

Featured SET policy:

3 – Science and technology as drivers of development

In a series of articles, the NSTF is unpacking the National Development Plan (NDP). The focus is on understanding it from a science, engineering, technology (SET) perspective. The NDP is seen as a blueprint/guiding document for South Africa. The NDP aims to eliminate poverty and reduce inequality by 2030.

- The complete document – ‘[National Development Plan – vision for 2030](#)’
- The executive summary ‘[National Development Plan 2030, Our future – make it work, executive summary](#)’.

NDP chapter: Overview

This considers the context and background of the NDP. See [1 – Understanding the context of the National Development Plan \(NDP\)](#). It also sets the stage for understanding what makes a developmental state. See [2 – The National Development Plan and the developmental state](#). There is also a summary of the plan and key targets and actions.

NDP chapter 1: Key drivers of change

NDP chapter 2: Demographic trends

NDP chapter 3: Economy and employment

NDP chapter 4: Economic infrastructure



An economy that will create more jobs

NDP chapter 5: Transitioning to a low carbon economy



Transition to a low-carbon economy

NDP chapter 6: Inclusive rural economy



An inclusive and integrated rural economy

NDP chapter 7: Positioning South Africa in the world

NDP chapter 8: Human settlements



Reversing the spatial effects of apartheid

NDP chapter 9: Improving education, innovation and training



Improving the quality of education, training and innovation

NDP chapter 10: Promoting health	 Quality healthcare for all
NDP chapter 11: Social protection	 Social protection
NDP chapter 12: Building safer communities	 Building safer communities
NDP chapter 13: Building a capable state	 Reforming the public service
NDP chapter 14: Promoting accountability and fighting corruption	 Fighting corruption
NDP chapter 15: Transforming society and uniting the country	 Transforming society and uniting the country

Chapter 1 – Key drivers of change

The world is an interconnected global system. Increased interconnectedness has allowed threats to spread more rapidly (such as the 1998 financial crisis). But it has also brought globalisation with its benefits and opportunities. It's not always clear how the global system will respond to a specific scenario or risk.

Some of the factors that impact the global system:

- Technology increases the world's interconnectedness, impacting growth, trade, cross border investment etc.
- There is economic integration and increased global trade yet many emerging economies are trapped in a cycle of poverty.
- There is diminished distance through, for example, air transport.
- There is increased urbanisation.
- There is increased inequality with globalisation (an increasing gap between the rich and the poor)

Countries and the world as complex systems

The interconnected global system presents complex systemic challenges. The NDP notes that "neither governments nor the relevant international institutions are set up to monitor or assess the risk of systemic contagion, or to deal with systemic failure".

The global impact of the financial crisis of 2008 showed governments' failure to regulate and prevent systemic collapse. This is one example of a complex system whose workings are not fully understood. The DP provides other existing complex system challenges, such as climate change, population pressures, urbanisation, and rising consumption and waste. There are also potential systemic crises, such as cyber attacks on financial markets, electricity supplies, transport etc.

Economic globalisation has outpaced political globalisation. The NDP notes that, in most countries, the public sector is locked into an outdated national model that isn't able to tackle global challenges.

Treaties and conventions take too long to negotiate, are often not ratified, and when they are, are rarely enforced. Big governmental conferences are long on declarations and short on implementation. Both governments and companies will need to adapt continuously as they address the risks and opportunities of the evolving global environment.

Reviewing economic policies

The NDP calls for efficient market policies that embrace principles of social justice, empowerment, and a balance between rights and responsibilities. At the same time, taking country-specific factors and global context into account.

Emerging markets have been increasing their contributions to global growth (while developed markets decrease their contribution). This is driven by better education and economic management, and greater openness to international trade. There are also demographic shifts (such as declining birth rates) and urbanisation (urban migration).

The expected global economic rebalancing depends on emerging market countries maintaining 2011 growth trends. This is not a given and will depend largely on policy. It also means wider and deeper investment in education and skills training.

Opportunities in Africa

- Minerals underpin the economic strength of many African countries. However, most African countries have not used their commodity wealth to reduce poverty.
- Africa has the world's youngest population but there is a need for education, skills, and programmes around job creation and entrepreneurship.
- Urbanisation reduces the number of people involved in small-scale agriculture and facilitates economic diversification. Employment and urbanisation significantly increase consumer spending. This has particular implications for consumer-facing industries, agriculture, resources and infrastructure.
- With the explosion of cellphone use and the related demand for the internet, there is a need for better connectivity and a need to harness technological opportunity.
- Africa has massive infrastructure deficit. At the same time, poor infrastructure and tough market conditions have forced innovative business models eg Mpesa (type of mobile money).
- Access to electricity is limited and electricity is a prerequisite for development. Renewable energy sources as increasingly important, with Sub-Saharan Africa well positioned to develop solar and hydro energy and to produce bio-fuels.
- Africa has great agricultural potential – more than one quarter of the world's arable land is in Africa. But poor regulation can have a negative impact, as does the lack of enabling conditions (eg transport and other infrastructure, stable business and economic conditions, trained business and scientific talent). Then, of course, there is the impact of climate change.
- Africa must do more to hold onto skilled workers. Future growth largely depends on how educated and skilled Africans view personal opportunities, and how domestic and foreign investors view return on investment. This is strongly influenced by government policies – more transparent regulatory and legal systems, greater openness in trade, higher investment in infrastructure etc.

Environmental challenges and drivers

The NDP is clear on the effect of climate change and the link between environmental threats and poverty. Human activity is warming the planet faster than the slow natural cycles of warming and cooling. Carbon and other green house gas emissions have contributed significantly to this. The NDP sees the threat to the environment and the challenge of poverty alleviation as closely intertwined.

A low carbon future is positioned as the only realistic option. This presents potential for innovation around energy systems. The political challenge is to develop policies and regulatory initiatives for improved resource management, for substantial clean technology industries, and to assist with the transition.

The chief ecological challenge is climate change but other challenges are closely linked. These include water scarcity, pollution, food production and safety, and depleted fishing stocks. We exist in an integrated ecosystem where the interaction between components is not well understood.

Science and technology as drivers of development

“Developments in science and technology are fundamentally altering the way people live, connect, communicate, and transact, with profound effects on economic development. Science and technology are key to development, because technological and scientific revolutions underpin economic advances, improvements in health systems, education and infrastructure.” (NDP)

Science and technology are seen as key to improving the lives of poor people in developing countries. According to the NDP, these are the differentiators for developing economies to emerge as economic powerhouses (when insights are applied creatively). Technology is defined as ranging from telecommunications to biotechnology and nanotechnology. Science innovations that are mentioned include: proton cancer therapy, genetic engineering, nuclear batteries, and photovoltaics that make electricity from sunlight.

Technology is seen as a way to increase productivity and to unlock access to affordable health and education. ICT and internet access provides access to many things, such as knowledge and markets. It changes relationships between citizens and those in authority. At the same time, ICT and internet access depend on electricity and other power sources – no power, no access.

There is a need to manage the challenges around technological revolutions. For example, there is a risk of worsening inequality through early and extensive technology access by the rich.

To promote technological advances, developing countries need to invest in quality education for the youth, continuous skills training for workers and managers, and ensuring that knowledge is shared as widely as possible across society. There is a need to build knowledge capabilities and pathways (stocks and flows). “Knowledge is the systemically integrated information that allows a citizen, a worker, a manager, or a finance minister to act purposefully and intelligently in a complex and demanding world.” (NDP)

To encourage research and development (R&D), there is a need for investment, incentives, and resource allocation of resources. Successful countries have grown their ability to innovate and learn by doing through investing public funding to help finance R&D in critical areas. Examples include the integrated value chains, just-in-time manufacturing, and total quality management in Japan, and the space programme, defence, and aerospace in the USA.