

Postgraduate

Entry number: 204

Number of words: 3458

**How Should South Africa Redesign Education, Industrial Policy, and Fiscal
Incentives to Harness Artificial Intelligence for Productivity Growth While
Limiting Labour Market Disruptions?**

1. Introduction

South Africa faces the problem of high unemployment and slow growth, while workplaces are changing how work is performed by adopting new technology, which includes artificial intelligence (AI) (Aghimien et al., 2021). South Africa is being drawn into an AI transition in such a way that workers, institutions, and policy instruments can absorb it.

AI is already utilised heavily in financial services, manufacturing sectors, and in public sectors. According to Nkwenkwe and Khumalo (2026), the argument is that the AI debate is currently framed around the wrong risk in South Africa. People fear AI taking away their jobs; however, in South Africa, the risk of full job replacement is lower than in developed countries because South Africa is still developing and has many manual and informal jobs that AI cannot easily replace completely (Alayande et al., 2026). The danger of AI in South Africa is uneven access: banks, high-skilled workers, and big companies benefit by working efficiently, fast and earn high from the use of AI, while other groups have little access to AI, which causes a gap between sectors.

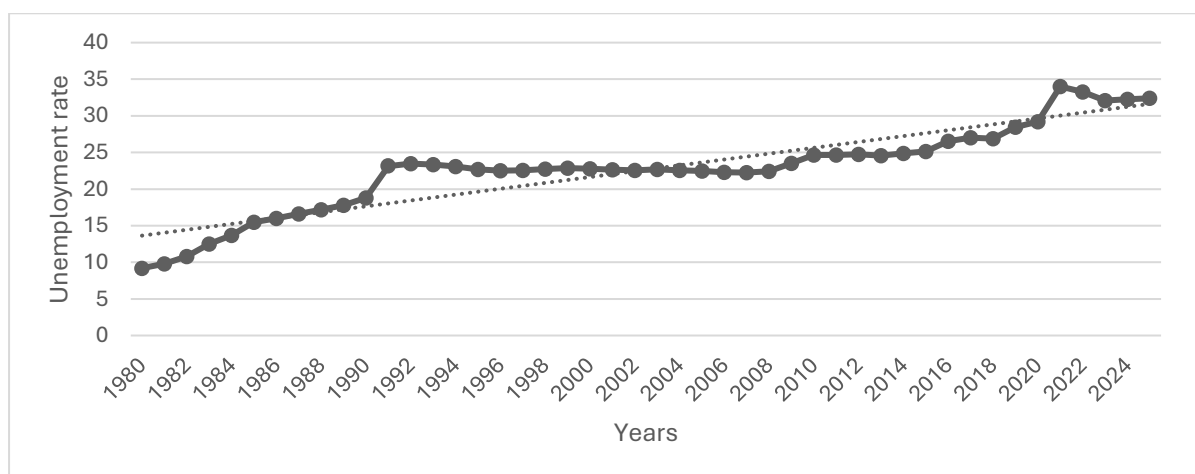
Spence (2024) states that the cases are different in terms of the economies; some countries are technologically advanced, with a high level of productivity resulting in growth and a low level of unemployment, and those countries are developed countries such as China. Those countries have their own strategies to utilise AI while keeping employment and growth a priority (Spence, 2024). This essay looks at how South Africa should renew its industry policy, education system, and fiscal incentives so that it can utilise AI to increase productivity without deepening the labour market crisis South Africa already faces.

The essay will use an AI-augmented production function as a single analytical framework to answer the essay question. Education, industrial policy and fiscal incentives are linked to one part of that function, and human capital theory is used as the supporting theory that explains how education raises labour productivity. The concept of Elasticity of substitution is utilised within this framework to examine whether AI replaces labour or complements it in South Africa.

2. Background: Unemployment and National AI policy

South Africa commences the journey of AI already facing the problems of high unemployment and slow growth. According to Statistics South Africa (2026), the official unemployment rate rose to 33,6% in the second quarter (Q2) of 2026.

Figure 1: Unemployment rate in South Africa



Source: International Monetary Fund (2025)

Figure 1 shows South Africa's annual unemployment rate. Unemployment in South Africa has been fluctuating and has had an upward trend for a long time; therefore, it shows that AI came while South Africa was already facing problems. International

Monetary Fund (2025) reports an unemployment rate of 9.2% in 1980, 23.07% in 1994, and 32.39% in 2025. The rise came around the transition to democracy.

According to StatSA (2026), youth unemployment is worse. Figure 2 shows that, in Q2 2026, about 10.4 million young people aged 15–24 living in South Africa, of whom 36.4% were not in employment, education or training (NEET) (Statistics South Africa, 2026). This is 1,2 percentage points higher than the NEET rate in Q2 2025. In this age group, the NEET rate for females increased by 1,6 percentage, and the rate for males increased by 0,9 percentage. The NEET rate for females was higher than that of males in both years.

Figure 2: NEET rate for youth aged 15–24 years by sex

	Q2:2025	Q2:2026
Total	35.6%	36.4%
Females	36.6%	33.7%
Males	33.7%	34.6%

Source: Compiled by the author from Statistics South Africa (2026)

The journey of establishing AI began in April 2024 in South Africa, followed by the National AI policy framework in 2024 (Department of Communications and Digital Technologies, 2024). The full draft of the National AI policy was then published by the Department of Communications and Technology, which included pillars such as inclusive economic growth and job creation, however, it was withdrawn in 2026. The Minister of Communications and Digital Technologies withdrew the draft after discovering that the sources that were used in the documentation of this policy were unverifiable. South Africa therefore still has no finalised national AI policy, which makes the design of education, industrial and fiscal measures more urgent.

One of the economists, Dawie Roodt, argues that South Africa faces weak productivity growth because output per worker grows little each year, which hinders investment, growth, and job creation (Nkwenkwe and Khumalo, 2026).

Spence (2024) indicates that a reduction in inequality allows people to have equal access to technology training; AI could assist in raising real gross domestic product (GDP) by 6% by 2035. Currently, if South Africa can make significant investments in electricity, internet connectivity, and digital skills, GDP can be boosted.

3. Theoretical Framework: AI-Augmented Production Function

Production function

Output can be expressed as an AI-augmented production function as follows:

$$Y = A(AI, H) F(K, L)$$

where:

- Y: represents output
- K: capital
- L: denotes labour
- H: human capital and skills
- AI: represents the adoption and effective use of artificial intelligence
- A: technological efficiency

Productivity depends on how much AI is adopted and how well the workers can use it. By increasing technological efficiency, productivity can rise, however its employment

effect depends on whether AI substitutes tasks that are done using labour or complements workers.

3.1 Total factor productivity and AI

Total factor productivity (TFP) measures the output gained by combining both labour and capital (Kane, 2022). AI assists in reducing errors in production, lets workers work fast and effectively, and produce quality tasks, by that total factor productivity increase. Because South Africa's problem is low output per worker, raising AI is more relevant than simply adding machines. However, AI can increase TFP with the support of reliable inputs such as electricity, technologically skilled workers, and connectivity.

3.2 Elasticity of substitution between AI and labour

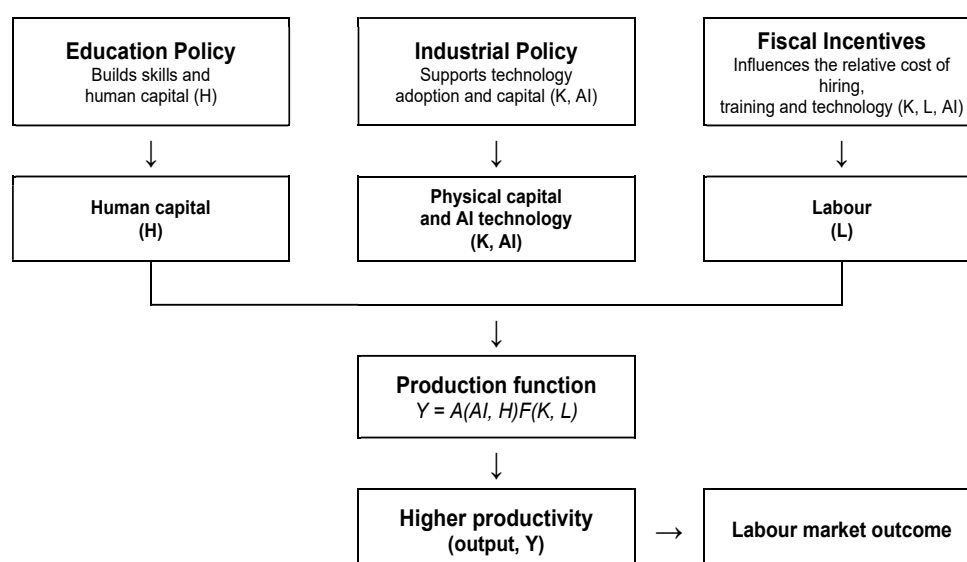
Behar (2025) defines elasticity of substitution as measuring how one input can substitute the other while keeping output constant. When labour cost rise firm can switch from labour to AI as it will become cheaper and more productive, increasing the risk of unemployment. When the labour costs are lower the firms can use both AI and labour in relatively fixed proportions. An elasticity of one indicates the Cobb–Douglas case, where a decrease in the relative price of AI shifts the input mix towards AI while maintaining each input's income share.

Elasticities differ by task and sector. Tasks involving judgement, physical presence, or interpersonal interaction have low elasticity, while everyday tasks, rule-based tasks like data capture, have high elasticity. This task-based approach is most helpful for policy since it demonstrates that the goal of policy is to shift AI adoption toward complementary uses rather than to completely prevent substitution (Acemoglu and Restrepo 2019).

3.3 Human capital and AI–labour complementarity

According to the human capital theory, investing in education and training increases employees' skills, which increases productivity and their income (Boloan and Stefan, 2023). In the above production function, this is denoted by H, human capital and skills and AI are complements because skilled workers can use AI to produce more output. Education turns the adoption of AI into worker productivity rather than displacement because higher H increases the productivity gain from each unit of AI.

Figure 3: Policy levers in the AI-augmented production function



Source: Compiled by the author

One model can now include all three policy areas. Improving digital and AI-related skills, education policy increases human capital and skills. By focusing investment on productive industries, industrial policy influences capital and AI, technology adoption, and the infrastructure that supports them. Through the relative costs of hiring, training, research and development (R&D), and technology adoption, fiscal incentives impact firms' decisions between L, K, and AI. This reasoning is summed up in Figure 3 above.

4. Redesigning Education

Education helps people build human capital (H). These skills determine whether AI raises worker productivity or replaces workers. AI-related skills will raise labour productivity; this means they can work with AI instead of being substituted by it.

The South African basic and higher education system was never designed with AI in mind; the education sector has been working in a traditional way over the years. The gap starts in basic education, which is the result of gaps in provinces due to the unavailability of funds and resources. In basic education, some high schools introduced a subject called Computer Applications Technology (CAT), and it has become compulsory for learners to take to equip them with the skills learners can use in the future because the economy and the way of performing work are changing as time changes. However, other schools do not offer this kind of subject due to the unavailability of funds to introduce it for example, labs, computers, and well-trained educators are required. Therefore, it brings us to the concept of scarcity.

Provinces are not the same; for example, if KwaZulu-Natal is compared with Gauteng, the majority of high schools and primary schools in Gauteng have already changed the curriculum. This province has access to different technologies, and the learners are equipped with AI skills due to the availability of resources. However, in KwaZulu-Natal, the majority of the schools are still trying to find a way out of using the traditional curriculum, which creates a gap and inequality in the education sector.

Currently, basic education will not be able to solve this skills gap because some people have already finished and left school; that is why the TVET colleges and universities are important, as these institutions offer programmes such as programming, computer science, computer technician training, Management Information Systems, and provide

e-learning platforms focusing on the Fourth Industrial Revolution, encompassing AI and robotics. Department of Higher Education and Training data indicates that around 65% of TVET graduates find work within six months of completing a National Qualifications Framework Level 4 programme, which becomes evidence that the risk of AI replacing jobs is far from South Africans (Denhere and Moloi, 2021).

To redesign the education system, the government should distribute equitable resources and shift the coding and robotics rollout so that the disadvantaged provinces and townships, particularly in rural areas, are also prioritised rather than being left out. Teachers must be given ongoing training regarding the use of AI, not the once-off workshops. Specifically for AI, short courses should be prioritised rather than only formal qualifications. The workers who are already in the workplace must be encouraged to take short courses, so that they learn new and improved skills to perform well in the industries. This makes sectors faster and more effective because workers have the skills to do the work quickly, which also increases production in the economy. Universities should encourage students to do more research on how AI can boost the economy, and they must be supported to expand postgraduate research capacity in AI so South Africa can use AI built locally, not elsewhere.

5. Redesigning industry policy

Industrial policy refers to government actions and public interventions targeted to shape the economy, encourage growth in specific sectors, and promote strategic business activities (Aiginger and Rodrik, 2020). The government makes choices about which technologies and industries to support using regulations, infrastructure, and coordination. Department of Trade, Industry and Competition (DTIC) manages the industrial strategic plan, and it was extended under the 2026 Industrial Development

Strategy (Criscuolo et al., 2022). The purpose of these industrial policies is to protect local sectors, strictly manufacturing sectors such as sectors producing steel, clothes, food, metal products, and electronic machinery, from foreign producers, however, modern industrial policy sets guidelines for growth across various strategic sectors, including green energy, technology, and agribusiness. The industrial policy aims to promote locally manufactured goods in the economy; however, South Africa is not strong enough in the manufacturing sector. The economy tends to import more manufactured goods; therefore, this policy wants to reduce the import of manufactured products. By doing so, people will start to consume more local goods. Protecting local manufactured goods assists in saving employment or jobs for the people. The introduction of AI then poses a different question to citizens now that South Africa no longer stresses about whether the sectors are going to manage producing the manufactured goods; however, the worry is now based on whether the industries will replace employment with AI and machines, since machines are more effective and can easily contribute to growth.

To redesign the industrial policy, this policy should target sectors that will increase productivity while using human labour (H) because the aim is to improve and see the efficiency of AI and other technologies without keeping on increasing the unemployment rate that is already high in South Africa. The policy that will be developed must prioritise and be willing to support such industries that will utilise both AI and human labour to produce more goods in the economy. Limited access to the internet and electricity problems have held back the economic promise of AI in Sub-Saharan African economies, which requires the government to consider fixing the infrastructure that AI depends on because the issue of infrastructure hinders the production of more goods. The industrial policy should support the local development

of AI that will be suitable to the South African economy and sectors, and inclusive of small businesses, and provide more funds to such programmes instead of using foreign systems.

6. Redesigning fiscal incentives

South Africa already has the fiscal incentive tools that are used to change how businesses behave through the tax system, and there can be relevant to AI strategies. South Africa does not need instruments that will redesign the AI transition from scratch or introduce new laws for the AI transition because it already has two tax tools in the budget that can be used again. The economic logic is as follows:

AI investment + training/hiring incentive → AI↑, H↑ → worker productivity↑ → Y↑

These tools include:

6.1. *Employment Tax Incentive (ETI)*

ETI reduces the tax burden for employers. If the employer hires young workers aged 18 to 29, then the employer gets a Pay As You Earn (PAYE) liability reduction from the South African Revenue Service (SARS), which encourages sectors to look for young people to assist them in gaining experience because most of the young workers still come from tertiary some with zero experience, and to reduce youth unemployment. The incentive values were increased from April 2025.

6.2. *Section 11D incentive for research and development*

Section 11D allows companies that do approved technological research and development in South Africa to pay a reduced tax on the taxable income. This project needs to be approved by the Minister of Higher Education, Science and Innovation. This incentive was effective again from 2024, consisting of adjustments, and it is

extended until 2033. This tool is a strong tool that encourages local AI research; by doing research regarding AI, it will assist in terms of finding out how AI can be beneficial for increasing production and South Africa while keeping human labour.

As people have a fear of being replaced by AI, these tools can be redesigned; ETI should be adjusted in such a way that it encourages employers to hire more young people and provide AI training to gain digital skills for them on how AI can be used to improve efficiency and productivity, while also considering labour for the employers to get reduced PAYE, and for those industries that hire fewer young people and invest less in AI must get less tax relief as well.

This will encourage employers to hire more young people, and it will encourage small businesses to grow as well to receive this benefit. For the Section 11D incentive, the budget should be increased to have access to more resources to conduct AI-based research because it will assist in terms of coming up with innovations, and also the barriers must not be too strict in such a way that small businesses are unable to participate; small businesses must also be allowed to grow and participate in research so that it can create employment and contribute to local AI development and establishments. Even though SA has these tools, none of these tools were addressing the AI side; therefore, these adjustments do not require the government to design the new incentive from scratch; however, it requires existing spending to be redirected to AI skills development and research.

7. Recommendations

These policies work best when they are used together. South Africa should use AI to make workers more productive, not to substitute them. Based on the analysis presented in this essay above, the following recommendations are provided below:

- **Equalise AI and digital skills in basic education:** even though provinces are different, the level of education that is provided must be the same to enable global competition; therefore, the introduction of equipping learners with AI or digital skills in basic education should be considered a priority in the education sector regardless of the provinces or locations. Equal resources must be distributed since most rural areas are being left out. This will also reduce the education gap in South Africa, which results in inequality in education. Developing AI skills also includes teachers.
- **Address the issue of overlooking TVET colleges and short courses:** people must be taught the importance of taking short courses to grow and improve their skills. Universities and TVET colleges should get more funds for short courses, especially those that are related to AI and digital literacy. These courses will assist people who are already in the workplace to learn so that they can contribute to industries and keep up with the new flow of doing things that will assist in increasing growth. This should be applicable to those who are not in employment as well.
- **The government should complete the national AI policy and target industrial support in South Africa:** Finalise a verified national AI policy, and direct industrial policy toward sectors where AI complements labour, while supporting workers in high-displacement activities to transition. The industrial policy should always consider the businesses that are willing to use AI while keeping human labour. Promoting the usage of AI must also benefit the labour market, as it will benefit productivity.
- **Provide high benefits for companies involved in AI research and local AI development:** this takes us back to where the fiscal incentives were discussed

in this essay because offering training to young workers assists in addressing some gaps. Research and development tax incentives should be made accessible to small businesses as well. Reform the ETI and Section 11D so that AI investment and local AI research are rewarded when accompanied by training, youth hiring and access for small businesses

- **The government should ensure that the issue of internet and electricity is resolved in South Africa:** invest more in reliable electricity and affordable internet access, since electricity issues were the current issue (load-shedding) before the economy can proceed to use AI to increase production because these issues hinder the fastness in the production process.
- **The government needs to firstly understand the importance of using AI:** to make informed decisions in terms of funding, encouragement, support, and providing learning programmes, the government must understand the importance of using AI. If that does not happen, then the economy will never grow using AI because the government will not be providing support to help companies to improve their AI skills to keep employment.
- **support lagging firms:** budgets should allocate more funds that will assist in uplifting the industries that have little knowledge about AI or those that lack funds and resources for using AI.

Artificial intelligence could become another source of productivity growth and increase employment while using AI if the SA can act on these recommendations.

8. Conclusion

This essay asks how education, industrial policies and fiscal incentives can be redesigned to utilise AI to increase productivity without disadvantaging the labour

market. The discussion in this essay indicated that South Africa is still growing, and it has high unemployment issues; therefore, innovations must always try to accommodate employment.

Using the production function, this essay argued that the employment effect of AI depends on whether it complements or substitutes for labour tasks. Education raises human capital, industrial policy directs capital and AI toward complementary sectors, and fiscal incentives shape firms' choices between hiring and training. Recommendations were also provided to promote the use of AI while keeping employment. Government agencies must work in cooperation with each other; if that is not the case, education policy, industrial policy, and fiscal incentives will move in different directions rather than reinforcing one another.

References

- Aghimien, D., Aigbavboa, C., & Matabane, K. (2021). Impediments of the fourth industrial revolution in the South African construction industry. In *Proceedings of the International Conference on Industrial Engineering and Operations Management*.
- Aiginger, K., & Rodrik, D. (2020). Rebirth of industrial policy and an agenda for the twenty-first century. *Journal of Industry, Competition and Trade*, 20, 189–207.
- Alayande, A., Nzuki, C., & Stanley, A. (2026). *AI strategies and the informal economy: Africa's job creation test*. CSIS. <https://www.csis.org/analysis/ai-strategies-and-informal-economy-africas-job-creation-test>
- Behar, A. (2025). The elasticity of substitution between skilled and unskilled labor in developing countries: A directed technical change perspective. *Journal of Development Economics*, 174, 103411.
- Bolohan (Cociorva), R. M., & Stefan, G. (2023). Osmosis between human capital and development and its impact on the 21st century economy: A review. *Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development*, 23(2), 89-96.
- Criscuolo, C., Gonne, N., Kitazawa, K., & Lalanne, G. (2022). Are industrial policy instruments effective?. *OECD Science, Technology and Industry Policy Papers*.
- Denhere, V., & Moloi, T. (2021). Readiness of public TVET for the Fourth Industrial Revolution: The case of South Africa. *Journal of Vocational, Technical and Continuing Education (INVOTEC)*, 17(1), 37–51.
- Department of Communications and Digital Technologies. (2024). *South Africa national artificial intelligence policy framework*. Republic of South Africa.
- Kane, A. (2022). Measurement of total factor productivity: Evidence from French construction firms.
- Nkwenkwe, L., & Khumalo, N. (2026). Technology, automation, and employment in South Africa: An employment relations analysis of secondary evidence. *African Journal of Employee Relations*, 50, 1–34.

Spence, M. (2024). AI's promise for the global economy. *IMF Finance & Development*.
<https://www.imf.org/en/publications/fandd/issues/2024/09/ais-promise-for-the-global-economy-michael-spence>