 and the United States' 0.77 (Hypertext, 2024; IndiaAI, 2024; IMF, 2025), R&D spending is 0.61% of GDP (HSRC, 2025), and 33.6% of the labour force is unemployed (EWN, 2026). The evidence reviewed above shows that the gains from AI depend on complementarity between technology and skills, which is a matter of policy design. Business as usual could deliver only a 1.2% increase in GDP over the decade, against 6% if access and skills improve (Filipacchi, et al., 2024).

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