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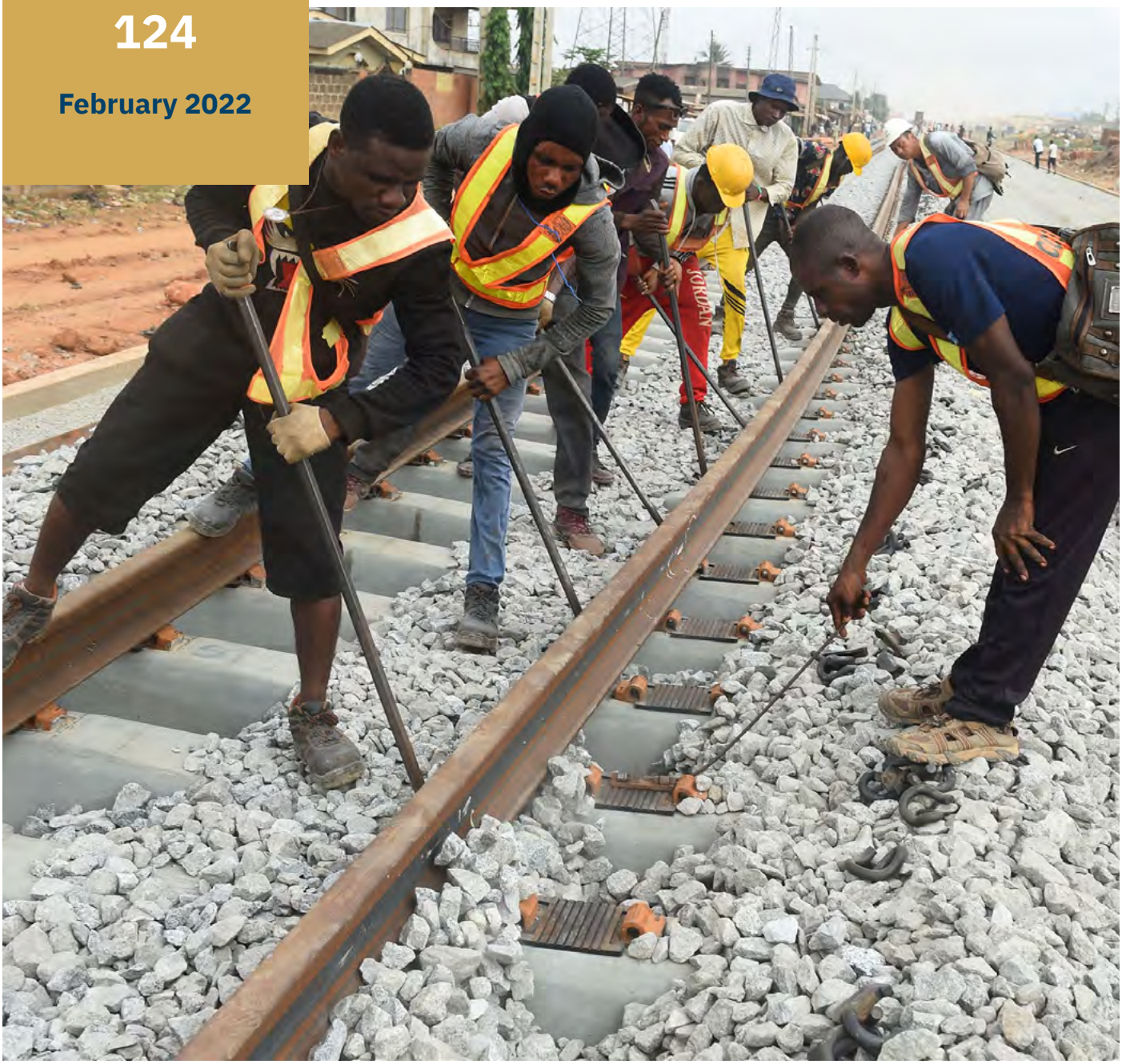

SADC Infrastructure Futures: Pathways to Complementary Regional Interconnectivity

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African perspectives
Global insights

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Executive summary

Effective regional connectivity calls for a vibrant relationship between economic and social infrastructure, on the one hand, and an underlying enabling policy framework for the financing and development of sustainable, appropriate infrastructure, on the other. In a rapidly changing, complex world where crises occur with regularity, there are weighty uncertainties that shape future markets, government and governance, and social and economic values. Anticipatory governance allows for the evaluation of potential activities that can help to shape the future in a complex environment, such as the SADC infrastructure landscape. The operationalisation of anticipatory governance can make a world of difference, allowing key stakeholders (including governments and their partners) to reflect on various early signals and barely recognisable inputs, thereby detecting and exploring unexpected complex emerging disruptors well before the pressing need to execute necessary changes. In SADC, transformative infrastructure can stimulate economic growth, delivering employment and an economically, socially and environmentally sustainable recovery from the COVID-19 crisis. Infrastructure investment has a high potential multiplier effect and a long-term impact on raising economic wellbeing. The Global Infrastructure Hub has found that the fiscal multiplier of public investment has generally been higher in the contractionary phase of the business cycle, particularly when interest rates are low. Through this current recessionary phase, the economic scene is set for greater government investment in infrastructure. The question is how to achieve transformative infrastructure outcomes in the region, now.

There is a clear need to reverse the trend away from elites' self-interest and national protectionism exacerbated by COVID-19. By focusing on greater regional interconnectedness and regional competitiveness, SADC should increase resilience and preparedness for future global shocks. Regional trading and value chains should be encouraged, and dialogue and trust – both between and among member state governments and regional business – are vital. The African Continental Free Trade Area (AfCFTA) is a unique opportunity for intra-regional and intra-African collaboration on non-tariff barrier elimination. The growth of Africa's youthful population, the speed of urbanisation in SADC, and the resulting informal settlements in SADC centres place a crushing burden on governments if they are left to develop infrastructure on their own. SADC governments, partners and the private sector must develop joint solutions to current lacklustre economic performance. SADC governments can no longer be held solely responsible for infrastructure funding and development. This requires collaborative and innovative approaches to financing, with new models being adapted to regional conditions.

Challenges facing SADC infrastructure

Regional infrastructure development is crucial to increase interconnectivity, competitiveness, and intra-African trade towards sustainable socio-economic wellbeing.

Southern African countries are lagging behind the rest of the world in almost every measure of infrastructure coverage, whether it is road, information and communications technology (ICT) density or power generation. The second pillar of the SADC Vision 2050 is aimed at addressing the issue of infrastructure development in support of regional integration.[1] However, a pre-COVID-19 infrastructure situation assessment by the Southern African Research and Documentation Centre shows that reality is at odds with the vision. Infrastructure developments are 'not progressing from preparation, financial closure through to implementation, as there is a high level of stagnation [throughout the] preparation cycle'.[2] These types of regional institutional weaknesses, whether at secretariat or country level, reinforce the infrastructure gap and accelerate unemployment, inequality and poverty.

Infrastructure development will take place in the context of large megatrends shaping the global and regional development trajectory. The interaction of the SADC strategy and the global megatrends provides space to develop regional infrastructure scenarios

For effective regional connectivity, a robust relationship is required between economic and social infrastructure, on the one hand, and the underlying policy framework to enable the financing and development of sustainable, appropriate infrastructure, on the other. Infrastructure development will take place in the context of large megatrends shaping the global and regional development trajectory. The interaction of the SADC strategy and the global megatrends provides space to develop regional infrastructure scenarios. This policy insight develops a set of desired, undesired and other possible futures over a 10–30-year time horizon, based on an STEEPV analysis of the high-impact uncertainties in SADC. A 2x2 uncertainty matrix scenario method is employed to enable better anticipation of opportunities and challenges that could emerge in the future, while seeking policy innovations to spur new thinking about the best policies, and to stress-test existing or proposed strategies against a range of future scenarios. Multiple scenarios are set out considering future options for embracing or rejecting transformative, inclusive, sustainable and resilient infrastructure with or without good policies; partnerships; or new financing models. The scenarios present potential SADC infrastructure pathways that are briefly unpacked according to desirable, undesirable and other plausible futures. The preferred infrastructure futures contained in the SADC Vision 2050 are imagined as a cleaner, greener and more regionally connected infrastructure network. This infrastructure network

1 SADC, *SADC Vision 2050* (Gaborone: SADC Secretariat, March 4, 2021).

2 SADC, *SADC Regional Infrastructure Development – Short Term Action Plan Assessment 2019* (Harare: Southern African Research and Documentation Centre, August 19, 2019).

is supported by sustainable financing, as well as better asset building, utilisation and maintenance.

What does regional infrastructure look like?

Regional infrastructure connectivity refers to the physical, policy and administrative linkages across regional economies via structures and facilities that enable the free movement of goods, persons, services, technology and ideas across the region. Physical connectivity is essential for the smooth and cost-effective flow of goods and services across borders. This requires economic infrastructure that promotes economic activities, such as roads, highways, railroads, electricity, telecommunications, and water supply and sanitation. Social infrastructure, on the other hand, stimulates education, health and culture related to standards of living, such as schools, colleges, universities, hospitals and museums.[3] Regional connectivity also requires appropriate policies. These include trade facilitation policies aimed at effective border and customs procedures for the smooth flow of people, services and goods across borders; effective laws, regulations, systems and procedures; and institutions to make infrastructure work properly.[4]

Several challenges (outlined below) lie ahead in the SADC region in the wake of the COVID-19 pandemic. Population growth and urbanisation in the region continue to place a strain on urban infrastructure. Although the impact of the pandemic is still inconclusive, COVID-19 has severely exacerbated regional challenges, especially in SADC's landlocked countries, and across vulnerable communities and sectors. Infrastructure deficiencies have been exposed particularly in marginalised settlements without access to proper water and sanitation, electricity, digital communication systems and safe and secure transport modes.

SADC's infrastructure plan, integration blueprint and the implementation shortfall

The adoption of the SADC Regional Infrastructure Development Master Plan (RIDMP) in August 2012 enabled a collaboration between the SADC Secretariat and SADC ministries responsible for energy, transport, tourism, ICT and post, and meteorology and water to formulate frameworks to guide the implementation of efficient, unified and cost-effective transboundary infrastructure networks in an integrated and coordinated matter.

Two-thirds into the implementation period just seven have been completed, while over 50% of the projects languish at the pre-feasibility or feasibility stage. Most of these were scheduled for completion by 2017.[5]

3 Avinash Kaur and Rajinder Kaur, "Role of Social and Economic Infrastructure in Economic Development of Punjab", *International Journal of Innovative Knowledge Concepts* 6, no. 5 (May 2018).

4 Biswa Nath Bhattacharyay and Madhurima Bhattacharyay, "Institutional Architecture for Financing Pan-Asian Infrastructure Connectivity" (Working Paper 6422, Center for Economic Studies and ifo Institute, Munich, 2017).

5 SADC, *SADC Regional Infrastructure Development*.

The central objectives of the infrastructure pillar in SADC's blueprint for regional integration – the Regional Indicative Strategic Development Plan (RISDP) – are to:[6]

- improve the capacity of cross-boundary infrastructure apparatus, services and networks to ensure that they are efficient, effective and integrated, to support and facilitate regional integration in SADC;
- identify and develop specific interventions in infrastructure development that will catalyse industrialisation front-loaded by the SADC Heads of State and Government Summit within the Revised RISDP 2015–2020;
- enhance access to infrastructure services that address poverty, climate change, unemployment and inequality; and
- reduce the cost of doing business in SADC through access to affordable, cost-efficient and seamless cross-border trade-carrying and -enabling infrastructure.

Regional infrastructure often lacks effective coordination mechanisms and regulatory harmonisation, with financing models that are difficult to execute simultaneously in multiple jurisdictions, making regional delivery much more challenging. For example, border posts create bottlenecks (because host countries do not want to accede border sovereignty) with the accompanying graft.

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SADC organs and institutions need up-to-date, detailed economic data to provide a clear sense of specific infrastructure gaps and requirements. In 2018, the African Development Bank (AfDB) estimated the continent's infrastructure needs at between $130 and $170 billion a year, with the projected gap in financing between $68 and $108 billion a year.[7] The African Economic Outlook 2021[8] notes that Africa suffered its worst recession in more than 50 years in 2020 due to the COVID-19 pandemic, leading to a gross domestic product (GDP) decline of 2.1%. GDP per capita is estimated to have contracted by 10% in nominal terms in 2020. Although African growth is expected to pick up to 3.4% again in 2021, the World Bank notes that the rate of recovery will depend on drawing up and implementing

6 SADC, "RISDP 2020–2030 Blueprints, 4th Draft" (SADC, Harare, March 2020).
7 African Development Bank, *African Economic Outlook, 2018* (Abidjan: AfDB, 2018).
8 AfDB, *African Economic Outlook, 2021* (Abidjan: AfDB, 2021).

the correct government policies aimed at inclusive, transformative economic growth with a strong focus on job creation.[9] This resonates persuasively with the need for greater anticipatory governance that will allow regional decision makers to register and track events that are barely visible at the horizon, tap into their ability to self-organise to deal with the unexpected and discontinuous, adjust rapidly to the interactions between current policies and complex emerging problems, and adopt collaborative and participatory processes and systems for exploring, envisioning, direction setting, and developing strategy and experimentation for a region.[10] However, the SADC Secretariat is not an implementer but a facilitator of policy and political agreements, with no teeth to exercise power over its members. SADC member states are only as strong as the secretariat and member states allow each other to be, for instance, in the adoption of the practical implications of anticipatory governance.

Disruptions in global value chains: Regional implications

The cost of the infrastructure deficit resulting from COVID-19 in SADC – with maintenance and new projects having been stopped – is still unclear. However, the deficit only increases each year that the necessary spending on maintenance and new infrastructure builds is not met.

The pandemic has brought global attention to the need for increased intra-regional trade to offset disruptions in global value chains across all sectors, including health products, pharmaceuticals and fast-moving consumer goods, especially during worldwide crises. In late 2019 China and the rest of Asia suffered the first wave of the pandemic, which spread globally, leading to business closures and supply chain interruptions. This led policymakers across the globe to seek greater economic self-sufficiency, as well as better national risk-mitigation tools. As a result, there has been a move away from the productivity gains achieved through globalisation towards a new form of protectionism – manifesting during the pandemic in additional non-tariff barriers (NTBs) and tighter cross-border trade conditions.[11]

BOX 1 ISSUES WITH REGIONAL PROJECTS

Political interference, even at the highest level, creates intractable challenges for regional projects. Sovereign- and self-interest often become greater than the motivation for regional cooperation and connectivity. As an example, the new Kazungula Bridge Project[a] is a multi-national infrastructure improvement programme on the North–South Corridor that includes a bridge over the Zambezi River linking

9 World Bank, "Amid Recession, Sub-Saharan Africa Poised for Recovery", Press Release, March 31, 2021.

10 Leon Fuerth, "Foresight and Anticipatory Governance", Foresight 11, no. 4 (2009): 14–32; Jose Ramos, Ida Uusikyla and Nguyen Tuan Luong, *Anticipatory Governance: A Primer* (Ha Noi: UN Development Programme, 2020).

11 Results of a study carried out by Tutwa Consulting Group for the SADC Business Council in 2021 highlighting the role of the private sector in the COVID-19 recovery.

BOX 1 ISSUES WITH REGIONAL PROJECTS (CONT'D)

Botswana and Zambia that replaces the existing ferry, and a one-stop border facility at Kazungula. The project, valued at about $260 million, is co-financed by the AfDB, the Japan International Cooperation Agency, regional governments and the EU–Africa Infrastructure Trust Fund.[b]

The bridge – shaped like an overstretched half-moon – was designed to incorporate Namibian territory and avoid Zimbabwe, given former president Robert Mugabe's refusal to allow the bridge to cross any part of the country.[c] While Zimbabwe had initially opted out of the project under the Mugabe administration, President Emmerson Mnangagwa's late involvement can be seen as a regional integration accomplishment at the highest national level.

Regional cooperation is especially needed in a global crisis, as relationships with global powers are re-established. While external investors in regional infrastructure, such as China, may add significant value, there is growing evidence and concern that foreign investors' motivations are not always geared to supporting intra-African cooperation.[d]

Some regional African countries tend to be ambivalent about concessional infrastructure projects that are built according to the demands of – and/or with conditionalities attached by – bilateral or multilateral partners. SADC has had its share of negative experiences with foreign-built infrastructure. While in previous centuries European powers were guilty of supporting infrastructure designed mainly to access Africa's raw materials, more recently this accusation has been levelled at China. Between 2009 and 2015, several Chinese-built infrastructure projects in Botswana faced long delays, while Angola and Mozambique consistently complain about the quality of road infrastructure.

a Launched on May 10, 2021.

b AfDB, "Multinational: Kazungula Bridge Project".

c "Mnangagwa Humiliated as Botswana Refutes Claim that Zimbabwe Co-Owns Kazungula Bridge", *The Zimbabwean*, May 11, 2021.

d Peter Konijn, "Chinese Resources-for-Infrastructure Swaps: An Escape from the Resource Curse?" (Occasional Paper 201, South African Institute for International Affairs, Johannesburg, 2014); Thapelo Ndlovu, "China's African Ambitions Stumble in Botswana", *Aljazeera*, September 18, 2014.

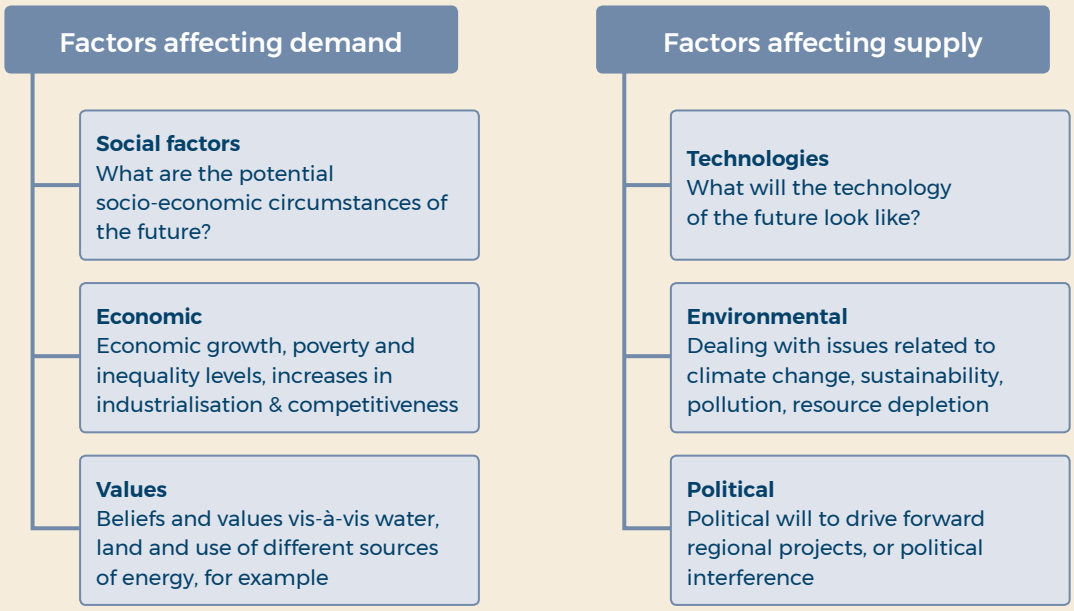
SADC infrastructure: High-impact uncertainties

In a rapidly changing, complex world where crises occur with regularity, there are weighty uncertainties that shape future markets, governments and governance, as well as social and economic values. These factors, and how they are addressed, have a profound effect on systems and organisations, as well as their capacity to deliver on their objectives.

In relation to understanding what future infrastructure challenges may bring, a UN Environmental Programme (UNEP) model advances a useful global framework for presenting uncertainties within infrastructure design and development processes. These include project selection, design, procurement, deployment, and financing decisions relating to low-emission, resilient infrastructure – all of which are key considerations that can improve the infrastructure landscape in SADC.

A STEEPV[12] framework is the preferred model for this futures analysis and is represented in Figure 1 with relevance for SADC. A This six-tiered approach is taken to reflect on the factors affecting future infrastructure demand and supply. On the infrastructure-demand side, different social and economic values and regional belief contexts are considered across countries at various development stages. On the supply side, the factors affecting the future of infrastructure are: technological developments accompanied by evolution of business models, and financial approaches, the environment and political will.

Figure 1 STEEPV framework for infrastructure futures planning



Source: Adaptation of UN Environmental Programme, "Financing Climate Futures: Rethinking Infrastructure – Shifting the Lens" (Interim Briefing, UNEP, Nairobi, September 2018), using a STEEPV analysis

12 Social, Technological, Economic, Environmental/Ecological, Political and Value-based (STEEPV) analyses are future-oriented and consider possible future factors of change and developments in a broader thematic context.

Within the STEEPV analysis, a series of challenges are consistently noted in the region. A recent study of the SADC economic environment[13] identified several of these (noted below), with recommendations for a post-pandemic economic recovery.

Socio-economic transformation for SADC (and African) infrastructure?

SADC countries include small, isolated island states, several landlocked states, a mix of low- and middle-income countries, and larger economies. The region's economic geography – 16 relatively small and non-complementary markets, with NTBs frustrating cross-border movements into neighbouring states – emphasises the need for integrated infrastructure for a larger, stronger economic market for the socio-economic development of its citizens.

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Moreover, climate resilience is a necessity for SADC economies plagued by long periods of drought, interrupted by episodes of storms and flooding.[14] The region needs to transform the way in which infrastructure is viewed and pursued. The networked nature of infrastructure assets must be emphasised for a more resilient SADC that relies more on regional economies than on international partners. This requires new approaches to blended financing, emphasising domestic (and regional) mobilisation of financial resources. Several financing techniques and models have emerged within the past decade, including infrastructure asset recycling. This concept has been adapted and innovated in several developing-country contexts and could offer interesting opportunities for Africa.

Clearly, trust in regional partners, including among SADC member states, international partners and the private sector is an important area element that must continually be fostered through ongoing dialogue, followed by practical steps to implementation.

In SADC, as highlighted by the current pandemic, clean drinking water and better sanitation services can help to limit the spread of infectious diseases. Reliable electricity is essential in medical services. Moreover, improved transport and digital communications infrastructure that supports the trade in essential goods and services is required. The speed and efficiency with which these infrastructure networks can be rolled out to support SADC

13 Tutwa Consulting Group, *Business Challenges and Recommendations to Stimulate Post COVID-19 Trade in SADC*, Report (Johannesburg: Tutwa Consulting Group, May 2021).

14 SADC Secretariat, "SADC Climate Change Strategy and Action Plan" (SADC, Harare, July 24, 2015).

recovery from the health and economic crisis remain key high-impact uncertainties in its infrastructure future.

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In terms of African demographics, 28 countries doubled their population between 1990 and 2015, and another 26 countries will double their population between 2017 and 2050. The African population is expected to grow to over 2 billion before 2040 – making up about 50% of the worldwide increase by that year. This implies that the current state of infrastructure in Africa (and SADC) will not be able to satisfy growing demands, or the development objectives set out in the AU's Agenda 2063.[15] The ability of governments to deal with SADC's population growth thus represents a driver of change.

International organisations and development finance institutions (DFIs)[16] recommend that Africa build infrastructure that is resilient to climate change to tackle its rapidly urbanising population. Over 40% of the population of sub-Saharan Africa live in cities, and this is expected to grow to 60% by 2050.[17] Urbanisation puts pressure on quality drinking water and sanitation services. Droughts and changing rainfall patterns also place a burden on food and energy security – especially for countries relying on hydro-energy (eg, Lesotho, Zambia, Zimbabwe and Mozambique).

SADC economies' coal-driven mining and industry are, in turn, heavily reliant on water. Africa's economic growth and infrastructure development needs will impact its energy demands – projected to rise by an additional 60% to around 1 320 million tonnes of oil equivalent in 2040,[18] based on the policies and plans currently in place. These plans will leave over half a billion people on the continent without access to electricity in 2030, falling well short of the Sustainable Development Goal (SDG) targets.

The *Africa Energy Outlook 2019* report[19] notes that existing policies and plans for investment will not meet Africa's energy needs. About 600 million Africans have no access to electricity and 900 million lack access to clean cooking facilities. Nonetheless, with

15 OECD and African Center for Economic Transformation, *Quality Infrastructure in 21st Century Africa: Prioritising, Accelerating and Scaling up in the Context of PIDA (2021–30)* (Paris: OECD/ACET, 2020).

16 OECD and ACET, *Quality Infrastructure in 21st Century*; World Bank, "Changing the Environmental Trajectory to Build Sustainable Cities in Africa", June 1, 2017.

17 OECD, "Water Security and Megatrends in African Cities", in *Water Governance in African Cities* (Paris: OECD, 2021).

18 International Energy Agency, "Africa's Energy Future Matters for the World" (Paris: IEA, 2019).

19 IEA, *Africa Energy Outlook 2019*, Report (Paris: IEA, 2019).

the correct policies, political will and policy implementation, Africa could reach its energy development targets – and do so mainly using modern (clean) energy sources. By 2040 African countries 'could meet the energy demands of an economy four times larger than today's with only 50% more energy'.[20]

Africa's Digital Transformation Strategy (2020–2030) was adopted by the AU in February 2020, with the specific aim to create a harmonised regulatory environment to guarantee investment and financing to close the digital infrastructure gap. The strategy targets the provision of affordable and secure broadband to 300 million African citizens by 2025.[21] The appropriate and timely rollout and application of technology remains a key high-impact uncertainty.

Assessing the key high-impact uncertainties in SADC infrastructure

To understand SADC's infrastructure deficit from a foresight perspective,[22] it is important to note that there are several outcomes for which one should prepare. SADC is currently at a critical inflection point where the region faces huge socio-economic challenges, but also various opportunities. The COVID-19 pandemic has accelerated the global transition to renewable energy by as much as five years, hinged on stimulus packages and economic diversification imperatives.[23] In addition, the health crisis has precipitated close consideration of enhanced domestic manufacturing capacity of medicine and personal protective equipment, with a potential impact on local industrialisation. Table 1 considers the key high-impact uncertainties in relation to the factors informing them.

SADC is currently at a critical inflection point where the region faces huge socio-economic challenges, but also various opportunities

Alternative futures for SADC infrastructure

Two years after the outbreak of the COVID-19 pandemic, SADC may be poised for a transformation in its infrastructure development trajectory towards better planning, proper

20 IEA, "Africa's Energy Future Matters for the World", Press Release, November 7, 2019.

21 International Telecommunication Union and UN Educational, Scientific and Cultural Organization, *State of Broadband Report 2020* (Geneva: ITU and UNESCO, 2020).

22 Foresight has been defined as "a systematic, participatory, future-intelligence- gathering and medium-to-long-term vision-building process aimed at enabling present-day decisions and mobilizing joint action". See I Miles, P Saritas and A Sokolov, *Foresight for Science, Technology and Innovation* (Cham: Springer Nature, 2016), 12.

23 Pedro Omontuemhen, *PwC Africa Oil & Gas Review 2020* (Lagos: PwC, 2020).

policy implementation and cleaner, greener infrastructure options – if the right options are considered and the appropriate decisions taken.

TABLE 1 POTENTIAL APPLICATION OF 4IR IN DRIVING TRANSFORMATION

High-impact key uncertainties	Informed by STEEPV conditions
Correct policy, policy implementation and political will	**Political** • Dominant ideology and opposition politics, political will versus political interference • Level of commitment to real reform and extent to which the administration will drive its implementation
The African Continental Free Trade Area (AfCFTA) bringing an end to NTBs' frustrating cross-border movement in intra-African trade	**Political** • Reluctance from policymakers to accede sovereign power to a regional or continental framework and who are averse to having 'foreign' products take over their domestic markets, or willingness to see the development of a regional market rather than national markets
Climate change resilience, energy demand and security, speed of just and sustainable transition to gleaner, greener energy Appropriate and timely rollout and application of digital technology to address digital, information and skills gaps	**Environmental** • SDGs and new priorities in the wake of COVID-19: inclusive growth, economic transformation with greener and more resilient infrastructure emphasising digitally accessible services **Technological** • Adopting 3D printing, new fuels (hydrogen and liquefied natural gas, or LNG) and new materials (such as cement alternatives), blockchain, 5D project planning, renewable energy storage and automation • Technology could result in unequal development, eg, if digitisation is further emphasised, more inequality could result
Population growth, speed of urbanisation, resulting informal settlements, possible gentrification	**Demographics** • Population growth trends • Urbanisation effect on the urban–rural interaction • Impact of the COVID-19 pandemic on poverty, inequality, ageing versus youthful population, resources for skills development • Development of reticulation systems • Upgrading of urban settlements
Business-friendly environment and attractiveness to foreign investors Post-pandemic recovery – building back better	**Political** • Policy reform and implementation will influence the COVID-19 recovery Anticipatory innovative governance, and proper implementation of well-thought-out policies • Support for private sector development of infrastructure, intra-SADC trade, African and international trade, foreign direct investment, industrialisation, social and environmental policy priorities

Adaptability to new financing models where domestic financing is emphasised to attract the local private sector and maximise local currency debt	**Financing** • Domestic resource mobilisation through, inter alia, effective fiscal management • Governments fund projects, with 'user pays' principle under pressure • Multilateral development banks and international financial institutions (IFIs) leverage private sector through blending • Partnerships become important
Business models in infrastructure – what will the post-pandemic effect be on partnerships?	**Values** • Will innovative public–private partnerships (PPPs) take hold in the post-pandemic phase? • This depends, in part, on the relationships and trust among potential partners in the government and non-state sectors

Source: Compiled by authors

What does a preferred future for infrastructure look like in SADC? Global insights

According to the Global Infrastructure Hub (GI Hub), a more resilient infrastructure future depends on governments' focussing 'on transformative outcomes in creating and implementing stimulus packages that rely on infrastructure'.[24]

The joint Organisation for Economic Co-operation and Development, World Bank and UNEP model[25] sets out an agenda for a low-carbon, resilient economic transformation where governments, the private sector and civil society play their designated roles in overall infrastructure development. The plan goes beyond just an incremental approach to addressing climate challenges and keeping to national policy commitments. Instead, it pursues an authentic change process in infrastructure development. It also acknowledges the importance of planning, innovation, budgeting, adequate financial systems, urban development and a holistic, systems approach to this transformation.[26]

The IMF recommends that, in the recovery from the pandemic,[27]

> policy efforts can focus more on building resilient, inclusive, and greener economies, both to bolster the recovery and to raise potential output … [P]riorities should include investing in green infrastructure to help mitigate climate change, strengthening social assistance and social insurance to arrest rising inequality,

24 Global Infrastructure Hub, "Building Back Better – What Does a Resilient Future Look Like for Infrastructure?", Blog, April 9, 2021.
25 OECD, World Bank and UN Environment, *Financing Climate Futures: Rethinking Infrastructure* (Paris: OECD Publishing, 2018).
26 This is an approach that considers a system in its entirety, instead of just focusing on specific properties or components. Here, significant cultural shifts are required in education, training, business, government and economic models.
27 International Monetary Fund, *World Economic Outlook: Managing Divergent Recoveries*, Report (Washington DC: IMF, April 2021).

introducing initiatives to boost productive capacity and adapt to a more digitalized economy, and resolving debt overhangs.

In SADC, transformative infrastructure should stimulate economic growth, thereby delivering employment and an economically, socially and environmentally sustainable recovery from the COVID-19 crisis. Infrastructure investment has a high potential multiplier effect on GDP and a long-term impact on raising productivity. In its research, the GI Hub found that the fiscal multiplier of public investment has generally been higher in the contractionary phase of the business cycle, particularly when interest rates have been low.[28] Through this current recessionary phase, the economic scene is set for greater government investment in infrastructure. The question is how to achieve transformative infrastructure outcomes in the region now, when many of the economic conditions for a multiplier impact have been in place in previous years, and where the region has endured other health, environmental and economic crises.

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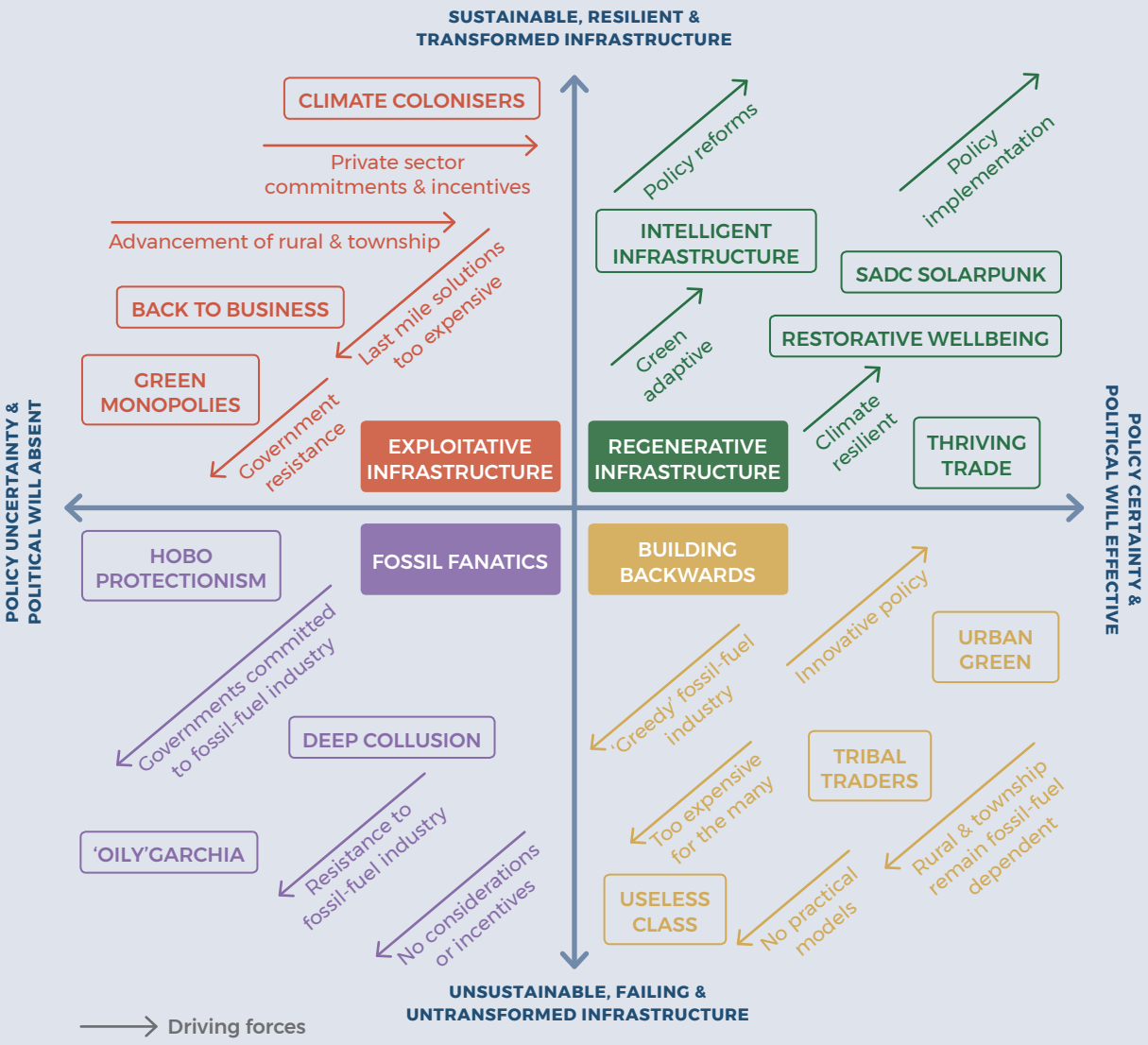
The study employed a 2x2 uncertainty matrix scenario method to enable better anticipation of opportunities and challenges that could emerge in the future, while seeking policy innovations to spur new thinking about the best policies and alternative futures and stress-testing existing or proposed strategies. Multiple scenarios are set out considering future options for embracing or rejecting transformative, inclusive, sustainable and resilient infrastructure with or without good policies, partnerships or new financing models.

Figure 2 sketches the SADC infrastructure scenarios. The scenario space presents potential SADC infrastructure pathways that are briefly unpacked according to desirable, undesirable and other plausible futures.

28 IMF, *World Economic Outlook*.

Figure 2 Probable SADC infrastructure scenarios



Source: Compiled by authors

Desirable futures

SADC Solarpunk

Policy reforms support a movement for change to achieve sustainable civilisation for the peoples of the South. The SADC Solarpunk movement[29] for change sweeps across

29 Solarpunk can be understood as a movement of imaginary speculation that seeks to awaken and deepen the ecological sensitivity of the individual and then expand into society through individual and collective actions. Solarpunks seek to collaborate in the creation of greater cultural and social awareness on problems that are certainly real: discrimination, social injustice, climate change, unbridled consumerism and uncontrolled exploitation of the planet's natural resources. Four aspects of Solarpunk include an eye toward decentralisation, a focus on ecological awareness, a long-term approach to design, and a merger of the practical with the beautiful. Stephen Gosset, "Solarpunk Is a Tumblr Vibe. It's Also a Practical Movement", Builtin.com, November 2, 2021.

Southern Africa by adopting comfortable lifestyle solutions without fossil fuels, while equitably managing scarcity and sharing in the abundance of nature by finding kindness in our common humanity. These reforms are enacted through regional member states acting responsibly towards the common good and in respect of the biosphere and ecosystems services. Wilful political decision-making creates regional climate policy certainty that leads to effective implementation of green infrastructure developments. The movement for change implements sustainable and climate-resilient infrastructure policy that brings about infrastructure transformation. Governments and the private sector partner on projects aimed at inclusive, low-carbon, green alternatives that adapt to changing socio-economic conditions.

Intelligent infrastructure

Fossil technologies are displaced by green technology, with government agencies, research institutions and private companies forming regional Triple Helix models for innovation. Concurrently, new spectrum offerings and broadband are released introducing artificial intelligence, Internet of Things, 3D printing and 5D planning for infrastructure governance applied to connecting national and regional infrastructure networks. High-tech initiatives deliver developments for climate-resilient and ICT-enabled infrastructure, making it possible to intensify efforts to mitigate climate change (eg, LNG, initially used for industrialisation and infrastructure, is overtaken by renewables). Citizens, governments and the private sector become users and beneficiaries of the data exchanged through these technologies, with clear monitoring and evaluation (M&E) systems for continuous improvement. High-tech initiatives deliver modern infrastructure, mitigating the effects of climate change. LNG is eventually replaced by renewables. New technology-based infrastructure assets support infrastructure, manufacturing and services in an integrated, fast-developing region.

Restorative wellbeing

Infrastructure is understood as being decolonised beyond the conventional provision of roads, bridges, buildings, power generation plants, and more. Through the espousal of novel partnerships and strengthened collaborations, innovative financing is fostered and enacted that allows for deeper engagement beyond physical infrastructure. The recognition of distinct yet mutually reinforcing and overlapping infrastructure types (physical, social, participatory, democratic, digital and economic) releases member states' fiscal constraints. At the same time, the crowding-in of domestic and international private finance allows an influx of investments seeking restorative wellbeing infrastructure. DFIs, IFIs and private domestic financiers help governments seek best-practice technical and financial solutions to projects. Clear, transparent tender processes result in **effective and efficient** PPPs that offer de-risking and value for money. Innovative and blended financing, including infrastructure bonds, development impact bonds, commodity-backed bonds and pension funds, is considered and used appropriately. Appropriate application of infrastructure asset recycling is undertaken in the African context. Credit guarantees are made available to entice investors in infrastructure programmes and governments recover revenues through better financing models.

Thriving trade

Member state governments, partners and business identify and assess risks to manage the consequences of COVID-19 regionally. Coordinated efforts by finance ministries and national and local governments incorporate the management of non-tariff barriers, including customs, physical and administrative infrastructure. SADC governments recognise the importance of regional trading and begin breaking down barriers. Responsiveness to and agility in the face of ongoing changes in infrastructure projects resilient to future crises, eg, social distancing and natural ventilation, are among the new requirements in infrastructure builds.

Undesirable futures

Oily-garchia[30]

There is two-stage resistance to reform by both governments and existing owners of fossil-based infrastructure (petrochemical industry, multinational oil corporations and oil lobbies). This leaves the region dominated by oligarchic power structures and bought fossil-fuel industry politicians. SADC member states with large coal and oil deposits justify further exploitation of these resources to grow their economies, just like developed countries (former colonisers) used fossil-fuel technologies to power their development. No consideration is given to climate commitments, agenda or green technologies and their use in last-mile, off-grid solutions for distant townships and rural areas. This is because of their perceived high cost, access challenges and intellectual property and manufacturing rights' mainly being situated in developed countries. Member states fear long-term dependency on developed nations in the adoption of green technologies. Political will is absent and there are no incentives or momentum to move from fossil-powered, untransformed infrastructure to sustainable climate-resilient infrastructure.

Tribal traders

SADC governments and consumers consider the new infrastructure technologies as being prohibitively expensive. Planning, maintenance and budgeting systems for regional first-generation infrastructure are not well coordinated at national or regional levels and result in crumbling infrastructure. Governance systems fail, are not attuned to regular M&E reporting and are insensitive to the need for new climate-friendly technologies and enabling infrastructure. Education systems are stuck in a cycle of educating for jobs appropriate to previous industrial revolutions, thereby rejecting new-generation technologies and digitisation as part of the curriculum. Citizens of the South take trading into their own hands to overcome aging infrastructure. Long-distance travel regionally becomes cumbersome and expensive. There is a sharp decline in the diversity of goods and local production and services. This leads to conflict over the shortage of goods and resources, and

30 The blend of oligarchs and oil robber barons.

local and regional strongmen emerge, giving rise to tribal trading. Those with the means to travel and trade enable tribal leaders and reinforce the state of disrepair and desperation.

Hobo protectionism

A sluggish post-COVID-19 recovery leaves SADC infrastructure developments untransformed. Non-tariff barriers are not prioritised and remain stubbornly in place. Regional trade suffers from inadequate infrastructure and bureaucratic processes at borders. There is reduced economic activity owing to a slow recovery after the health, environmental and economic crises. More local and international businesses close because of low demand. Member states and citizens are left to fend for themselves, and many member states adopt protectionist policies to prevent economic refugees from entering pockets of growth with employment potential. A hobo protectionist mentality is adopted among regional political decision makers to protect the little they have while growing their insider interests. Workers try to migrate and seek temporary work, but are blocked at borders. Short-sighted politicians try to develop and foster domestic industries, but capacity constraints reinforce regional poverty. Politicians promote domestic trade, patriotism and nationalism, rather than working with other member states to overcome the multiple infrastructure development crises.

Deep collusion

A sluggish post-COVID-19 recovery leaves infrastructure developments untransformed through various state-capture strategies. Politicians collude with corrupt individuals and sophisticated organisations to create patronage networks by selling access to state infrastructure development. Inadequate infrastructure is upgraded with new technologies and never-ending, budget-ballooning projects, at a huge cost to the public purse. These are facilitated through carefully curated illegal tender handouts in the name of sidestepping bureaucratic processes to increase economic activity and recovery to overcome several crises. Regional democracies and institutions are weakened through corrupt rackets and predatory power-accumulation activities. These activities include[31]

- manipulating procurement to extract and control rents;
- weakening accountability by repurposing law enforcement;
- changing and implementing shadow state-friendly policy and regulations;
- securing control of the public purse;
- capturing parliaments and oversight institutions; and
- controlling narratives through the media to drive misinformation and so maintain legitimacy and enable and protect patronage networks.

31 Ivor Chipkin et al., *Shadow State: The Politics of State Capture* (Johannesburg: Wits University Press, 2018).

There is strong political will for corrupt activities, but political will and policy certainty is intentionally absent to build truly sustainable and transformed infrastructure. The illusion of steps towards sustainable and resilient infrastructure is created, but the sole purpose is to secure networks of patronage by any means necessary, eg, greenwashing, carbon washing, etc. Infrastructure assets are in the hands of shadow state actors.

Other plausible futures

Back to business

Governments resist the shift away from old-technology economic infrastructure assets to sustainable, climate-resilient infrastructure technologies. There are low levels of policy reform and political will, which leave the private sector and citizens to develop decentralised infrastructure solutions such as green, off-grid energy and new technology water and sanitation models. The private sector drives practical models to reach distant townships and rural areas, while governments resist development because the cost of last-mile solutions is prohibitive. SADC member-state citizens flock to flourishing regions where corporations become quasi-state actors, while infrastructure developments lead to improved regional trade and inter-connectivity.

Climate colonisers

New technologies with falling costs disrupt coal-intensive infrastructure. Unfortunately, processes are not institutionalised, and there is inadequate or weak governance to manage these innovations at various levels, eg, intellectual property and patents. New innovations, products and models are rolled out by climate-conscious oligarchs in isolation without overarching policy, regulatory, governance and institutional frameworks, thereby creating monopolies. The multi-billionaires believe the natural world can be bent to accommodate humanity's existing behaviour and are obsessed with doing the bending towards a net-zero-carbon-emitting, climate-safe world. This is done through sheer will, access to power and staggering financial excesses. These climate colonisers' sole ambition is to maintain power and financial control through the continued use of fossil fuels, but in safe new ways, or by extracting energy from other planets. As a result, new technology costs do not reduce concurrently, competition is unequal and consumers do not benefit. Digital technology is applied unequally to benefit elite educational institutions and other benefactors, with little regard to the poor and marginalised. New technological developments help to drive better designed infrastructure assets, but M&E systems do not exist because they are in the hands of oligarchs who hold more political power than many individual SADC member states. The unencumbered oligarchs take de facto control of infrastructure assets due to weak regional and national institutional guidance and governance.

Urban green

In this future, owners of fossil-powered infrastructure refuse to relinquish control, despite government efforts to transform through policy reform. There is no adoption of practical models to develop sustainable climate-resilient infrastructure that will reach distant townships and rural areas due to prohibitive costs. Governments promote innovative, green, off-grid energy and water and sanitation, but citizens and private players consider these too expensive. This leads to urban infrastructure development and the adoption of green technologies that attracts citizens to these areas, leaving distant townships in squalor and rural areas marginalised.

Useless class

Certain SADC member state governments and institutions consider workarounds to use new technologies, despite resistance and their prohibitive costs. National and regional infrastructure planning and budgeting systems align, despite adherence to first-generation infrastructure. Governance systems provide regular M&E reporting to maintain and improve infrastructure. However, there is no emphasis on new technology and digitisation skills development. Education systems emphasise old but effective curriculum approaches, and reject or fail to implement new economy skills development such as digital modalities, green skills coupled with creativity, complex problem solving, people management and critical thinking skills to match new industry skills requirements. This leads to massive unemployment. There is a high supply of old-economy jobs and skills, but employers have little need for the traditional workforce. Various developments such as business model innovation, robotics, artificial and machine intelligence, and a bio-technological revolution tip the scales towards human-level artificial general intelligence robotics. Corporations employ robots that can accomplish any general cognitive task at least as well as humans, leaving governments with a useless class of workers.

Green monopolies

Member state governments, international cooperating partners and the private sector adopt the transformative 'build forward better' approach. Sustainable and resilient infrastructure development is fostered at national and regional level. This enables transformation in infrastructure projects, making them more resilient to future crises. Yet, infrastructure development does not benefit rural and marginalised communities, and technological know-how remains in the hands of a few monopolistic green economy corporations in the global North. Regional trade remains lacklustre and opportunities to produce and manufacture infrastructure goods with strong local content do not improve the livelihoods of SADC member states. This results in increasing NTBs that are prioritised by government agencies due to fears of fiscal reduction. The maintenance and continual adoption of climate-resilient infrastructure is controlled by green monopolies with little regard to local job creation, management know-how and intellectual property transfer, thus leaving the region beholden to international actors.

Recommendations: Pathways to desired SADC infrastructure

There is a clear need to reverse the trend away from the self-interests of leaders and national protectionism exacerbated across Africa by COVID-19. By focusing on greater regional interconnectedness and regional competitiveness, SADC should improve its ability to grow resilience and preparedness for future global shocks. Regional trading and value chains should be encouraged, whereas dialogue and trust – both between and among member state governments and regional business – are vital. The AfCFTA presents a unique opportunity for intra-regional and intra-African collaboration on NTB elimination, including the development of connective infrastructure.

By focusing on greater regional interconnectedness and regional competitiveness, SADC should improve its ability to grow resilience and preparedness for future global shocks

The growth of Africa's youthful population, the speed of urbanisation in SADC (and across Africa) and the resulting informal settlements in SADC centres will continue to place a crushing burden on governments, if they are left to develop the requisite infrastructure on their own. SADC governments, partners and the private sector must develop joint solutions to current lacklustre economic performance. They should actively develop and support job-creation opportunities in sustainable, transformative infrastructure programmes to manage the dire socio-economic consequences of COVID-19.

Governments must foster anticipatory innovative governance by being more proactive in their planning and budgeting, and by creating a transparent environment for regional problem-solving. Policy reform and implementation should focus on transformative, inclusive infrastructure financing and development. Innovations in infrastructure financing should explore blending solutions, where pilots are attempted first on smaller projects and then scaled up. As highlighted during the pandemic, inclusive digital transformation is a regional and global imperative. If access to digital infrastructure and information is not universal, socio-economic problems such as poverty, inequality and unemployment will only be compounded.

SADC governments can no longer be held solely responsible for infrastructure funding and development.

SADC governments, partners and the private sector should actively develop and support job-creation opportunities in sustainable, transformative infrastructure programmes to manage the dire socio-economic consequences of COVID-19

The requirement for transformative, resilient and responsive infrastructure has been underlined by the COVID-19 pandemic. Antiquated, fossil-powered and non-transformative infrastructure programmes will reinforce the problems of the past. Human settlements must be planned holistically to ensure that households are served with acceptable requirements for, inter alia, shelter, water and sanitation, access to electricity, safe and affordable transport, and access to economic opportunities.

Building anticipatory innovation in SADC infrastructure governance

The COVID-19 pandemic and the associated economic crisis have laid bare how intricately linked the social infrastructure sectors are with the region's economic infrastructure. The complex linkages between, for instance, health, housing and education, and water and sanitation, transport systems and digital communication have revealed structural weaknesses in the SADC economies. Without greatly improved and more proactive planning, reform and implementation, SADC governments and institutions will always be at risk of catastrophic events – whether health crises or economic and financial crises.

There is a need to operationalise anticipatory governance, which involves reflecting and acting on early signals and inputs barely visible on the horizon. It is also crucial to adjust rapidly to unexpected and complex emerging problems while developing proactive strategies and experiments – well before the irrevocable decision to execute necessary changes. Anticipatory governance enables use of foresight, networks and feedback systems to experiment with potential strategic activities. Such activities may help to shape regional responses to governance structures to reduce risk and increase capacity to respond by harnessing collective intelligence to better use the future in a complex environment.[32]

Anticipatory innovation in governance does not prevent a crisis from occurring. It does, however, provide the institutions and individuals responsible for managing the economy out of the crisis (ie, governments and their officials) with the ability to explore possibilities

32 OECD, *Public Value in Public Service Transformation: Working with Change* (Paris: OECD, 2019).

and experiment with future scenarios. This relies on officials actively learning from changing conditions, anticipating what future the changes will bring about, and preparing policy positions and implementation to secure a future where infrastructure is more responsive to citizens' needs.

SADC member states, as a regional bloc, can select a route towards a more sustainable, more resilient future. The 16 countries could together embark on a process to strengthen the networks that bind them – roads, rail, ICT, energy and waterways

It has always been a pan-African aspiration that regional blocs develop and strengthen to ensure a stronger continent. SADC member states, as a regional bloc, can select a route towards a more sustainable, more resilient future. The 16 countries could together embark on a process to strengthen the networks that bind them – roads, rail, ICT, energy and waterways. Stronger infrastructure links should inevitably bring more robust regional trade and harmonised approaches to the manufacture, procurement and distribution of goods (where pharmaceuticals are especially significant in a health crisis), among others. By focusing on these pathways towards regional cooperation, each participating member state can expect to benefit economically – as will the region.

In the short to medium term, significant (new and existing) challenges will arise, as set out in the scenarios above. The options that SADC leaders and key stakeholders select will determine whether and to what extent our future is different from the past, or simply more of the same.

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Cover image

Workers adjust the new standard gauge railway line under construction from Iju in Lagos to Abeokuta, Ogun State in southwest Nigeria, 2019. The passenger train service is designed to boost economic activities and ease movement of passengers by rail from Lagos to Abeokuta (Pius Utomi Ekpei/AFP via Getty Images)

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