POLICY BRIEF

SEPARC
Swaziland Economic Policy Analysis and Research Centre

THE STATE OF THE NATIONAL SYSTEM OF INNOVATION IN SWAZILAND

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Key Message

Swaziland, in the National Development Strategy (NDS), aspires to achieve development through investments in science, technology, and innovation (STI). However, using innovation to uplift the country from poverty and tackle economic growth requires investment in research and experimental development (R&D), human capital development, and the establishment of relevant institutions and governing bodies to direct scientific and technological development which are currently missing. Due to low investments in innovation and R&D, the lack of funding sources, absence of a national STI strategy and R&D agenda, and low collaboration between institutions, the country is struggling to propel STI-driven development. As a result, Swaziland is largely a consumption-based economy, with high imports and low exports, and the domestic industry is underdeveloped.

The implication is that as economies grow and become more competitive, Swaziland will continue to remain behind. Hence, to use STI to drive social and economic development the country needs to affirm this concession by developing a national STI strategy. Establishing a Ministry of Science, Technology, and Innovation would enhance the coordination of STI activities and manage the funding and implementation of STI policies. To effectively use STI as a vehicle for development requires that the national development strategy is embedded in national STI strategies, as it cuts across all sectors of the economy. This will improve the innovation environment which is critical to spreading the benefits of innovation and driving social and economic growth.

What is the issue?

Swaziland's gross domestic product (GDP) has declined from an average growth rate of 2.7% in the 2000s to a low 1.7% in 2015 (CBS, 2016; CSO, 2015), while poverty remains high at 63%, unemployment at 28.1% and food security is an issue. Despite the fact that Swaziland has identified STI as a driver of economic and social development, its development in the country has lagged behind. The NDS and the Poverty Reduction Strategy and Action Plan (PRSAP) emphasise the need for research and development, as well as science, technology, and innovation to drive industrial growth and alleviate poverty. The importance attached to STI in Swaziland is further demonstrated in the country's investment into the Royal Science and Technology Park (RSTP). However, Swaziland's industry is characterised by a stagnant business environment with small and medium enterprises (SMEs) engaged in low value addition (Edwards *et al*., 2013). This is compounded by a low technological readiness (Schwab and Sala-i-Martin, 2016) in the country and low innovation (UNESCO, 2015). The

NDS also reports a lack of STI personnel and inadequate infrastructure for science, technology, engineering, and maths (STEM) education. It further reports a low engagement in research and development as well as a lack of coordination in policy implementation, which hinders development. Meanwhile, development has remained relatively low.

Why do we need to understand our national system of innovation?

As a country that aspires to be among developed countries by 2020, Swaziland strives towards being a knowledge based economy powered by an innovative industrial growth. However, the country's social and economic development has remained very low. To move from this present state of development to an innovation driven or knowledge based economy requires an understanding of the country's innovation system. Bartels *et al*. (2012, p.6) define the national system of innovation (NSI) as an 'envelope of conforming policies as well as private and public organisations, their distributed institutional relations and their coherent social and capital formations, that determine the vector of technological change, learning and application in the national economy'.

Understanding the NSI is important for Swaziland to relate STI to national development and strengthen its innovative performance and global competitiveness through prudent policies and interventions. This will also assist in guiding funding priorities and investments. Understanding the NSI will assist policymakers to identify gaps and mismatches in the innovation process and further identify areas for policy change. Investing in innovation and upgrading to value added activities can boost productivity, create employment, and improve social wellbeing. Therefore, it is imperative to understand the actors, activities, and relationships within the national economy to drive and support innovation for socioeconomic development.

How was the study conducted?

The study was carried out by conducting R&D and innovation surveys. The survey data was analysed through descriptive analysis to map the actors, activities, and interactions in the innovation system. This is based on other studies (Arocena and Sutz, 2000; Carvalho *et al*., 2015; OECD, 1997) that have used the R&D and innovation surveys to understand national systems of innovation. This method is supported by the triple helix model which describes government, academia, and industry as the fundamental actors of the innovation system. The model further explains the dynamic organisation of the interactions and subsystems in the innovation process (OECD, 1997; Seidel *et al*., 2013; Etzkowitz and Leydesdorff, 2000). Thus, the surveys were used to provide an understanding of the patterns of knowledge and technology flow and creation, and to understand the kind of relationships that exist in Swaziland's national system of innovation.

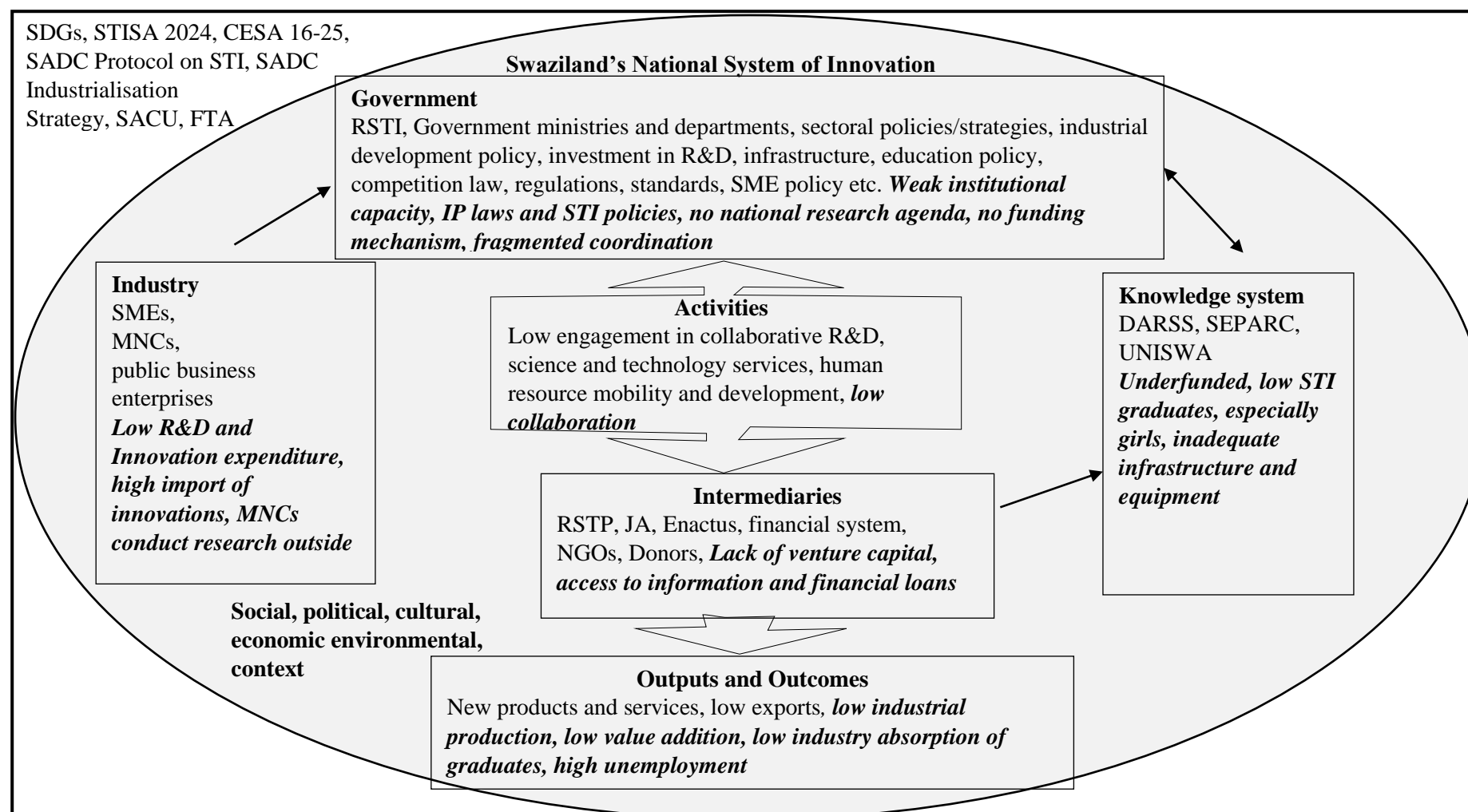## What did the study find?

The study found that Swaziland has a weak innovation system. This is because the country has a weak institutional and policy framework that does not support innovation. For instance, there is neither a national strategy for STI nor a stipulated agenda for R&D activities, and intellectual property laws are outdated. Of the surveyed innovative firms, 60% specified that

the lack of STI policies and inflexible regulations were a barrier to innovation, further making the coordination of STI activities difficult.

Figure 4.1 shows an illustrative diagram of the country's national system of innovation. The diagram shows that there is generally low investment in innovation and R&D in the country. Presently, there are no national funding mechanisms for innovation and R&D; the national gross domestic expenditure on R&D (GERD) was found to be at 0.26% compared to the 1% target of the Southern African Development Community (SADC) and the African Union (AU). This implies a low investment in knowledge generation, which is also demonstrated by the low funding of R&D institutions such as the University of Swaziland (UNISWA) and the Department of Agricultural Research and Special Services (DARSS), which hinders the conduct of cutting edge research due to inadequate equipment and materials.

Moreover, the study identified a number of gaps and challenges of the innovation system that could require policy change. For instance, a low number of science and engineering graduates relates to the low number of scientists and engineers engaged in R&D in the country. This compromises the development of new goods and services in industry. Figure 4.1 also shows that the low investment in R&D and innovation in industry is substituted by a high importation of innovations and low assimilation of R&D. Collaboration between industry and research institutions was found to be low; only 10% of the surveyed firms collaborate with universities in innovation activities. Thus, over 50% of the innovations in the country originate from outside, implying minimal local creativity and innovativeness, which is a gap in the innovation process.

The study found that there is low collaboration between and among the actors in the innovation system, with only the knowledge system and government having two-way interaction mechanisms (Fig. 4.1). Nonetheless, the NSI of Swaziland is composed of a relatively diverse set of actors supporting innovation. This includes government ministries and departments, sectoral policies and supporting (intermediaries) institutions, such as the RSTP and development partners. It also consists of existing relationships, such as the industry government link which can further be exploited to support and channel innovation driven industrial growth.

Figure 4.1: Swaziland's National System of Innovation

SDGs, STISA 2024, CESA 16-25, SADC Protocol on STI, SADC Industrialisation Strategy, SACU, FTA

Swaziland's National System of Innovation

Government
RSTI, Government ministries and departments, sectoral policies/strategies, industrial development policy, investment in R&D, infrastructure, education policy, competition law, regulations, standards, SME policy etc. *Weak institutional capacity, IP laws and STI policies, no national research agenda, no funding mechanism, fragmented coordination*

Industry
SMEs,
MNCs,
public business enterprises
Low R&D and Innovation expenditure, high import of innovations, MNCs conduct research outside

Activities
Low engagement in collaborative R&D, science and technology services, human resource mobility and development, *low collaboration*

Knowledge system
DARSS, SEPARC, UNISWA
Underfunded, low STI graduates, especially girls, inadequate infrastructure and equipment

Intermediaries
RSTP, JA, Enactus, financial system, NGOs, Donors, *Lack of venture capital, access to information and financial loans*

Social, political, cultural, economic environmental, context

Outputs and Outcomes
New products and services, low exports*, low industrial production, low value addition, low industry absorption of graduates, high unemployment*

Source : Author's Own Depiction
Notes : The *italicised* and **bold** text represents some of the gaps and challenges in the national system of innovation, while the rest of the text describes what was mapped in the study.

Recommendations

The study found that Swaziland has a weak innovation system. Given the conviction in national and regional policy frameworks to drive development through science, technology, and innovation, Swaziland needs to strengthen its national system of innovation. Thus, the study recommends the following:

- Develop a national STI strategy that is embedded in the country's national development agenda (as seen in South Korea and Singapore, where STI is a vehicle to national development). This should spell out the innovation and R&D agenda for Swaziland's development priorities, funding, and available resources.
- Improve STI governance by introducing the Swaziland National Commission for Research, Science, and Technology as planned. However, the mandate, role, and influence of this institution should be considered at the level of its influence to national budgets and prioritisation of STI initiatives in the country's development agenda.
- Establish a Ministry of Science, Technology, and Innovation to ensure full coordination of the funding of, and support for, R&D and innovation activities. Cognisant of the need to reduce the civil service, this comes at a time where bold commitments and priorities need to be set and a restructuring of government could prove beneficial.
- Introduce a national PhD programme and form linkages with regional and international research institutions to expedite the development of researchers in the fields of science, technology, engineering, and mathematics (STEM).
- Deliberately target women in STI research initiatives to ensure a gendered national innovation agenda.
- Develop incentives (monetary or otherwise) to entice young researchers to stay in research.
- Provide a conducive environment for innovation by updating outdated legislative frameworks and regulatory environment for the growth of innovative firms. For instance, through the provision of tax breaks for private sector R&D, improving price controls, eliminating monopolies, and setting clear output specifications in procurement and quality standards.
- Implement programmes and incentives to sustain a continuous engagement of the private sector in R&D and innovation activities. For instance, through the establishment of contest funds, problem-solving networks, or well-designed matching funds that support innovation.
- Increase R&D investment, especially capital investments, with a special focus on investing in equipment and machinery to curb under-employment of existing researchers.
- Enhance regional and international collaborations in innovation activities to foster knowledge and technology transfer and the sharing of best practices.
- Reinforce efforts geared towards demonstrating the value of engaging in R&D to industry by showing the kinds of incentives that are in place to support R&D activities in Swaziland, particularly given the successful completion of the Royal Science and Technology Park.
- Provide incentives to increase and foster private sector funding for education to universities and STEM skills development, especially in technical and vocational education and training (TVET).

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