

South Africa

Digital Economy Diagnostic

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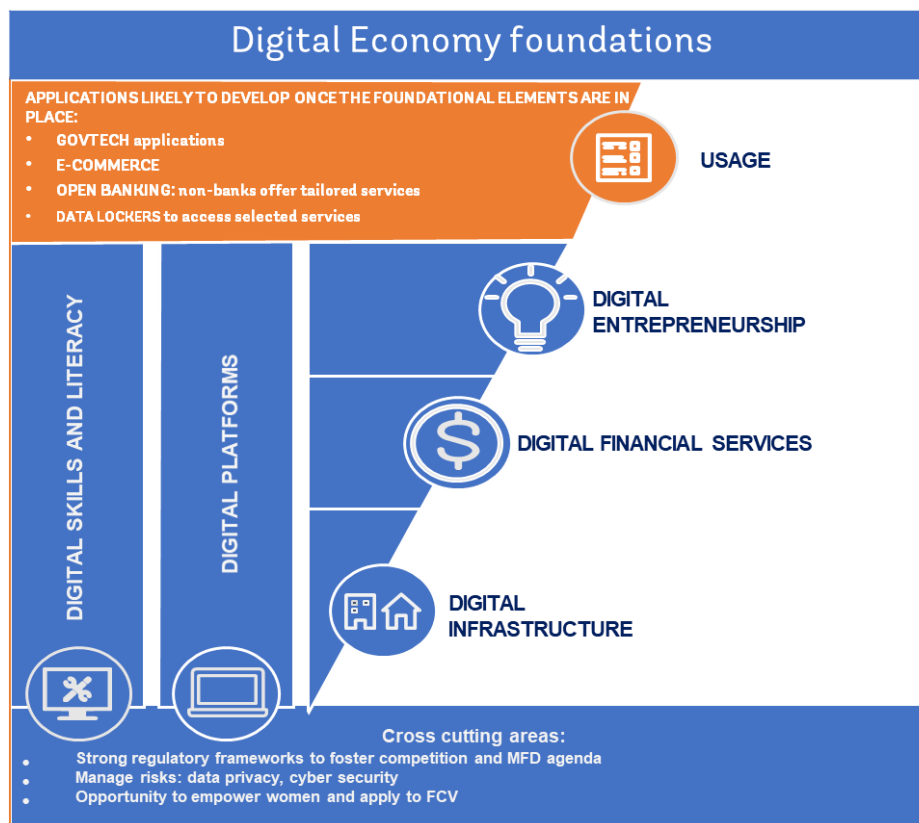
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ABOUT THE DE4A

This assessment of South Africa’s digital economy development has been launched as part of the World Bank Group’s (WBG) Digital Economy for Africa Initiative (DE4A), launched in 2018 through a collaboration between the African Union and the World Bank Group. The initiative aims to ensure that every individual, business and government in Africa will be digitally enabled by 2030. The related diagnostic framework is based on a standardized methodology focused on five key foundations. In South Africa, the DE4A builds on the ICT deep dive carried out in the WBG Country Private Sector Diagnostic, the results of the advisory work on ICT regulation by the WBG competition team, and the next steps agreed between the WBG and government at the Digital Economy workshop held in Pretoria in November 2018. The assessment maps the strengths and weaknesses that characterize the national digital economy ecosystem (See Figure 1) and identifies challenges and opportunities for future growth.

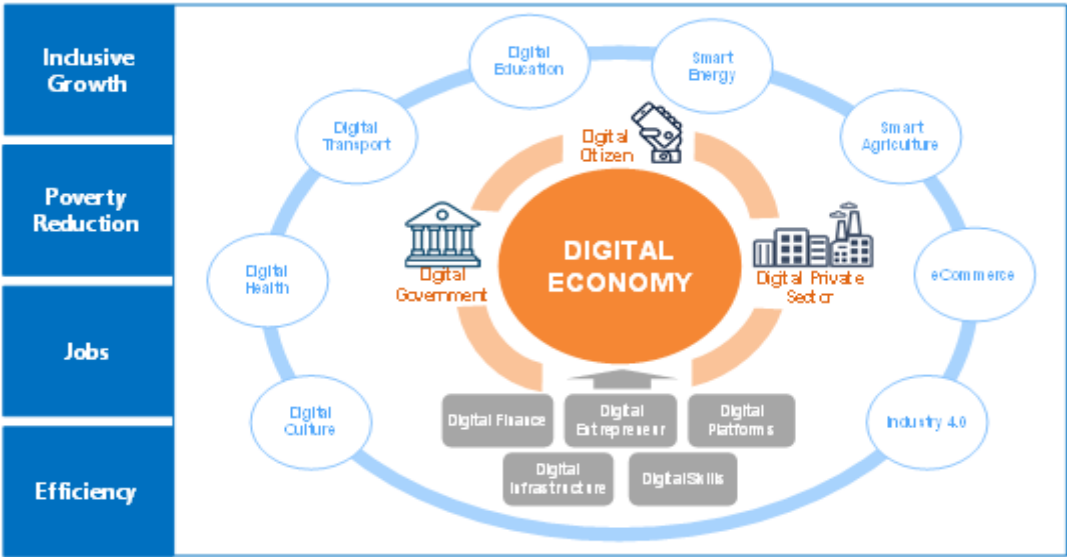
Figure 1: Five key foundations of the digital economy ecosystem



The digital transformation is reshaping our global economy, permeating every sector and aspect of daily life – changing the way we learn, work, trade, socialize, access public and private services and information (Figure 2). In 2016, the global digital economy was worth some \$11.5 trillion – equivalent to 15.5 percent of the world’s overall GDP. It is expected to reach 25 percent in less than a decade, quickly outpacing the growth of the overall economy. However, countries like South Africa are still currently only capturing only a fraction of this growth and need to strategically invest in the foundational elements of their digital economy to keep pace.

Universal adoption and effective application of digital technology is expected to characterize economies of the future, shaping their ability to succeed in the global marketplace and offer a better quality of life for their citizens. Disruptive technologies are already altering traditional business models and pathways to development, yielding significant efficiency and productivity gains, increased convenience, as well as supporting better access to services for consumers. Well-functioning digital economies thus may offer potential to achieve faster economic growth, offer innovative products and services, as well as create more job opportunities. The disruptive technologies coming onto the market also carry risks that need to be managed and mitigated, for example, job losses in industries affected by structural change and automation. Assessing where strategic investments and interventions need to be made is a critical first step to enabling digital economy growth.

Figure 2: The digital economy can bring shared prosperity and reduced poverty

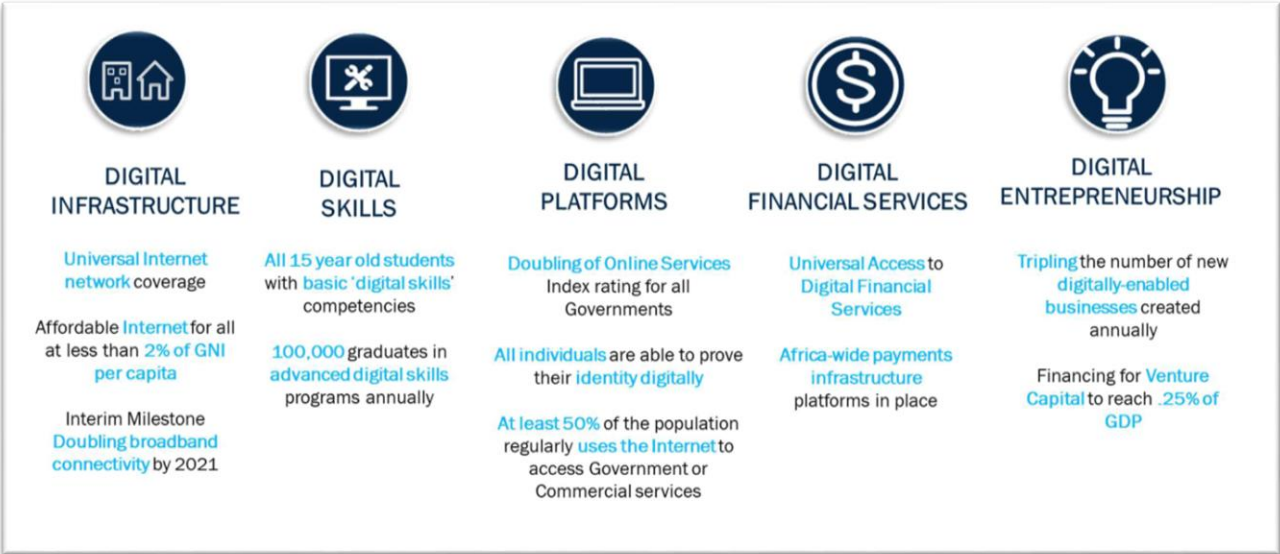


The framework that shapes the assessment looks at five foundational elements of the digital economy:

- Digital Infrastructure: the availability of affordable and quality internet, which is instrumental to bringing more people and businesses online.
- Digital Public Platforms: the presence and use of digital platforms that can support greater digital exchange, transactions and access to public services online.
- Digital Financial Services: the ability to pay, save, borrow, and invest through digital means, which is key to financial inclusion and increasing the e-commerce market.
- Digital Entrepreneurship: the presence of an ecosystem that supports entrepreneurs, startups and bigger companies to generate new products and services that leverage new technologies and business models, including private platforms, which is critical to widen and deepen digital economic transformation.
- Digital Skills: the development of a tech-savvy workforce, with both the basic and advanced digital skills to support increased technology adoption and innovation and enable investments in high value-added services.

This report aims to highlight opportunities to further develop South Africa’s digital economy with a special focus on policies that can bridge the digital divide and help South Africa achieve the DE4A targets. As discussed in the recent SCD, the legacy of exclusion presents unique challenges in South Africa, and this is true also in the digital space. Based on quantitative and qualitative assessments, and a series of more in-depth background papers on four of the DE4A’s five pillars (digital infrastructure, digital skills, digital entrepreneurship and digital financial services), the diagnostic findings provide recommendations that inform country targets and decisions on priority areas for development, proposing a mix of possible policy reforms and interventions.

Figure 3: The Africa-wide proposed DE4A targets across the five pillars of the digital economy



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LIST OF ACRONYMS

4IR	Fourth Industrial Revolution
12J	Section 12J of the Income Tax Act which allows for the creation of VCCs
AI	Artificial Intelligence
API	Application Program Interface
AU	African Union
B-BBEE	Broad-Based Black Economic Empowerment
CDD	Customer Due Diligence
COMESA	Common Market for Eastern and Southern Africa
CPSD	Country Private Sector Diagnostic
CRC	Cybersecurity Response Committee
CSD	Central Supplier Database
CSIR	Council for Scientific and Industrial Research
CSIRT	Computer Security Incident Response Teams
DBE	Department of Basic Education
DE4A	Digital Economy for Africa
DHA	Department of Home Affairs
DHET	Department of Higher Education and Training
DFS	Digital Financial Service
DST	Department of Science and Technology
DPSA	Department of Public Services and Administration
DSBD	Department of Small Business Development
DTI	Department of Trade and Industry
DTPS	Department of Telecommunications and Postal Services
e-GP	Electronic Government Procurement
ECT Act	Electronic Communications and Transactions Act
ESD	Enterprise and Supplier Development, a subsector of B-BBEE
GCIS	Government Communication and Information Services
GDP	Gross Domestic Product
GITOC	Government Information Technology Officer's Council
GPW	Government Printing Works
HANIS	Home Affairs National Identification System
ID	Identity Document
IT	Information Technology
ICT	Information, Communication and Technology
IFWG	Intergovernmental Fintech Working Group
IDC	Industrial Development Corporation
iNeSI	iKamva National e-Skills Institute
IP	Intellectual Property
ITU	International Telecommunication Union
FIC	Financial Intelligence Center
KYC	Know Your Customer
M&E	Monitoring and Evaluation
MFD	Maximizing Finance for Development
MIC	Middle-Income Country

MICT	Media, Information and Communication Technologies
MIOS	Minimum Interoperability Standards
NDP	National Development Plan
NPS	National Payments System
NSA	National Skills Authority
NPD	National Populations Database
NIPMO	National IP Management Office
OGCIO	Office of the Government Chief Information Officer
OGP	Open Government Partnerships
PASA	Payments Association of South Africa
PKI	Public Key Infrastructure
POPI	Protection of Personal Information Act
PPP	Public-Private Partnerships or Purchasing Power Parity
R&D	Research and Development
SA	South Africa
SADC	Southern African Development Community
SARB	South African Reserve Bank
SASSA	South Africa Social Security Agency
SCD	Systematic Country Diagnostic
SETA	Sector Education and Training Authority
SITA	State Information Technology Agency
SOE	State-Owned Entity
SMEs	Small & Medium Enterprises
SSA	Sub Saharan Africa
SSC	Shared Service Center
STI	Science, Technology and Innovation
TVET	Technical and Vocational Education and Training
USD	United States Dollar
VAT	Value-Added Tax
VC	Venture Capital
VCC	Venture Capital Company as defined by 12J of the Income Tax Act
WBG	World Bank Group
WEF	World Economic Forum
WOAN	Wireless Open Access Network
ZAR	South African Rand

EXECUTIVE SUMMARY

The overall state of South Africa's digital economy as viewed through the lens of the five foundational pillars is encouraging but momentum has stalled in recent years and much of the population remains excluded from the digital economy. With a PPP adjusted GDP per capita of USD 13 000, South Africa is among the few countries in Africa with upper-middle income status. On the digital economy, South Africa leads the region in indicators such as internet usage (54%) and mobile phone penetration (80%), and broadband coverage (99%). However, the nation slipped from 78th in the ITU ICT Development Index to 92nd between 2002 and 2018 against the backdrop of a slowdown in economic growth. And when benchmarked against other middle-income countries and more dynamic economies, South Africa lags behind. Internet usage among poorer South Africans remains low with as much as 60% of the population paying more than the affordability benchmark of 2% of GNI per capita.

Proactive, effective, and coordinated government policies to holistically support the digital economy and could yield competitiveness, growth and jobs in South Africa. The World Bank Country Private Sector Diagnostic report identified ICT as a sector where medium-term reforms could unlock private investment. Already in 2013, an assessment showed that increased broadband investment of R 65 billion in the following 10 years could create more than 400,000 jobs and add R 130 billion in the GDP of South Africa¹. Policies with strong monitoring and evaluation will be needed to reduce risks from increased automation and digitization. For example, doubling the rate at which the workforce acquires skills needed for the 4iR could reduce the proportion of at-risk-jobs from 33 percent to 14 percent by 2025.² And as recently noted in South Africa's Doing Business 2018 report for eight major cities, digitalization can remove red tape through government platforms that enhance the business environment.

South Africa has good potential to build on its strong foundations to continue to grow and expand its digital economy, including playing an increasing regional leadership role, and should boost efforts on digital infrastructure and skills in particular. A holistic, coordinated and whole of government view on the different actions necessary on each of the pillars, including their linkages, would help unlock maximum benefits. The diagnostic finds that South Africa should focus efforts on current regulatory tools covering infrastructure and skills which need to be better implemented and complemented with targeted interventions to help underserved segments of the country. Priority recommendations of the diagnostic include for infrastructure, updating the national broadband policy SA Connect in line with international best practices, fast-tracking spectrum licensing and ensuring the independence and capacity of ICASA, which are measures that can unlock private investment and move South Africa towards universal coverage of high-speed and affordable internet. With regards to skills, government should consider improving the enrolment and completion rates in ICT studies as well as fostering more partnerships with private sector in reforming the curriculum and providing resources to schools. Beyond these two pillars, anchoring the different Digital Economy interventions across the five pillars with a high-level initiative, such as the Presidential Commission on 4iR for example, could be useful to ensure efficient coordination of implementation of actions and reforms. Moreover, building on the objectives of the AU, CATFA, SADC and COMESA of greater economic integration, South Africa could play a leading role on the digital economy development across the continent.

¹ Katz R.L. (2013) The impact of South Africa Connect on jobs and the economy. Presentation in the Broadband Workshop (DoC) 11-12 November
²https://www.accenture.com/t20180201T173907Z_w_/za-en/_acnmedia/PDF-70/Accenture-Creating-South-Africa-Future-Workforce.pdf?fla=en

There is a growing economic and social urgency for South Africa to develop its digital economy. Over the past decade, the economy has not been growing fast enough to create jobs. The unemployment rate is 27%, inequality has increased, and half of the population lives in poverty. The dualism that stems from the legacy of demographic and spatial exclusion in South Africa is reflected in the digital economy landscape, and a large share of South Africans remain disconnected from the opportunities it has created. Whereas the Government of South Africa has been consistent in trying to leverage ICT for socio-economic development since the 1990's, policy choices have not always been optimal, or there has been difficulty to implement outlined reforms and programs as demonstrated under many of the foundational pillars. The policy and regulatory uncertainty have undermined and slowed down private investment. Advances in digital technology present an opportunity for South Africa to reverse declines in competitiveness and service delivery and push towards a dynamic and inclusive growing economy in line with the goals of the National Development Plan.

This report uses the DE4A methodology to propose a rapid and holistic examination of the five pillars of the digital economy in South Africa, namely digital infrastructure, digital government platforms, digital financial services, digital entrepreneurship and digital skills, and is based on a series of background papers produced for this report. The following are a summary of diagnostic findings by pillar.

KEY FINDINGS

Digital Infrastructure

The overall state of South Africa's digital infrastructure is relatively robust and has enabled progressively better market outcomes for consumers. In the 2016 WEF Networked Readiness Index, South Africa was the second best performing African country and mobile download speeds are the fastest on the continent. In the past 10 years, it has moved to an open, competitive regime in terms of its international connectivity, with a good number of submarine cables connecting it to the rest of the world, resulting in fast growth of international bandwidth usage.

The Mobile Network Operators (MNOs) have played an important part in providing connectivity throughout the country, resulting in impressive 3G and 4G network coverage, while international connectivity benefited from away from monopoly after 2009 to an open and competitive regime. The Digital Economy for Africa target of 100% of population covered by mobile broadband networks is almost reached. Fixed-line internet and especially fiber-optic connections to homes and businesses (FTTX) have experienced rapid growth in recent years, showing much promise. In international connectivity, competition translated resulted in 5 international submarine cables with more to come online, lower prices and rapid increase in international bandwidth usage, which more than doubled from 2016 to 2018. South Africa possesses the most extensive backbone infrastructure on the continent, with around 200,000 kms of fiber deployed, but concentrated in urban areas and with much network duplication. The expansion of infrastructure can be largely contributed to commercial fiber operators, even though the state has a strong role in the sector. South Africa also has a strong non-profit national research and education network, SANREN.

However, there are concerns about the country's performance. South Africa has experienced much policy uncertainty and has been slow to implement regulatory reforms, and the country is facing a major digital divide. Delays in spectrum assignment have limited the operators' ability to expand their 4G networks and provide faster speeds on existing networks. Most targets of the national broadband strategy, SA Connect,

have not been reached and the strategy needs updating. Also, whilst the urban metro regions are benefitting from an expansion of fiber optic cable infrastructure, preparing for the arrival of 5G networks and having increased consumer choice for fast internet connectivity, rural areas are being left behind. As extending mobile broadband coverage is becoming a less important issue, the divide is explained more by affordability and characterized by quality of access. South Africa's Quality of Service is regarded as poorer than in comparable countries and mobile data prices are high, especially for poorer, more rural consumers. The current regulatory and market regime is not resulting in sufficient digital inclusion, and the state-run programs for advancing access have not been able to fill the gap.

Digital Public Platforms

South Africa is one of the leaders on digital public platforms in the region - second only to Mauritius in Africa - based on the 2018 UN's e-Government Development Index (EGDI). Digital public platforms serve as an important enabler of digital economy allowing both public and private sector organizations to come up with new or better outcomes for citizens. Citizen participation in particular is a strong point for South Africa. The government has adopted solid strategies in the National e-Government Strategy and Roadmap in November 2017 to guide the country's digital transformation. Although the activities outlined in the Strategy are in various stages of implementation, funding appears to be a challenge. At the sub-national level, progress is being made at the provincial levels, especially in Gauteng and Western Cape, where much drive for government innovation happens.

There is significant fragmentation and proliferation of institutions at the national level responsible for various platforms and ICT services that is hindering further development. The main institutions have overlapping mandates and blurred, overlapping, and sometimes undefined responsibilities. The institutional picture looks more cohesive at the provincial level. In terms of data protection and protection of 'privacy', South Africa has an appropriate legislative framework in place, but the ability to share data between Departments and Agencies is restricted. Open data policy and initiatives are still at a pilot phase, with benefits yet to be reaped. Capacity to use big data analytics within the public sector is being developed. Key back-office systems are mostly digitized in South Africa at the national level. South Africa has a recently-updated national-level policy document on interoperability with SITA having a central controlling role. However, legacy systems and lack of connectivity pose hurdles for implementation. No strong push for mainstreaming open Application Program Interfaces (APIs) within the public sector exists.

South Africa has a strong existing national ID system, which is largely used for face-to-face transactions, but the repositioning of the Department of Home Affairs (DHA) and desire to introduce a new National Identity System (NIS) are an opportunity to build a world-leading digital identity system to underpin trust in the digital economy and boost digital trade with Africa and beyond. Coverage of South Africa's national ID system is above 90 percent, which places South Africa among the highest in the world and is a great asset for introducing the NIS as a next generation digital identity system. However, it will be important for the NIS to be designed as a platform and with interoperability in mind (rather than as a silo), and for the Government to examine options beyond a centralized system such as a federated model that would create an ecosystem of trusted public and private sector digital identity providers that would be regulated and supervised by Government.

The national e-Strategy places much emphasis on digital services and encompasses several specific objectives linked to public service delivery and innovation both in public and private sector, including developing capacity and skills for effective service delivery. A National e-Government Central Portal had

been launched in 2018, for access to selected online services, as a part of new e-Government roadmap; however, there is currently no inventory or registry of all online services maintained by DPSA or DTPS. Therefore, it is not immediately possible to take stock how many services have been automated and at what level.

Digital Financial Services

Digital financial services provide individuals and households with convenient and affordable channels by which to pay, as well as to save and borrow. According to the 2017 Global Findex survey, 60 percent of South African adults (ages 15+) reported having made or received a digital payment in the past year, well above Sub-Saharan Africa (SSA) average. Traditional account ownership among South Africans is also significantly higher than in the Sub-Saharan Africa region and on par with middle-income countries (MICs). South Africa's large and sophisticated banking system (108 percent of GDP) offers an array of products and services and is investing in digitization to further expand its product offerings through incumbent large banks and the entry of new players.

But South Africa's financial services are characterized by stark dualism. The usage of debit cards (other than for cash withdrawal) and other electronic payment instruments remains low among low income households with cash dominating their means of transacting. Moreover, only a fifth of adults used mobile phone or internet to access their accounts, substantially lagging Kenya at 72 percent. As the World Bank South Africa Retail Banking Diagnostic (2017) highlighted, product design and fees on transaction accounts by major banks do not distinguish between low-income and high-income customers thus making these products costly for low-income customers. In addition, consumers may be reluctant to use internet or mobile banking due to high cost, including the cost of data / airtime to access such electronic services, as highlighted in the financial infrastructure section of the report.

While it is growing and gaining international recognition, South African fintech is relatively strong with 219 companies, benefiting from good mobile phone and internet penetration. However, several key challenges remain. In South Africa only locally-registered banks may issue e-money, since issuing e-money is considered as deposit-taking and this has in part resulted in low usage of mobile money despite a high mobile phone penetration. Non-banks argue that the low percentage is due to legal framework that requires non-banks to offer their services jointly with a bank, which reduces profitability and flexibility in their product and service offering.

At the regional level, the developments in South Africa digital financial services have strong implications, especially in the SADC region. South African banks have expanded extensively in Africa; the 5 largest banks currently have 69 foreign subsidiaries, of which 43 are in Africa. Importantly at SADC level, in July 2014 the SADC financial industry launched a wholesale cross-border payments system known as the SADC Integrated Regional Electronic Settlement System (SIRESS). Participants to this system include banks and central banks in the region with the SARB acting as the operator and settlement agent of the system. The launching of SIRESS laid the foundation for developments in low value payment streams which are critical for supporting cross border remittances and promoting financial inclusion within the region. In this context, a low value credit transfer scheme is being implemented to facilitate bank-to-bank transfers, bank-to-non-bank transfers and non-bank-to-non-bank with settlement taking place via banks. The direct participation of banks and non-banks in this scheme will be a positive development that will facilitate interoperability, promote competition, increase beneficiary reach and reduce cost of transacting.

Ultimately, financial inclusion levels are expected to increase as customers get easy access through mobile instruments.

Digital Entrepreneurship

South Africa is already a key digital entrepreneurship player in Africa, serving as a “hub” for many initiatives and investments on the continent, but its leadership is being increasingly challenged, as it is being held back by key policy, regulatory and human capital bottlenecks. Vibrant digital entrepreneurship is a key pillar of a strong digital economy, leading to new products and services, business models, markets, and in the end growth and jobs. A host of tech players, investors, and success stories, along with existing national and provincial-level support, has set a strong foundation that is already leading to some notable successes, including a round of startups raising over \$USD100M. The sector remains however overwhelmingly white, male, and middle class. Digital talent is rare at all skill levels and becoming a critical bottleneck for growth of digital startups, particularly for higher-end/global skills. Issues in implementation and coordination of policies, coupled with limited monitoring and evaluation, are likely leading to a sub-optimum allocation of resources, and South Africa is losing ground on digital entrepreneurship leadership to other rising continental tech hubs, including the likes of Kenya, Rwanda, Botswana, and Nigeria. Specific policies including the R&D tax incentive scheme, IP legislation, exchange controls, and labor legislation are also currently hindering entrepreneurial growth.

Further strengthening of the numerous digital entrepreneurship support services provided by organizations and increasing access to early and growth stage finance is needed to help South African digital entrepreneurs scale. Sector-specific clusters are developing, e.g. around fintech, edtech, or agritech, some attracting substantial foreign investment. Most support is provided in the early stages of business set-up and is highly geographically concentrated in the affluent urban areas of Gauteng and the Western Cape. The quality of business support services provided by many organizations is considered low, with few relevant mentors; digital acceleration programs are not well tailored to the South African context in terms of duration and are insufficiently geared for access to markets beyond South Africa. Availability of early and growth-stage finance for growth-oriented businesses has increased significantly over recent years, in the context of difficult access to credit for SMEs overall, but needs to be further increased to help high potential digital businesses grow. Supply increase has come mostly for more mature digital businesses thanks to a significant tax incentive. Finance gaps persist throughout most of the lifecycle of digital startups, including the very early stage. Although leading the way on the African continent, most South African later stage funds also still lack sufficient capacity, inclusiveness, and critical size to fund and facilitate rapid internationalization of South African digital businesses.

Access to both the domestic, regional and international markets continues to be difficult for South African digital entrepreneurs, pleading for greater regional programs and integration. South Africa is a key entry point for global digital companies on the continent and an expanding digital market, and many local digital business models and services have developed. The high cost of data does remain a challenge, and key players with growth and job potential, like e-commerce and other digital private platforms, face restrictions and costs for processing online payments. Long private and public procurement cycles disadvantage smaller players. ICT services exports data show limited global reach, compounded by ExCon difficulties, while the local market remains limited compared to richer countries due to infrastructure and persistent inequalities.

Digital Skills

South Africa's digital skills are a key weakness for the development of a South African digital economy. The development of a vibrant, dynamic and inclusive digital economy requires a pool of skilled digital entrepreneurs to build new businesses, and a deep labor pool to work with technology. This is an area that requires attention, as the South African labor market is characterized by critical skills shortages that are more acute in sectors such as ICT. The demand for specialized digital skills is rapidly increasing, with 3,000 of the 10 most sought-after ICT jobs not filled, 25 jobs listed on the Department of Higher Education and Training's (DHET) occupations in high demand are in ICT fields, and LinkedIn data showing that 10 out of the 11 most in demand skills are in the ICT sector. The SCD and the CPSD outline skills as the key mechanism through which South Africa can foster competitiveness and economic inclusion, this could not be truer for the ICT sector. Skills are also critical in making sure that 4iR does not lead to massive job losses.

Digital skills weaknesses stem from quality lags of South Africa's education system. Even though South Africa is leading African countries in some aspects of digital developments, it only ranks 116th out of 140 countries in the Global Competitiveness Report's assessment of digital skills among the population. South Africa ranks at a low 126th out of 157 countries on the World Bank's Human Capital Index, below peer African countries with less income. When schooling is adjusted for learning, the average 18-year-old would have completed 9.3 years of actual schooling, but a learning equivalent to 5.1 years, implying a learning gap of over 4 years. Weak outcomes in basic education in turn result in low tertiary education enrollment and low graduations - including in ICT related qualifications.

Other weaknesses in digital skills relate to governance, curriculum and resources. While significant progress has been made by the DTPS to develop the iKamva National e-Skills Institute (iNeSI), conduct large-scale environmental scans to determine digital skills needs, and indications of developing a digital skill strategy, these initiatives are still in early stages and not directly linked to the broader skills development work done by the DHET, NSA, or SETAs. Therefore, to date, there is a lack of identification of specific digital skills that need developing in each of the levels of digital skills. Digital skills development in schools also still has a long way to go. Many schools are still without devices and connectivity, many do not offer ICT-related subjects, and there are concerns about teacher training in effective technology use. All of this hinders digital literacy. With regards to professional digital skills, the production of post-school graduates does not meet labor market demands and curricula are not responding fast enough to meet rapid changes in demand. The development of professional digital skills is also impaired by a lack of coherent, national leadership and collaboration, which leads to lack of coherence in institutional offerings. And finally, only some universities are recognizing the link between entrepreneurship, business, and ICT skills which hinders e-business skills

1. INTRODUCTION

South Africa is one of the digital economy leaders on the African continent, but lags developed countries. With a population of 57.7 million people, a GDP of over USD 350 billion and a PPP-adjusted average income of USD 13,000, South Africa is among the few countries in the region with upper-middle income status. The ICT sector contributes around about 17 percent of service exports and close to 3 percent of GDP.³ With internet usage of more than 54 percent in 2017, South Africa is among the leaders in Africa⁴ but lags behind many developed economies and other middle-income countries (MIC). Smartphone penetration rates are also relatively high, with more than 80 percent of the population owning a smartphone. Moreover, the country is ranked of 46th out of 140 countries for innovation capability by the World Economic Forum (WEF) Global Competitiveness Report.

In this context, the Digital Economy for Africa targets appear within reach for South Africa, although efforts need to be maintained. Launched in 2018 through a collaboration between the African Union (AU) and the World Bank, the Digital Economy for Africa Initiative aims to ensure that every individual, business and government in Africa will be digitally enabled by 2030. With strong fundamentals such as a relatively strong manufacturing base, a critical mass of private sector firms, deep and diversified financial and capital markets, competence in research & development, several internationally recognized universities, and wide coverage of mobile broadband, it is estimated that over the next decade, more than ZAR 5 trillion in value could be created in South Africa through the use of digital technologies in key industry sectors, including agriculture, public infrastructure and administration, financial services and manufacturing.⁵

South Africa could also play a leading role for regional digital development, particularly within the context of the recently signed Continental Free Trade Area (CFTA) agreement, as well closer to home in the Southern Africa Development Community (SADC) and Common Market for Eastern and Southern Africa (COMESA) context, following on the East Africa Single Digital Market as an example. This could be all the more important given that the World Bank's Systematic Country Diagnostic (SCD) identified limited integration into global value chains as one of the major constraints to growth in South Africa. Closer cooperation between the region's countries would also help in creating more value out of public and private infrastructure investments such as fiber-optic backbone networks and data centers. South Africa could assist by leading the agenda to harmonize customs, disseminating best practices to other countries around issues such as data regulation, improvement in the ecommerce environment, promotion of Africa-wide payment systems and the provision of an even stronger regional hub for tech entrepreneurs.

In this context, the South African government is aiming to pass several reforms across core elements of the digital economy, recognizing the need for new policy directions and preparing for the 4iR. In its Industrial Policy Action Plan, the government of South Africa identified ICT as among 12 priority sectors that can grow and create jobs. In 2016, the National Integrated ICT Policy White Paper defined the overarching ICT policy framework. One important action taken in 2018 was to initiate the merger of the Department of Telecommunications and Postal Services (DTPS) and the Department of Communications (DoC) to improve the overall institutional framework to promote faster decision making and clarifying

³ Statistics South Africa (2017) Statistical Release P04414 Available online <http://www.statssa.gov.za/publications/P0441/P04414thQuarter2018.pdf>

⁴ Research ICT Africa (2018) The State of ICT in South Africa, Policy Paper No.5, Series 5, Accessed online https://researchictafrica.net/wp/wp-content/uploads/2018/10/after-access-south-africa-state-of-ict-2017-south-africa-report_04.pdf

⁵ Accenture (2018) "Unlocking digital value for business and society in South Africa."

mandates, which has been confirmed in the latest government nominations. In September 2019, South Africa will join the WEF Centre for the 4iR Network (C4iR Network) alongside China, India and Japan.⁶ In March 2019, the Presidential Commission on the 4iR was announced.⁷ The commission is chaired by President Cyril Ramaphosa and aims to identify relevant policies, strategies and action plans that will position South Africa as a competitive global player.⁸

Yet more efforts are needed to tackle entrenched socio-economic exclusion, which has resulted in keeping household income at low-levels and preventing MSMEs from fully participating in opportunities offered by the digital economy. At 0.63, the Gini coefficient measuring income dispersion in South Africa is among the highest in the world, and around half of the population live in poverty.⁹ While South Africa's wealthy households have broad access to quality and relatively affordable internet, people earning less than ZAR 7000 a month are largely unconnected.¹⁰ This report reviews how the digital divide affects the foundations of the digital economy and provides policy options for bridging the divide.

Furthermore, while South Africa is a regional success story of attracting private investment into digital economy, since 2009 FDI into the digital economy has been falling.¹¹ Significant investments in fiber-optic networks made over the past decades have endowed South Africa the most extensive backbone infrastructure in Africa¹², while investment from MNOs have enabled almost universal coverage of mobile broadband networks. But since 2010, the regulatory, policy and business environment has been less conducive to private investment. Regarding digital infrastructure specifically, notable constraints to private investment in digital infrastructure include delays in allocating high demand spectrum and policy uncertainty around the Wireless Open Access Network (WOAN). Moreover, based on the findings, in specific areas such as broadband roll-out or government service digitalization, the government appears to rely excessively on its own resources and capacities, at times leading to inefficient, expensive and incomplete project implementation. Overall, there is room to consider leveraging more private investment and expertise in key areas such as infrastructure deployment, skills development and the roll-out of e-government platforms. This is especially pertinent in the context of the South African Government's commitment to fiscal consolidation.¹³

Moreover, South Africa's private sector has been slow to adopt digitization, particularly in the manufacturing sector where competitiveness has been declining. None of the South African manufacturing companies surveyed in PWC's Digital Champions report are frontrunners in digitalization

⁶ The WEF established the C4iR in San Francisco, USA in March 2017 as a hub for global, multi-stakeholder cooperation to develop policy frameworks and advance collaborations that accelerate the benefits of science and technology. The South African government, through the Department of Science and Technology (DST), intends to establish a WEF Affiliate Centre as a public-private partnership based at the Council for Scientific and Industrial Research (CSIR).

⁷ The full list of commissioners comprising labour, private sector, academic, women and youth can be found at <https://www.bizcommunity.com/Article/196/831/189620.html>

⁸ In 2018, Telkom and several universities established the 4iR South Africa partnership with the objective of stimulating and facilitating an inclusive national dialogue to shape a coherent national response to the 4iR. The partnership also aims to complement and support other national activities relating to 4iR - most notably the recently appointed Presidential Commission on 4iR.

⁹ This based on the upper-bound poverty line of ZAR 1 183 (in April 2018 prices) per person per month. This refers to the food poverty line plus the average amount derived from non-food items of households whose food expenditure is equal to the food poverty line.

¹⁰ Research ICT Africa (2018) The State of ICT in South Africa, Policy Paper No.5, Series 5,

¹¹ Financial Markets Data

¹² Research ICT Africa (2018) The State of ICT in South Africa

¹³ Maximizing Finance for Development (MFD) is the World Bank Group's approach to systematically leverage all sources of finance, expertise, and solutions to support developing countries' sustainable growth.

of operations.¹⁴ In fact, most fall into the “digital novice” category - which represents the least digitally mature companies. These firms are missing out on cost-saving, productivity gains and revenue growth. The competitive gap between dynamic economies such as in the Asia Pacific region (which are digitalizing much more quickly) will thus continue to widen unless action is taken¹⁵. In other segments such as e-commerce where South Africa lags - 1.4 percent of total sales compared to the global average of 11.5 percent-, barriers could be coming from the demand side including issues such as lack of trust and consumer culture.

Accelerated development of the digital economy is critical to unlock economy-wide investment, create much needed jobs, and help reverse the productivity decline in South Africa. The recent Country Private Sector Diagnostic (CPSD) identifies the ICT sector as one of the sectors where short- to medium-term reforms, notably aimed at addressing the digital divide, would unlock private investment and create jobs¹⁶. Even in a context of heightened economic and policy uncertainty, the ICT industry has demonstrated resilience in job creation, with employment in the telecommunications sector alone growing by 6.2 percent over the last five years¹⁷; LinkedIn data shows that 10 out of the 11 most in demand jobs in South Africa are in the ICT sector. Moreover, empirical estimations from the Future of Work study show that faster internet adoption improves the prospects of finding a skilled job without reducing the prospects of finding an unskilled.¹⁸ More generally, in a context where 6.2 million South Africans are actively looking for jobs but cannot find them¹⁹, putting in place technologies to better advertise vacancies and help people start their own companies by lowering barriers to entry and improving access to markets relative to other industries would go a long way toward improving job market prospects.

The consequences of inaction are high, and South Africa is also already experiencing an exodus of skills that could dampen its digital economy ambitions. LinkedIn data tracking cross-country movements of professionals across industries indicate that computer software has one of the highest rates of migration out of the country, and that half of the skills lost to migration out of South Africa are in the ICT sector and are concentrated in skills that are critical for the 4iR. While such migration can also be seen in other MICs, it is happening at a faster pace in South Africa. It also takes place in a context where ICT skills are already scarce, immigration requirements are cumbersome, and skilled workers command a skills premium²⁰. As ICT is an industry with high skills intensity, these developments act as a drag on cost competitiveness and lessens the interest of investors that would like to anchor their ICT operations in South Africa to serve a pan-African market.

The remainder of this report will provide a diagnostic and offer recommendations on the five foundations of the digital economy in South Africa. The report will examine, in turn, challenges concerning digital

¹⁴ PWC (2018) “Digital Champions: How industry leaders build integrated operations ecosystems to deliver end-to-end customer solutions”, surveyed 1,155 executives at global manufacturing companies in 26 countries including South Africa and asked them about their views on Industry 4.0 and digital operations. Based on the outcomes, PwC developed a digital maturity index to explore the role of frontrunners – the so-called ‘Digital Champions’ – and what distinguishes them to outpace their competitors.

¹⁵ Deloitte (nd) “Industry 4.0: Is Africa ready for the digital transformation?”

¹⁶ World Bank (forthcoming) Creating Markets in South Africa: Boosting Private Investment to Unlock Growth Potential, Country Private Sector Diagnostic, Washington DC

¹⁷ ICASA (2019) State of the ICT Sector Report 2019. .

¹⁸ Hjort and Poulsen (2019) Future of Work

¹⁹ When discouraged workers are also included, the unemployment rate is 34 percent.

²⁰ World Bank (forthcoming) Creating Markets in South Africa: Boosting Private Investment to Unlock Growth Potential, Country Private Sector Diagnostic, Washington DC

infrastructure, public digital government platforms, digital financial services, digital entrepreneurship, and digital skills.

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2. DIGITAL INFRASTRUCTURE

2.1. BACKGROUND AND IMPORTANCE OF DIGITAL INFRASTRUCTURE

Fast, high-quality and affordable broadband internet is a key foundation of the digital economy. Increased connectivity affects economic growth, productivity, firm performance and efficiency and quality of public institutions and services in a positive way²¹. The effect of increased broadband access on economic growth and employment has been well documented²². By enabling improved access to information governments can be made more accountable to citizens, and citizens connected to opportunities for learning and employment.

For this report, digital infrastructure is analyzed in four parts: (1) the first mile (South Africa's international connectivity), (2) the middle mile (national backbone and long-distance networks), (3) the last mile (access networks connecting the end-user) and (4) the invisible mile (policies and regulations promoting or hindering broadband access). Special attention will be paid to the market for both fixed-line and mobile broadband services in different parts of the broadband value chain.

In the Networked Readiness Index of the WEF Global Information Technology Report from 2016 South Africa performed well and rose to the position of 65th as the second best performing African country. Gains were made especially by businesses, and improvements were evident in infrastructure and affordability. Based on data from Ookla²³, South Africa comes first in Africa on mobile internet download speeds. Commercial cloud providers such as AWS and Huawei have entered the market with big growth prospects²⁴.

However, South Africa has slipped in the ITU's ICT Development Index from position 78 to 92 between 2002 and 2018 trailing behind emerging market competitors such as Brazil, Mexico, Turkey and India, much due to lack of progress on infrastructure. It's performance on fixed broadband speeds is not as favorable as mobile, ranking at position 102 globally, behind several other African countries. South Africa suffers from a persistent digital divide, with almost half the country still not using the internet. The urban metro regions are enjoying an expansion of fiber optic cable infrastructure, preparing for the arrival of 5G networks and benefiting from increased consumer choice for fast internet connectivity, but rural South Africa is being left behind. Multi-faceted problems around affordability, lack of internet-enabled devices, limited demand and poor skills hinder progress towards universal access²⁵.

The South African policy and regulatory environment has sound legal and institutional foundations, although it has suffered from much uncertainty in recent years. There has been a lack of clear policy direction in key questions such as wireless spectrum allocation and licensing and difficulties in implementing agreed regulatory reforms. The ability of the Independent Communications Authority of

²¹ World Development Report 2016. Digital Dividends. World Bank, 2016.

²² For a latest review of evidence see: The economic contribution of broadband, digitization and ICT regulation ITU (2018). On employment effects, see: Hjort J. and Poulsen J. (2018) The Arrival of Fast Internet and Employment in Africa. NBER Working Paper No. 23582

²³ www.speedtest.net Data from: Q3 / 2019

²⁴ <https://businesstech.co.za/news/cloud-hosting/279877/amazon-web-services-to-open-new-data-centres-in-south-africa/> and <https://techcentral.co.za/huawei-cloud-now-available-in-south-africa/87985/>

²⁵ Research ICT Africa (2018)

South Africa (ICASA) to effectively regulate the digital communications sector²⁶ has been questioned. Several experts interviewed for this report stated that the regulator's independence and capacity have weakened over the past few years. This has caused some key processes such as spectrum licensing to be seriously delayed²⁷. There are signs of a turnaround strategy. President Ramaphosa in 2018 announced that his government will work to implement reforms and fast-track delayed spectrum assignment. These efforts are also being coordinated under the new Presidential Commission on the 4th Industrial Revolution (4IR)²⁸, which will focus on digital infrastructure as one of its themes.

Despite a dedicated Universal Service and Access Agency (USAASA) managing The Universal Service and Access Fund (USAF), the growing demand for services has largely been met by operators on commercial terms. Over the lifespan of the USAF, only some ZAR 620 million had been allocated to projects under the USAF by the Treasury and the role of USAASA in promoting internet access in South Africa has been marginal. The USAF is currently being consolidated into a new Digital Development Fund (DDF) with a broader mandate, possibly repurposed to contribute better to the SA Connect's objectives and to promote innovation in the digital sector. This is a step that most stakeholders welcome.

The National Integrated ICT Policy White Paper (2016) by the Department of Telecommunications and Postal Services set out key objectives for developing the ICT sector in South Africa. The White Paper addressed issues such as establishing cross-government leadership in ICT, promoting innovation and competition, strengthening regulation, addressing the digital divide and ensuring affordable access. It extended and reinforced existing strategies including the national broadband strategy South Africa Connect (SA Connect)²⁹ and the National Cybersecurity Policy Framework³⁰.

The South Africa Connect (SA Connect) broadband policy from 2013 set ambitious targets for improving internet access and connecting government facilities. It aimed to extend a minimum of 5Mbps broadband access to 90% of the population and 100Mbps to 50% of the population by 2020. The long-term target for 2030 was set at 100% of the population connected at 10Mbps and 80% at 100Mbps. In addition to these, several institutional targets were set, aiming at connecting all government facilities by 2020 at speeds ranging from 10Mbps to 100Mbps. The implementation of SA Connect has been delegated to three publicly owned entities: Broadband Infraco (BBI), State Information Technology Agency (SITA) and Sentech with downstream participation by other private operators. Progress has been slower and costlier than expected and South Africa is not on track to meet the 2020 targets for connected facilities or internet access, although the intermediary target of 50% internet access by 2016 has been achieved somewhere in 2017. Phase 2 of SA Connect is currently on hold, pending a feasibility study.

26 The sector is also subject to regulation by the Competition Commission of South Africa. In some areas, ICASA and the Competition Commission have overlapping powers and mandates.

27 For example, the planned spectrum auction that ICASA was planning to proceed with in 2016 was contested by the DTSP and finally cancelled by a High Court verdict.

28 <https://www.gov.za/speeches/president-cyril-ramaphosa-appoints-commission-fourth-industrial-revolution-9-apr-2019-0000>.

29 South Africa Connect. Creating Opportunities, Ensuring Inclusion. South Africa's Broadband Policy. 2013.

30 National Cybersecurity Policy Framework. 2015.

Table 1: SA Connect targets

Policy Target	Penetration Measure	Baseline (2013)	2016	2020	2030
Access / Mbps	% of population	33.7%	50% at 5Mbps	90% at 5Mbps, 50% at 100Mbps	100% at 10Mbps, 80% at 100Mbps
Schools	% of schools connected	25%	80% at 100Mbps	100% at 10Mbps, 80% at 100Mbps	100% at 1Gbps
Health Facilities	% of health facilities connected	13%	50% at 10	100% at 10Mbps, 80% at 100Mbps	100% at 1Gbps
Public Sector Facilities	% of government offices connected		50% at 5Mbps	100% at 10Mbps	100% at 100Mbps

2.2. DIAGNOSTIC FINDINGS: CURRENT STATE OF DIGITAL INFRASTRUCTURE

2.2.1. Analysis of the Broadband Market

Based on ITU statistics, 54% of South Africans were using the internet regularly in 2017, comparing favorably with countries such as Kenya, Nigeria and Mauritius, but lagging well behind world leaders such as Korea (Table 1). Mobile remains the primary means for people to get online in South Africa³¹. Overall wireless penetration in 2017 was at 162% with 5% growth from the year before. According to ICASA³², mobile cellular data subscriptions increased from 61.4 million in 2017 to 65.8 million in 2018 and smartphone penetration has risen to 81.7% with rapid growth from 2016. 9 out of 10 mobile broadband subscriptions are pre-paid³³. During the same year, fixed-line subscriptions increased by 147%, all implying good growth in internet access for 2018. It will nevertheless be highly unlikely that South Africa meets the SA Connect target of 90% penetration by 2020 based on the current trajectory.

Currently, there are four main MNOs operating in South Africa, the three largest of which jointly hold overall revenue market share of 95.3%³⁴: Vodacom (49.8%), MTN (33.5%) and Cell-C (12%). Telkom, a company in which the government has a major stake is the fourth player. The latest entrant is the data-only operator Rain, which so far has a modest market share, but the most affordable data offering. Voice

31 57% of South African household's internet use in 2017 took place using mobile devices, highlighting the role that mobile connectivity plays. (Research ICT Africa 2018)

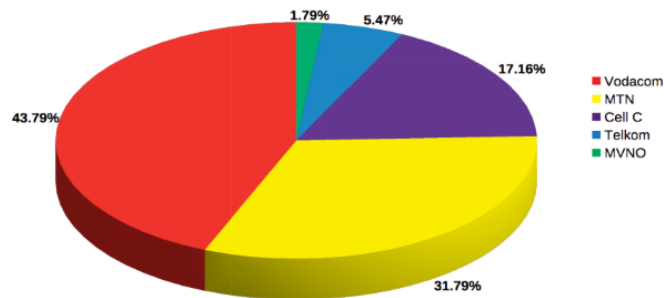
32 State of the ICT Sector Report 2019. ICASA 2019.

33 Ibid.

34 Data Services Market Enquiry. Provisional Findings and Recommendations. Competition Commission of South Africa 2019.

revenues have been falling as data services and OTTs have gained ground. Over the past three years, mobile data use has grown rapidly, between 55% to 68% annually.

Figure 4: Reported mobile subscriber market shares in 2018³⁵



Source: Operators' Reports

In addition to infrastructure-based operators, South Africa has a growing number of Mobile Virtual Network Operators (MVNO) which were permitted in 2005. Altogether they hold around 2% share of mobile users, translating to around 1.8 million subscribers³⁶. The MVNO market has attracted entrants from companies in other sectors such as retail, banking and consumer goods.

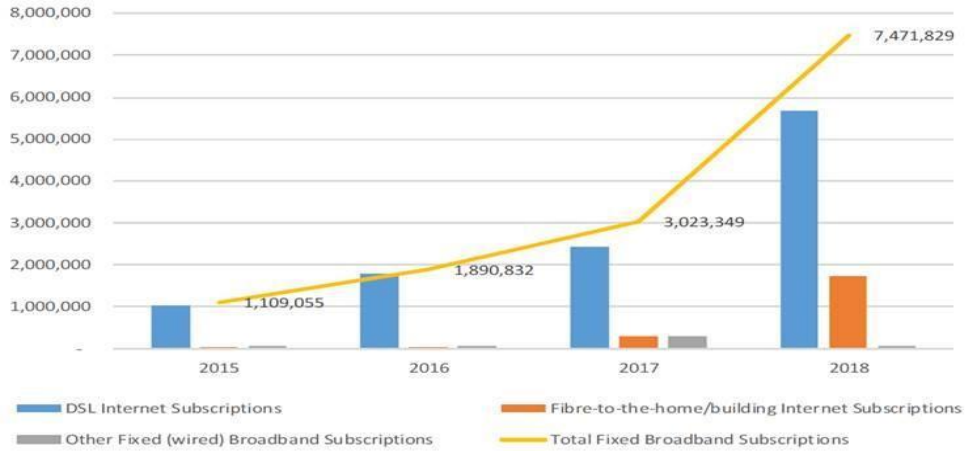
The fixed-line market in South Africa has recently received a boost, after years of being held back by an expensive operating environment. Market growth has been restricted to urban environments but has been impressive over the past years (growing to almost 7.5 million of xDSL and FTTX connections in 2018.³⁷ The role of Telkom is still significant, and it is the market leader with around 14% market share. The rest of the market is shared between many ISPs. In fixed-line broadband access, South Africa is currently making gains that have broader significance in Africa, where the fixed-line market is generally in its infancy.

³⁵ Source: operators' reports, summarized at <https://businesstech.co.za/news/mobile/266423/south-african-mobile-market-share-vodacom-vs-mtn-vs-cell-c-vs-telkom/>

³⁶ Telegeography GlobalComms Database, accessed 15 May 2019

³⁷ This growth is not yet visible in ITU statistics, reported by ICASA 2019

Figure 5: Fixed-line subscriptions for the period ending 30 September each year



Source: ICASA Electronic Communications Questionnaire 2018

Table 2: Benchmarking penetration, affordability and coverage

Indicator	South Africa (65 th on the NRI)	Kenya (86 th on the NRI)	Nigeria (119 th on the NRI)	Mauritius (49 th on the NRI)	South Korea (13 th on the NRI)
Internet penetration (ITU 2017)					
Internet usage (per 100)	54	16.6	26	53.2	92.7
Active mobile-bb subscriptions (per 100)	70	36	20	144.2	122.7
Fixed broadband subscriptions (per 100)	3.43	0.6	0.04	16.9	41.1
Affordability (ITU 2017)³⁸					
Mobile broadband 1GB (% of GNIPC)	1.24	4	1.9	0.2	1.5
Fixed-BB basket (% of GNIPC)	2.73	37.9	14.9	0.6	1.2
Mobile-cellular basket (% of GNIPC)	1.24	4	1.9	1	0.4
Coverage (GSMA 2018)					
2G Population Coverage (%)	97.8	68.9	59.4	94.4	-
3G Population Coverage (%)	99.4	85.0	76.2	90	99
4G Population Coverage (%)	77.6	36.8	51	36.7	99

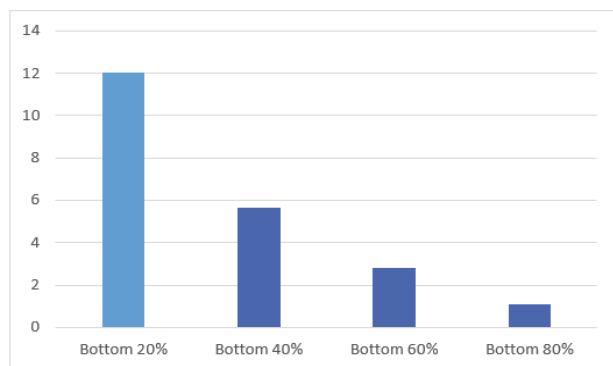
Source: Author's calculations based on ITU (2017) and GSMA (2018) data

38 Price basked methodology available at: <https://www.itu.int/en/ITU-D/Statistics/Pages/definitions/pricemethodology.aspx>

Whereas network coverage gaps in South Africa are closing, the digital divide is increasingly characterized by unaffordability of internet use³⁹. In 2019⁴⁰, the Competition Commission of South Africa in 2019 found that the current data prices are excessively high, noting that existing competition in the sector has not been sufficient to push prices down. Based on Research ICT Africa's⁴¹ Mobile Pricing Index Portal the cheapest mobile 1GB data product on the market in Q3/2019 cost US\$ 6.81, compared with Kenya's US\$ 2.44, Nigeria's US\$ 2.78 and Mauritius's US\$ 5.16, suggesting much room for improvement. On the other hand, based on ITU data from 2017 (Table 1), South Africa's mobile broadband data appear relatively affordable at 1GB mobile broadband data costing 1.2 percent of Gross National Income Per Capita (GNIPC), well below the UN Broadband Commission target of 2%. Based on this measure, South Africa performs well against Kenya and Nigeria, but is far more expensive than Mauritius. Also, ICASA in 2018 found that South Africa's data costs fall in the mid-range of SADC and BRICS comparator countries. The final findings of the Competition Commission's Data Market Inquiry⁴² from December 2019 provide at least a partial way forward in terms of lowering consumer prices, as it mandated both MTN and Vodacom to reach agreements with the Competition Commission on significant price cuts.

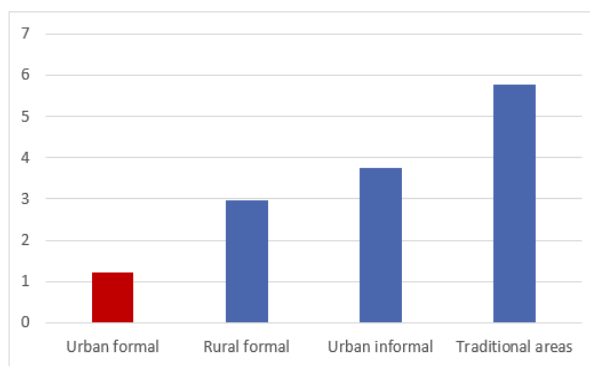
Using data from the Statistics South Africa's Living Conditions Survey 2014/2015, and the ITU prices for 1GB of mobile broadband data from 2018, the bottom 20 percent of South Africa's population would have to spend around 12 percent of their income per capita for 1GB of mobile data (Figure 6), a figure much higher than the ITU average. Geographical analysis shows that South Africans living in rural and informal areas face substantially higher data prices as a percentage of their income per capita, as do demographic groups of blacks and women, in which poverty levels are higher. Results from a 2017 Survey by Research ICT Africa⁴³ point out to a 36 percent gap between rural and urban internet use in South

Figure 6: Price of 1GB of data as a percentage of income per capita by income type



Source: Author's calculations based on the Living Conditions Survey

Figure 7: Price of 1GB data as a percentage of income per capita by geography



Source: Author's calculations based on the Living Conditions Survey

39 Based on the RIA survey from 2017, the majority of those not connected to the internet belong to the lowest two income quartiles (earning less than ZAR 7167 per month) and are disproportionately located in rural areas

40 Data Services Market Inquiry. Provisional Findings and Recommendations. Competition Commission of South Africa 2019.

41 https://researchictafrica.net/ramp_indices_portal/

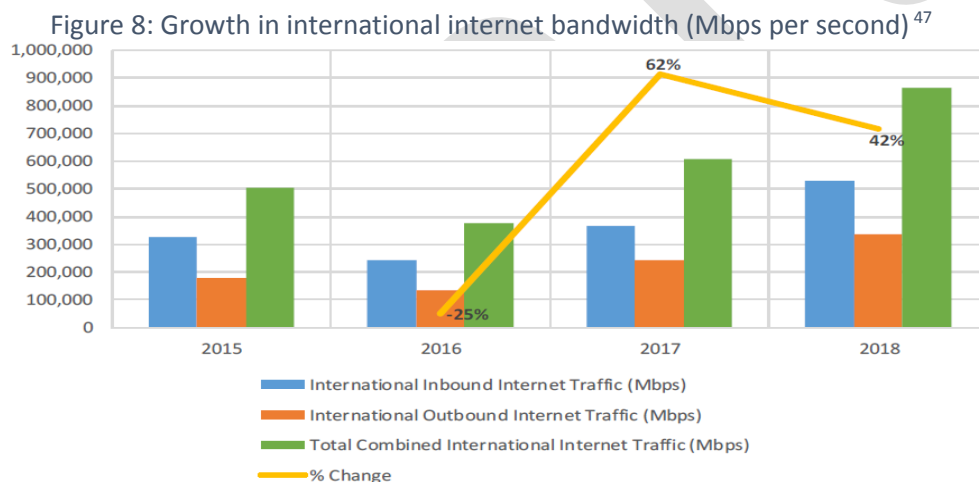
42 Data Services Market Inquiry. Final Report.. Competition Commission of South Africa 2019.

43 Research ICT Africa (2019)

Africa, which may at least partially be explained by unaffordability of use. There are structural issues with pricing that work against poorer consumers: postpaid data is cheaper than prepaid, and people with less disposable income also end up buying smaller data bundles, which are costlier than large ones.

2.2.2. First Mile: South Africa’s International Connectivity

For a long time, international connectivity formed a major bottleneck in South Africa. Until 2009, Telkom enjoyed monopoly on the submarine cables connecting South Africa to the rest of the world and input prices for local internet service providers (ISPs) were high. Today, there are five submarine cable systems landing on both East and West coasts of South Africa with more planned to come online in the next years⁴⁴. Together with an open and competitive international connectivity market this has resulted in significant reductions in bandwidth prices⁴⁵. Based on ICASA operator surveys, the total used international internet bandwidth increased by 61.7% from 2016 to 2017 and by 41.6% from 2017 to 2018 and was around 0.87 Tbps in 2018⁴⁶. South Africa has open international gateways to all its neighboring countries.



Source: ICASA Electronic Communications Questionnaire 2018

2.2.3. Middle Mile: National Backbone Infrastructure

South Africa has the most extensive backbone infrastructure on the African continent. The market has been liberalized since 2005 and has seen an expansion of infrastructure providers since. Overall, South Africa is estimated to have around 200.000km of fiber deployed of which a little over 100.000km in long-distance transmission⁴⁸. By far the largest network is owned by Telkom’s Openserve wholesale subsidiary (over 150.000km in total of which 75.000km long-distance, passing around 300.000 homes). BBI has a network of about 15.000km of fiber and provides managed bandwidth to its customers. Main dark fiber providers include Dark Fibre Africa and Vumatel, estimated to have 20.000km of fiber deployed. Fibreco operates around 4000km and Liquid Telecom 3000km of fiber, covering main cities and towns across the

44 The existing cable systems include: SEACOM, EASSy, West African Cable System (WACS), Africa Coast to Europe (ACE), SAT-3/WASC/SAFE.

Planned include: SABR, SAEx, IOX Cable System, Africa-1, and METISS

45 According to Telegeography market data, the price of a 100 Gbps IRU between Johannesburg and London has come down from US\$87 million to around US\$3,97 million between 2013 and 2018

46 Telegeography estimates are much higher than the ICASA statistics, pointing to 3.39 Tbps in Q4 of 2018.

47 Values for the 12-month period ending 30 September

48 This part based on Competition Commission 2019, Operators’ reports, Research ICT Africa 2018

country. Main MNOs have their own long-distance transmission networks and municipal fiber networks exist in some towns and cities.

SANREN is South Africa's national research and education network connecting academic institutions and campuses⁴⁹. It is operated by The Tertiary Education and Research Network of South Africa (TENET) on a non-profit basis under a collaboration agreement with the Council for Scientific and Industrial Research (CSIR). The network is specifically important for running big science projects at universities and research institutions. For example, it provides national and international connectivity for the flagship Square Kilometer Array (SKA) project.

Overall, the fiber-optic backbone infrastructure has grown increasingly robust, albeit concentrated in more urban areas. Already in 2013, it was estimated that 86% of SA population in 2013 resided within 10km of fiber, after which deployments have expanded significantly. There are six active Internet Exchange Points (IXPs) in the three biggest metro areas of Johannesburg, Cape Town and Durban, the largest IXP in Africa ranking within the top 15 globally⁵⁰. The main challenges with the middle mile are related to duplication of infrastructure and rural reach. The government has a strong presence on the market through its ownership in Telkom and the fully state-owned BBI⁵¹. As the market has showed it is capable to deploy infrastructure to largely meet South Africa's growing needs, privatization of government-owned assets combined with stronger regulation of the wholesale market could be considered.

2.2.4. Last Mile: Reaching the End-Users

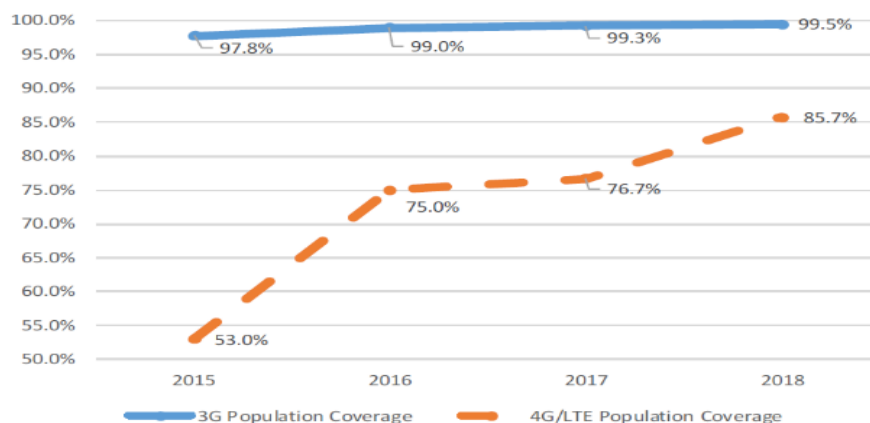
In South Africa, Mobile Network Operators (MNOs) have played an important part in providing connectivity throughout the country. The last mile in South Africa is mostly built, operated and dominated by the four main MNOs: Vodacom South Africa, MTN South Africa, Cell C and Telkom Mobile. In addition, South Africa has a recent market entry of the data-only operator Rain and a growing number of MVNOs. Based on latest ICASA data, mobile broadband network coverage was 99.5% population coverage for 3G and 85.7% for 4G in 2018, the latter going up significantly since 2017 (Figure 9) and compared to ITU data from 2017 (Table 1). The Digital Economy for Africa Initiative's target of 100% mobile broadband coverage by 2030 is virtually reached.

49 <https://www.sanren.ac.za/> Currently the network tracks 1031 sites connected.

50 <https://www.teraco.co.za/news/napafrika-ixp-ranks-top-15-globally/>

51 South Africa Connect. Creating Opportunities, Ensuring Inclusion. South Africa's Broadband Policy. 2013.

Figure 9: National population coverage for 3G and 4G



Source: ICASA Electronic Communications Questionnaire 2018

Quality of Service (QoS) in South Africa is regarded as poorer than in many other comparable countries⁵² and network performance can vary greatly across the covered areas. Delays in spectrum auction have limited the operators' ability to expand their 4G networks and provide faster speeds on existing networks. Spectrum allocations per operator are considerably low by international comparisons. South Africa is first in Africa for average mobile download speeds, but performance varies in different provinces, with speeds in the fastest province (Free State) was 38.7% faster than that in the slowest (Northern Cape)⁵³

There is an estimated 28 000 cellphone towers in South Africa as of mid-2018⁵⁴. Although the majority of these are owned by the two biggest MNO's Vodacom and MTN, they are also built and operated by independent Towercos or in-house tower business units like in the case of Telkom's Gyro Towers. Altogether there are 11 independent Towercos on the market, owning around 1/3 of South Africa's tower infrastructure. The passive infrastructure market is expected to grow as operators divest from their own tower infrastructure.

Fixed-line internet and especially fiber-optic connections to homes and businesses (FTTX) have experienced rapid growth in recent years (*Figure 3*) on the back of the expanded long-distance and metro area open access fiber infrastructure. This has led to duplication of infrastructure in metro areas, but on the other hand has promoted competition and opened opportunities for smaller ISPs. The higher speeds and reliability that DSL and FTTX connections provide are important for the growth of the digital service market. There are signs emerging of operators looking to expand affordable fiber connections also to lower income township markets⁵⁵.

In addition, South Africa has several commercial operators and non-profits utilizing unlicensed spectrum for providing community-level local internet connectivity. South Africa is the only country in the region to

52 Alternative fiber-optic infrastructure is owned and developed by both Eskom (South Africa's public electricity utility) and Transnet (Public operator of ports, railways and pipelines). BBI enjoys exclusive servitude access to these assets.

53 Based on the GSMA Mobile Connectivity Index

54 www.towerxchange.com Issue 23 2018

55 <http://businessmediamags.co.za/business/made-in-sa/is-fibre-lighting-up-the-townships/>

have published TV whitespace regulations⁵⁶, but progress on exploiting the frequencies commercially has been slow.

2.2.5. Invisible Mile: Key Policy and Regulatory Issues

The Government has viewed the current regime of infrastructure competition among MNOs as ineffective, arguing it has resulted in high prices, much infrastructure duplication and an urban bias. Driving down data prices through stronger regulation and more competition has become a political priority⁵⁷, but also a regulatory problem, reflected in the Competition Commission's inquiry into the data markets and ICASA's parallel mobile market review. The proposed Electronic Communications Act (ECA) Amendment Bill of 2018 was designed, among others, to give smaller MNOs better means of accessing high-demand spectrum, encourage more service-based competition and lower data prices. The Bill was withdrawn in early 2019 and its re-introduction and adoption of the legislation has been postponed.

One of the key proposals in the Amendment Bill was to establish a Wireless Open Access Network (WOAN) operator in the wholesale market. Through the WOAN, The Government's objective was to promote more efficient spectrum use and service-based competition for achieving more affordable rates for consumers. The model has experienced much opposition from the market, especially from most of the existing MNOs. The Council for Scientific and Industrial Research (CSIR) in a study⁵⁸ commissioned by the DTSP confirmed the model's feasibility in terms of available spectrum, recommending that 20% of the available high-demand spectrum be assigned to the WOAN. It also noted the need to carry out a proper market study on the model, which to date has not been done. The Competition Commission in its preliminary findings⁵⁹ concluded that the model could increase market competition if correctly structured: it needs to be an effective competitor in the wholesale market instead of a monopoly in any part of it, and requiring vertical separation if operated by an existing MNO.

Despite repeated calls for releasing more high-demand spectrum for 4G use, the process has been subject to substantial delays. The slow progress has created much concern in the market, restricting the operators ability to expand and upgrade their existing networks and to prepare for the introduction of next generation 5G networks. Even though 5G will likely not play a major role in advancing rural access and quality of service, it will play a major part in promoting South Africa's international competitiveness, ensuring continued private investment in the sector and promoting innovation in the digital economy. Through a Policy Direction issued on July 26 2019⁶⁰, the DTSP mandated ICASA to proceed with the WOAN licensing process as well as assignment of high-demand spectrum to other operators. This has been widely regarded as a positive step. After the withdrawal of the ECA Bill, the licensing process will be carried out under the existing licensing regime, guided by the ICT White Paper of 2016 and the Policy Direction. ICASA issued an information memorandum on the licensing process in November 2019⁶¹ and plans to issue an Invitation to Apply (ITA) in 2020. Constraints still remain: the available spectrum is fragmented, and some

56 Innovative Business Models for Expanding Fiber Optic Networks and Closing the Access Gaps. World Bank. 2018.

57 For example, ICASA introduced new rules in April 2018 that specified that operators are not be allowed to charge consumers out-of-bundle rates for data when their data has run out without consumers' prior consent.

58 CSIR (2018)

59 Data Services Market Enquiry. Provisional Findings and Recommendations. Competition Commission of South Africa 2019.

60 Electronic Communications Act (36/2005) » Policy on High Demand Spectrum and Policy Direction on the Licensing of a Wireless Open Access Network. July 26 2019

61 ICASA 2019b

of the identified spectrum in the 700Mhz and 800Mhz bands is still occupied due to the unfinished digital migration process.

Whereas market players interviewed for this study did not raise any major problems related to the current infrastructure sharing regime, some challenges remain. All licensees are required to provide access to facilities on negotiated terms (except if technically and financially unreasonable), but in practice incumbents have often refused access. There are also complaints that gaining permissions from local governments and utilities to deploy broadband infrastructure is expensive and complex. The Amendment Bill was to introduce stronger enforcement around infrastructure sharing, moving to impose ex-ante sharing obligations to vertically integrated operators. It also aimed at establishing a national center to support rapid deployment and necessary permits. Stronger regulation on infrastructure sharing could present an alternative to the WOAN through lowering barriers of entry to the market.

South African cybersecurity, data protection and privacy policies have been proactive compared with many African peers. The Protection of Personal Information Act of 2013 (POPIA) is well in line with international standards and the Constitution of South Africa provides for strong privacy protection. The National Cybersecurity Policy Framework passed in March 2015 focuses on improving institutional coordination, cybersecurity functions, infrastructure and information flows across sectors. In organizing for cybersecurity response, South Africa has employed a distributed model, where the national Cybersecurity Response Committee (CRC) and the Cybersecurity Hub coordinate several sectoral Computer Security Incident Response Teams (CSIRTs). There has been some legal progress, but implementation of the framework has not been as fast as hoped.

2.3. RECOMMENDATIONS & NEXT STEPS

The overall state of South Africa's digital infrastructure is relatively robust and has enabled progressively better market outcomes for consumers. The challenges have moved from expanding network coverage to ensuring access and affordability through regulating an increasingly populated and complex market. Going ahead, South African policies should aim at universal internet access, ensure competitive broadband markets, alleviate concerns around mobile spectrum capacity, improve network performance, promote rural connectivity and stimulate fixed-line adoption.

South Africa needs an updated national broadband policy with realistic targets and implementation models based on international best practice. It should aim for universal fast internet access during the next decade in line with the Digital Economy for Africa Initiative. Instead of continuing to rely on SOEs, grant or guarantee mechanisms to subsidy private sector investment could be considered to incentivize infrastructure roll-out. The Government should also use its anchor position on the market more proactively to stimulate competition, through aggregating its demand for connectivity and have this delivered on a competitive basis. These measures would help attract more private interest into underserved areas.

Ensuring ICASA's independence and capacity under the new merged national department is key. The regulator needs clear mandate confirming its field of play, to help alleviate concerns around its independence and expedite stalled actions such as spectrum licensing. The regulator should also have

sufficient budget resources. The ECA Amendment Bill's proposal for enhancing coordination between ICASA and the Competition Commission appears sound.

The government should prioritize fast-tracking spectrum assignment, to increase network capacity and alleviate constraint that the operators currently face and to take a proactive stance towards next generation 5G networks, to promote South Africa's international competitiveness. The DTPS Policy Direction and the ICASA Information Memorandum in 2019 have been good steps towards this direction. Allowing sharing of spectrum as part of the licensing process, and trading of high demand spectrum if there is no detrimental impact on competition could be considered.

In the WOAN licensing process there needs to be careful consideration of the model to avoid monopolistic outcomes in the wholesale market, maximize private investment and ensure continued incentives to innovate. Although there is room for improvement in mobile competition, it is not clear that the WOAN would solve issues around market competition in the short term.

South Africa should make efforts to encourage further positive developments in the fixed-line broadband market. Promotion of infrastructure sharing, pro-competition open access principles, implementation of transparent wholesale pricing and determination of regulatory remedies could help the market grow. A possible market enquiry into the wholesale market by ICASA could be beneficial to guide these steps.

Ensuring effective access to civil infrastructure such as ducts and poles held by incumbents can have significant potential for promoting competition and further investment in South Africa. Stronger enforcement of the country's existing infrastructure regime and new rules around infrastructure sharing might also be needed to lower costs for new entrants, backed up by more coordination for rapid deployment as proposed by the ECA Amendment Bill.

The USAF of South Africa currently administered by USAASA (and to be integrated into the DDF) should be redesigned to better promote expansion broadband access in the country and innovation in the digital sector. Incentives for de-risking private sector investments in rural areas and accelerating deployment of high-speed fiber in peri-urban areas could be part of the mix, as could be demand-side schemes for subsidizing low-income consumers' communication costs as a more economic option to supply side subsidies. Innovative use of unlicensed spectrum (Wi-Fi, TV whitespace) could be further supported.

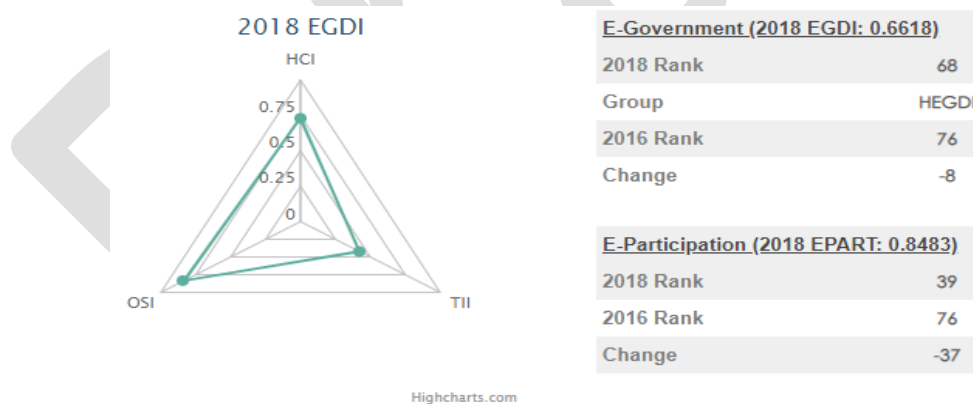
3. PUBLIC DIGITAL PLATFORMS

3.1. BACKGROUND AND IMPORTANCE OF PUBLIC SECTOR DIGITAL PLATFORMS

Digital public platforms serve as an important enabler of digital economy that allows both public and private sector organizations to come up with new or better outcomes for citizens. The discussion of digital public platforms is often equated with the development of e-government or digital government. While the level of digitalization of government is an important reflection of the state of the development of the digital public sector platforms, the core platform components are more foundational. First, they include *facilitation of secure transactions between people and institutions* – through digital ID systems and trust services. Second, it is the *facilitation of data exchanges leveraging common resources* – through interoperability and shared services; and finally, the *interface through which governments engage with the public* – through digital service delivery and applications of core government functions. This chapter discusses the current state of these core components of digital public platforms in South Africa and provides recommendations for their further development.

South Africa is one of the leaders in the region - second only to Mauritius in Africa - based on the UN's 2018 e-Government Development Index (EGDI) (Figure 10). Only four African countries (Mauritius, South Africa, Tunisia and Seychelles) are in the top fiftieth percentile along with countries that have EGDI's above the world average of 0.549. South Africa's EGDI is 0.66 (ranked 68th out of 193) with a high online service index (0.83) and human capital index (0.73), and a lagging telecommunication infrastructure index (0.42). On the other hand, citizen participation index (0.85) is very strong, where South Africa is ranked 39th in the world.

Figure 10: EGDI overview of South Africa⁶²



Source: United Nations (2018) e-Government Survey

The government adopted the National e-Government Strategy and Roadmap in November 2017 to guide the country's digital transformation. The Strategy identifies three e-Government strategic thrusts: (1) e-Government Services Transformation: Standardized national e-services portal; (2) Enhanced e-Governance: Shared platforms, open government, improved governance; (3) Digitally-enabled Society: Digital literacy for citizens, service centers.

62 <https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2018>

Although the activities outlined in the Strategy are in various stages of implementation, the funding appears to be a challenge. This shortcoming requires urgent attention so as not to lose the momentum, at the onset of important initiatives planned for 2019. As important as the scarcity of funding is the shortage of human capacity for implementation. This concerns both the stock of skilled IT professionals as well as the need for constant updating of their skills.

Given the above context, this chapter examines the building blocks for public sector digital platforms to uncover enabling conditions and bottlenecks for the further development of the platforms. These building blocks include: (i) institutional setup for digital government development and management; (ii) data policy and frameworks; (iii) interoperability, back-office systems, and shared systems; (iv) digital ID; and (v) digital service delivery.

These building blocks are tightly interconnected. Institutional setup and leadership underpin the coordination of digital government initiatives. This, in turn, depends on the legal and behavioral norms regarding sharing the data among the Departments and Agencies and the public at large. Coordination and data exchange further enable or hinder the creation and operating of the shared systems, as well as ensuring the interoperability among the systems of Departments and Agencies. Creation of shared systems and ensuring interoperability also depends on how much of the government back-office operations are digitized in the first place. At the interface with the public, the digital ID services are crucial to ensure trust and facilitate secure transactions. Finally, all of these issues impact the ability of the government to provide digital services to its citizens.

Because of the government structure in South Africa, the assessment at the national level can only paint a partial picture of the state of the government digital platforms. Because many of the key services are provided at the provincial level, much drive for the government digital innovation happens there. Although a full subnational analysis was beyond the scope of this rapid assessment, the discussions with the national-level institutions were supplemented by a selective examination of the public sector digital platforms in two provinces: Gauteng and Western Cape. There is a consensus that these two provinces are generally at the forefront of developing digital government solutions in South Africa and thus capture the biggest advances at the provincial level.

3.2. DIAGNOSTIC FINDINGS: CURRENT STATE OF PUBLIC DIGITAL PLATFORMS

3.2.1. Institutional setup for e-government development

There is a great fragmentation and proliferation of institutions at the national level responsible for various platforms and ICT services. The main institutional players include the following:

- Department of Public Service Administration (DPSA). The overall responsibility for public sector innovation is vested in the Minister for the DPSA. It includes the Center for Public Sector Innovation (CPSI), whose mandate is to “to entrench the culture and practice of innovation in the public sector in its entirety.”
- Department of Telecommunications and Postal Services (DTPS). The above-mentioned National eGovernment Strategy was developed by the DTPS. The DTPS was founded in 2014 to focus on “modernizing the economy and economic infrastructure to bring the cost down through the roll-

out of Broadband, e-Government, Cybersecurity, Postal, and Postbank services.” The DTPS is expected to be the facilitator and catalyst for the implementation of the Strategy.

- Department of Science and Technology (DST). DST, along with DTPS and DPSA, is responsible for some parts of the strategy dimension, including producing innovation strategies (somewhat overlapping with those produced by DTPS and DPSA) and ICT Roadmap.
- Department of Home Affairs (DHA). DHA manages the Government’s Home Affairs National Identity System (HANIS), which is being upgraded transformed into the National Identity System (NIS) as a digital identity system to facilitate electronic transactions online, among other improvements.
- State Information Technology Agency (SITA). SITA, originally formed within DPSA, was detached from DPSA and attached to DTPS for the procurement of IT services, standard setting and products authentication, security of government data, and provision of e-government services. SITA is expected to work together with DTPS and DPSA in providing project management and other support to all e-Government projects for the delivery of government services especially at national and provincial levels.
- The Office of the Government Chief Information Officer (OGCIO) and the Government Information Technology Officer’s Council (GITOC). OGCIO and GITOC were established by regulations that came into effect in 2003 under the umbrella of the DPSA. Both aim to bring value to government in terms of ICT use for internal administrative applications and general government service provision to citizens and businesses alike.

This institutional fragmentation leads to coordination and collective action problems, with many blurred, overlapping, and sometimes undefined responsibilities. Following the organizational changes introduced in 2014, the DPSA and DTPS have focused on relevant parts of the e-Government agenda. However, coordination of efforts has been difficult due to multiple regulations and less than clear allocations of roles and responsibilities, despite progress made over the past few years. World Bank (2019) mapped the roles and responsibilities of the various actors in the e-Government space to the EU e-Government framework used by all 34 EU member and candidate countries.⁶³ This comparative analysis (Figure 11) identified several overlaps and challenges with these roles. Critically, coordination role itself is not clearly defined, with DTPS de facto filling this space and assuming this role at times. Going forward, it would be important to clarify the specific role of each key entity to minimize coordination and communication challenges.

⁶³ World Bank 2019: Unlocking Innovation in South African Public Service

Figure 11: Mapping of new governance model to EU e-government model



Source: World Bank 2019: Unlocking Innovation in South African Public Service

The institutional picture looks more cohesive at the provincial level, at least in the two leading provinces: Gauteng and Western Cape.

- Gauteng is the only province in South Africa that has a dedicated Department of e-Government, established in 2015. Formerly a Shared Services Center (SSC) within the Department of Treasury, the Department of e-Government has been building credibility by focusing on change management, specifically changing the internal culture and behavioral norms, fashioning itself as a service center and creating a client-oriented culture toward other provincial departments. Its mandate is the implementation of the Gauteng e-Government Strategy, approved at the beginning of the provincial administration that covers a comprehensive space including digital infrastructure, skills, cybersecurity, big data, and development of e-services, including a single platform (electronic one-stop shop).
- The Western Cape. Like in most other provinces, the e-Government agenda in the Western Cape is driven from the Office of the Premier. The Western Cape Office of the Premier houses a sizeable ICT unit that includes four key directorates and employs about 300 full-time staff and additional 120 contractors. The Premier's ICT unit is responsible for the implementation of the provincial Digital Government Strategy and relies on the ICT units and ICT champions in all provincial departments. The Western Cape Digital Government Strategy is similarly comprehensive as in Gauteng, and includes infrastructure and connectivity, service delivery, information security, data governance, and digital empowerment of both citizens and government employees.

3.2.2. Data policy and frameworks

There are several aspects to the data building block for government digital platforms. On the one hand, there is a question of protection of personal privacy; on the other, there is a push for information sharing and transparency to citizens at large. At the same time, data protection and privacy is not about information being confidential, but rather about the data subjects having consent and control over their data, and data controllers and processors taking appropriate responsibility to secure personal information. This tension between privacy and transparency is again shaped by legal, technical, behavioral, and political economy aspects. However, the underlying premise is that if the privacy of

personal information is protected, there are sizeable benefits of data sharing among the departments and agencies for the benefits of citizens. Data sharing can reduce costs of service delivery: citizens only need to be contacted once; citizens do not need to furnish the data to one agency that another agency already has on file; and in addition, more transparency improves the ability of citizens to monitor and provide feedback on service delivery. A related aspect is the government's capacity to process data and utilize data analytics for policy making, especially in the rapidly evolving world of the big data.

RSA has a Protection of Personal Information (POPI) Act, parts of which recently became effective with appointment of a new Information Regulator. POPI sets out conditions to lawfully process the personal information of data subjects (people and firms). The POPI Act does not require the Departments and Agencies that process personal data to get consent from the data subjects; however, Departments and Agencies information processors are responsible for complying with the POPI conditions. If Departments and Agencies outsource processing, it is also responsible for a failure by their contractors to meet the conditions. The biggest compliance burden is therefore borne by the citizen-facing service-delivery Departments and Agencies that process personal information, such as Departments of Home Affairs or Department of Health.

On the other side of the equation, the open data policy at the national level is driven by the Open Government Partnership (OGP). In its OGP Action Plan, South Africa has committed to developing a pilot national open data portal and consolidating various datasets from across the three branches of government. The main objective is to enable citizens and businesses to easily access government published data. Aside from increasing transparency and accountability, the objective of the portal is also to allow for the development of user-centric applications utilizing data published on the portal. DPSA was the main implementing institution, with support from Government Communication and Information Services (GCIS), Innovation Hub, DTI, and firms and CSOs (OpenUp, Microsoft, Chillisoft). After the piloting phase and early results in 2016, the permanent Portal is currently in its beta testing version. *"The pilot national open data portal and hackathons opened government's eyes to new possibilities of collaboration around open data and has successfully served as the basis for the further development of a permanent open data portal," according to the OGP report. Moreover, "locally, many metropolitan municipalities (Cape Town, Ekurhuleni, Johannesburg, and eThekweni) are in initial discussions for establishing open data portals and/or hosting hackathons. This is evidence of growing interest in using open government data to solve government problems and foster innovation and entrepreneurship."* (OGP Annual Report 2017)

The government has some capabilities for data analytics, but big data use is still an area of growth. A behavioral change is taking place within all levels of the government stemming from the understanding that data needs to be taken more seriously than in the past. Hackathons are increasingly popular to come up with new solutions for public sector problems. Within the Departments and Agencies, CPSI is incentivizing innovative data analytics, including visualization and infographics, through CPSI annual Public Sector Innovation Awards that focus on innovative ways to improve service delivery and evidence-based decision-making. The demand from policy-makers is growing, hence these capacities are being developed at a faster pace.

At the provincial level, there is a similarly upward trajectory for the demand for data analytics and utilization of big data.

- Gauteng. Big data analytics are part of the provincial e-Government strategy. Because Gauteng is geographically smallest but demographically largest while also enjoying a relatively high level of development, the province can entice private sector and national government support to pioneer big data approaches. There are currently three big data projects in the province (education, treasury, and Office of the Premier) being implemented through PPPs (including with Microsoft and local companies and academic institutions). Demonstration effects are expected within three years.
- Western Cape. The provincial government has pursued a goal of data-driven service delivery and decision-making. It has become very capable at collecting the data for monitoring but is still ramping up its capacities to analyze and act upon the data. This requires a certain shift in the mindset that was spearheaded by the Western Cape Delivery Support Unit (DSU) in the Office of the Premier. DSU's trademark has been very strong data analytics to drive the implementation of Premier's priorities (game changers), which has had a demonstration effect for other Departments and Agencies.

3.2.3. Interoperability, Back-office systems, and shared services

Because interoperability relates to data and process sharing among Departments and Agencies, it involves technical, legal, and behavioral aspects. South Africa has a recently-updated national-level policy document on interoperability. The basic premise is that because all IT procurement is centralized in SITA, the procured systems should by design adhere to a minimum interoperability standards (MIOS). However, in practice this is not always the case. Sometimes there are technical reasons, such as legacy systems that precede SITA and MIOS; at other times, there is a lack of connectivity at the last-instance service delivery point (e.g. maternity ward) that prevents accessing a more centralized database (e.g. Department of Home Affairs and birth registrations).

In theory, the OGCIO coordinates through GITOC to ensure the MIOS; however, this does not always result in interoperability in practice. There are also legal and legislative hurdles that prevent exchange of data among Departments and Agencies, including the POPI Act that limits the ability of departments to share information. Some of these issues are also behavioral, where there is reluctance to share information that may be a source of power or revenue. At the technical level, there is no concerted push for mainstreaming of Application Programming Interfaces (APIs) that would allow limited queries from one system to the other. The latest version of MIOS does not even refer to APIs, which suggests there may be a capacity issue relating to the understanding of the latest developments in the field. At the provincial level, there are limited legacy systems, so interoperability is easier to ensure given that most of the digital systems are new.

Key back-office systems are mostly digitized in South Africa at the national level. This includes the transversal systems, such as financial management, payroll and procurement. SITA is responsible for the maintenance of these systems, even if some of them have been developed with the assistance from private sector, often decades ago. National Treasury is the owner of these key systems and the driver of the reform. Crucially, however, the transversal systems are not fully integrated and are becoming outdated. The beginnings of integration efforts date back to 2003 and have still not been completed. The transversal systems are shared between the national and provincial levels. At the provincial level, there is still a preponderance of manual systems in health and education, mainly due to the limited broadband availability at the level of schools and clinics.

There is no single Electronic Government Procurement (e-GP) system in South Africa covering a comprehensive end-to-end processes of procurement system conducting procurements using functions and tools online, except the publication of transversal procurement (like a Framework Agreement) in g-Commerce portal, which is already in use. In April 2015, the Office of the Chief Procurement Officer (OCPO) launched the e-Tender Publication portal and the Central Supplier Database (CSD). National and provincial departments publish their tenders in accordance with the demand plans for acquisition of goods, services and infrastructure. The e-Tender portal was the first step towards implementing government's e-GP system as part of the Integrated Financial Management System and directly contributed to reducing duplication, fragmentation and inefficiency in government tender publications. However, it would be advisable to implement the end-to-end e-GP system covering all procurement processes addressing all the dimensions of public procurement good governance dimensions like transparency, accountability, efficiency and effectiveness, equity, rule of law, predictability, citizen engagement and value for money for socio-economic development.

Shared or common ICT services are a growth area at both national and provincial levels. Nationally, as of April 1, 2019, SITA was expected to launch South Africa's first government cloud (gCloud) platform. SITA partnered with private sector companies (Gijima, IBM and Huawei) to develop gCloud. Departments of Higher Education and Training, Department of Labor, National Space Agency, and Gauteng provincial government are among the early adopters, and have relocated their storage and hosting from data centers to the gCloud. Introducing gCloud as a shared service for Departments and Agencies will contribute not only to modernization, capability and improved services, but also to government business continuity.

In addition, at the provincial level, there is further push toward common ICT services. These efforts focus as much on the technical part of the issue as well as on the change management requiring behavioral changes, including building trust in centrally provided systems.

- In Gauteng in 2018, provincial Cabinet approved the centralization of five functions in e-Government department: broadband, SAP enterprise resource planning, Microsoft licensing, Security Operations Center (SOC), and data center services.
- In Western Cape, some of the shared services include: the provincial project management system (Microsoft-based); internal data governance; and client relations management. There is also a shared website for all provincial departments maintained centrally; however, updating is a challenge as it is not an ICT issue but rather a communication strategy issue. Western Cape is also at the forefront of integration of the transversal systems (FM, payroll, procurement), although the effort is driven nationally by the National Treasury.

3.2.4. Digital Identity

Trust in a person or entity's identity is critical for the ability of governments, firms and citizens to engage in various transactions, including service delivery. Official forms of identification, e.g. ID cards, birth certificates and passports, have traditionally served this purpose, but the emergence of the digital economy has necessitated verifiable digital identity credentials. Digital ID systems facilitate the secure identification and authentication of a person, entity or device—both in person and/or online—and bind the user of an online transaction with their “real world” or legal identity. Combined with digital certificate services (e.g., public-key infrastructure or PKI), they are also the basis for e-signatures, which enable knowledge, approval, acceptance, or obligation to be indicated without physical presence.

South Africa has a strong identity ecosystem comprising digitized and fully-integrated national ID and civil registration systems, which are built on a comprehensive national population register.⁶⁴ The Department of Home Affairs (DHA) is responsible for maintaining these systems, including the provision of registration and related services through 574 offices at regional and district levels, and mobile units that travel across the country. The national ID system is known as the Home Affairs National Identification System (HANIS), and it includes fingerprints for biometric authentication and deduplication. Since 2013, DHA has been replacing expired green barcoded ID books with a national ID smartcard, which is expected to be completed by 2023. However, the rollout has been slow, owing to the fact that less than half of DHA offices are equipped with equipment to electronically capture fingerprints, which is a requirement for the new smartcard.

The 2017 ID4D-Findex survey found indicates that 92 percent of the population in South Africa aged 15 and above has a national ID card (either the green barcoded ID book or the new national ID smartcard, with lower levels of coverage among vulnerable populations. Combined with the current high birth registration rate, an estimated 90 to 95 percent of South Africa's population are registered. This places South Africa among the highest levels of ID coverage in the world, let alone in Africa. Two key reasons for the high coverage are: (1) that registration services are widely-accessible across the country, including in hospitals for birth registration; and (2) that the national ID and civil registration system are used for public and private sector service delivery, therefore generating demand for and value in these systems. Crucially, the DHA has committed to addressing disparities in coverage among vulnerable populations such as migrants and refugees.

Usage of the national ID system for identity authentication is largely limited to face-to-face transactions, except for some banks having access (in some cases for a fee) to remotely verify information against the HANIS for customer onboarding. This service through HANIS have enabled users to reduce fraud and administrative costs, such as eliminating staff time needed to manually validate ID documents. In 2016, the Minister for Home Affairs speculated that approximately R322 million was being saved per month⁶⁵. It is noteworthy, however, that few other sectors have the opportunity to leverage the HANIS for identity verification services, which points to a conclusion that the full impact of the HANIS is not necessarily being realized.

The DHA is in the process of transforming itself, including to replace the HANIS with a National Identity System (NIS) that will support digital identity and authentication, which are prerequisites for trust in the digital economy. A policy white paper on the repositioning of DHA was released for public comment in early 2019.⁶⁶ The white paper acknowledges that the DHA has an opportunity to accelerate South Africa's development by introducing a NIS that would be a platform that enables trusted electronic transactions online, as well as underpin smarter digital government. However, it is notable that the white paper does not consider alternative models to a centralized digital identity system, such as a federated model as what operates in the UK and Scandinavian countries, and is emerging in Canada, Thailand and several other Asian countries. Such federated models work best in countries with a dynamic private sector who can act as third party digital identity providers (along with public sector entities such as DHA) and a strong capacity to regulate and supervise those digital identity providers, which, it could be argued, South Africa possesses.

64 World Bank, 2019. South Africa Identification for Development (ID4D) Case Study.

65 Banks fight fraud with home affairs system, <https://www.itweb.co.za/content/APero3qZe9AMQb6m>

66 Department of Home Affairs, 2019. White Paper on Home Affairs. <http://www.dha.gov.za/files/dhawhitepaper.pdf>

An important opportunity exists for South Africa to introduce a new digital identity system that will drive inclusive growth of the digital economy and facilitate cross-border transactions (both within Africa and abroad), and could be a model for other countries. Crucially, South Africa has what many other countries, particularly in Africa, lack: high coverage and a strong existing national ID system (for face-to-face transactions). These are assets that can be leveraged to effectively build a digital identity layer on top, whether centralized or federated. In order to be successful, the NIS should be designed as a platform and with interoperability in mind, and digital identity should be seen as a whole-of-government issue and not one exclusively for DHA to solve, which is evident by the removal of “Home Affairs” from the name of the new system. For instance, there are use cases such as online land or business registration that will make doing business easier, and others such as social assistance that will accelerate efforts to reduce inequalities and poverty. Furthermore, building on the white paper, consideration should be given to exploring a federated model for digital identity in South Africa - at least in the long-term - looking to best practices from across the world, particularly related to data protection and privacy-by-design⁶⁷. Finally, South Africa can demonstrate leadership on mutual recognition of digital identities within SADC and across Africa, which can boost regional integration and, importantly, South Africa’s digital economy

3.2.5. Digital Services

Digital service delivery has received much attention in South Africa in recent years. The 2017 National e-Government Strategy and Roadmap includes a vision “to digitize government services while transforming South Africa into an inclusive digital society and economy.” This national strategy encompasses several specific objectives linked to public service delivery and innovation both in public and private sector, including developing capacity and skills for effective service delivery, fostering innovation in technologies and applications to service delivery (e.g. cloud computing, big data, internet of things, mobile innovations), and transforming the way government interacts with citizens while providing services.

National e-Government Central Portal had been launched in 2018, for access to selected online services, as a part of new e-Government roadmap; however, there is currently no inventory or registry of all online services maintained by DPSA or DTPS. The UN’s four-stage maturity model of e-Government has been selected to categorize online services, in line with good practices seen in many countries. SITA is expected to develop the necessary integration platform to connect each department back-end systems with the central portal (front-office) with the objective of improving the level of online services (connected services).

Because there is no single portal for digital services at the national level yet, it is not immediately possible to take stock how many services have been automated and at what level. Currently, DTPS maintains two domains www.gov.za and www.services.gov.za with different classification of the partial list of the existing digital services. However, the process of digitization and automation is quite decentralized across individual Departments and Agencies; these tend to do the work either in-house, or through SITA, or by utilizing public-private partnerships. New services and apps are added online frequently, mostly at levels 1-3 of automation. There is a growing number of mobile applications.

⁶⁷ The ten Principles on Identification for Sustainable Development, which have been endorsed by 25 international organizations, offer a useful guiding framework of best practices. They are available at <http://id4d.worldbank.org/principles>

Provincial governments and municipalities have their own websites and menu of services. Provincial governments are the providers of key services such as health and education, as well as local police, agriculture, transport and other services.

- Gauteng. As part of the implementation of the provincial e-Government strategy, the Department of e-Government has developed a single online platform for service delivery by the province that was launched on May 13, 2019. However, starting already in 2018, 42 e-services went live on the new platform as a “minimum viable product.” The Departments of Health, Education, Agriculture, Roads & Transport, and others are the service providers, while the Department of e-Government serves as a facilitator for the design, validation, and quality control for digital services.
- Western Cape. The current modernization efforts focus on higher levels of automation – i.e., moving towards transactions online. Western Cape adopted citizen-centric approach. This includes determining the demand for particular services that citizens would like to access online and focusing on developing the associated systems. This has led to digitizing popular services, including: (i) health - patient-doctor interface (single patient view); (ii) transport – integrated transport app with a scanning function (licensing; fines); (iii) agriculture – farm inspectors can automatically upload their reports with digital PINs; and others. In addition, citizen-centricity also involves actively pushing information and select services to citizens via online or mobile platform, rather than simple access to services.

3.3. RECOMMENDATIONS AND NEXT STEPS

The state of the digital platforms in South Africa reflects both the country’s relatively advanced position on various digital government dimensions, as well as some of the bottlenecks related to their resourcing, coordination, and M&E. To achieve the Digital Economy for Africa targets for all South African citizens, the key recommendations for public digital platforms include:

First, it is crucial to adequately resource the implementation of the national and provincial digital government strategies. A consistent feedback from the implementing Departments and Agencies has been the shortage of resources for the implementation of the National e-Government Strategy and Roadmap. Reviewing the available resources at both the national and provincial level would be the first step toward making this agenda a priority, consistent with President Ramaphosa’s call to use Fourth Industrial Revolution technologies to accelerate the improvement of people’s lives in South Africa. If a budget shortfall is indeed identified, then fostering public-private partnerships could be one of the possible solutions.

Second, for these efforts to succeed, it will be important to improve coordination and communication among Departments and Agencies driving this agenda at the national level. The analysis in this chapter identified a fragmentation and proliferation of institutions at the national level responsible for digital government, leading to coordination and collective action problems, with many blurred and overlapping responsibilities. Coordination role itself is not clearly defined. In order to consistently drive and implement

this agenda, it will be important for the center of government to clarify the specific role of each key entity involved in the digital government at the national level.

Third, taking a holistic view of interoperability challenges will remove some of the existing bottlenecks. To achieve better interoperability, a set of interdisciplinary measures are required. First, a legal and regulatory review is needed to ensure that the Departments and Agencies are legally allowed to share data. Second, a concerted push to mainstream APIs would help to ensure that the databases of various Departments and Agencies can communicate with each other on a selective as-needed basis. Finally, an adoption and implementation of a change management strategy would allow to target behavioral constraints for further data sharing and openness.

Fourth, digital capacity building within public sector requires more emphasis. SITA provides training on the transversal systems but training on data skills, big data analytics and broader aspects of e-Government and digital platforms are lacking. Considering the role of government training institutions such as the National School of Government (also under DPSA), there is an opportunity to rethink the offerings of such institutions. Other institutions (e.g. Canada School of Public Service, Brazil's ENAP) already offer Big Data Fundamentals and Analytics and related subjects.

Finally, taking stock, monitoring and evaluating the development of digital services will greatly improve their efficiency, cost-effectiveness, and citizen-centricity. While government digital services are clearly an area of rapid development in South Africa, the process is very decentralized and seems poorly coordinated and monitored. This will ultimately constrain the uptake and efficiency of provision of these services. To this end, an entity should be identified that would take stock of all the digital services available at the national and provincial levels and monitor the number of users and transactions. This will avoid duplication and will aid in further improvement and efficiency of e-services. Eventually, it will also help to make digital service delivery more citizen-centric.

4. DIGITAL FINANCIAL SERVICES

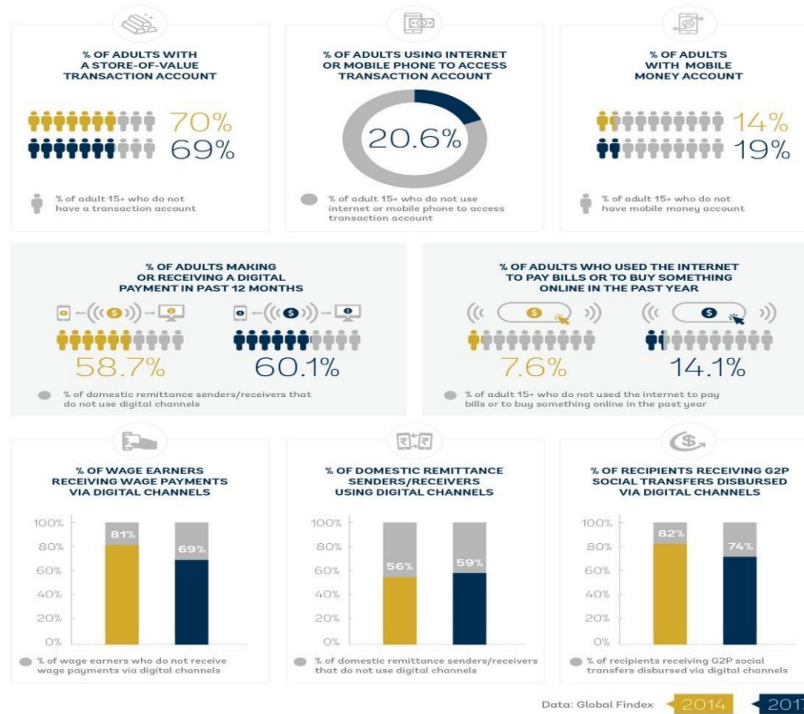
4.1. BACKGROUND AND IMPORTANCE OF DIGITAL FINANCIAL SERVICES

Digital financial services provide individuals and firms with convenient and affordable channels by which to pay, as well as to save and borrow. Firms can leverage digital financial services to more easily transact with their customers and suppliers, as well as build digital credit histories and seek financing. Governments can use digital financial services to increase efficiency and accountability in various payment streams, including for the disbursement of social transfers and receipt of tax payments. A digital financial services ecosystem requires a forward-looking and proportionate legal and regulatory framework (e.g., to allow market entry and innovation), robust financial infrastructures (e.g., national payment systems and credit reporting systems), and development and deployment of low-cost delivery channels (e.g., agents, point of sale devices, automated teller machines, mobile phones). South Africa's financial sector is adopting digitization across wide range of financial segments including payments, savings and deposit, lending, insurance and capital markets. Amongst these the payment and lending segments are most prominent and the main focus of this section.

South Africa has made significant progress on access to digital financial services (DFS), however concerted efforts are needed to further increase usage of available financial services. Despite the wide range of payment options available in the sophisticated banking system, cash remains a dominant means of payment for a large percentage of the population. Given high unemployment and inequality, the disparity between the available financial services in the advanced side of the economy and the needs of the consumers particularly in the less advanced side of the economy is significant. Government and the private sector have over the years embarked on initiatives aimed at addressing this disparity and these have included introduction of cards for social benefits, shift of government payments from cash to electronic transfer, financial products and services for the unbanked, including domestic and cross border money transfer services, airtime transfers, bill payments.

According to the 2017 Global Findex survey, 60 percent of South Africa adults (ages 15+) reported having made or received a digital payment in the past year, well above Sub-Saharan Africa average. While the 60 percent is in line with the average for middle-income countries, there is room to significantly increase usage of available financial services as shown in Figure 12.

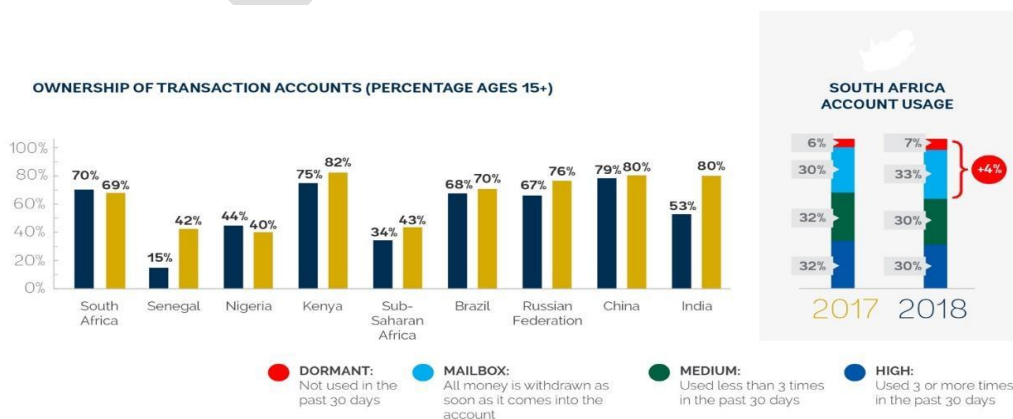
Figure 12: Uptake and usage of digital financial services in South Africa



4.2. DIAGNOSTIC FINDINGS: CURRENT STATE OF DIGITAL FINANCIAL SERVICES

Account ownership among South Africans is significantly higher than in the Sub-Saharan Africa region and on par with middle-income countries (MICs). According to the 2017 Global Findex survey, 69 percent of adults (ages 15+) have an account at a financial institution or used mobile money account compared to 65 percent for middle-income countries. Compared to regional peers on account ownership, South Africa exceeds Senegal and Nigeria by a wide margin but lags Kenya. However, when compared to its BRICS peers it is on par with Brazil but lags China, India and Russia. The shift in government payments from cash to electronic transfer methods such as direct deposits to bank accounts and usage of pre-paid cards made a significant contribution to account ownership in South Africa.

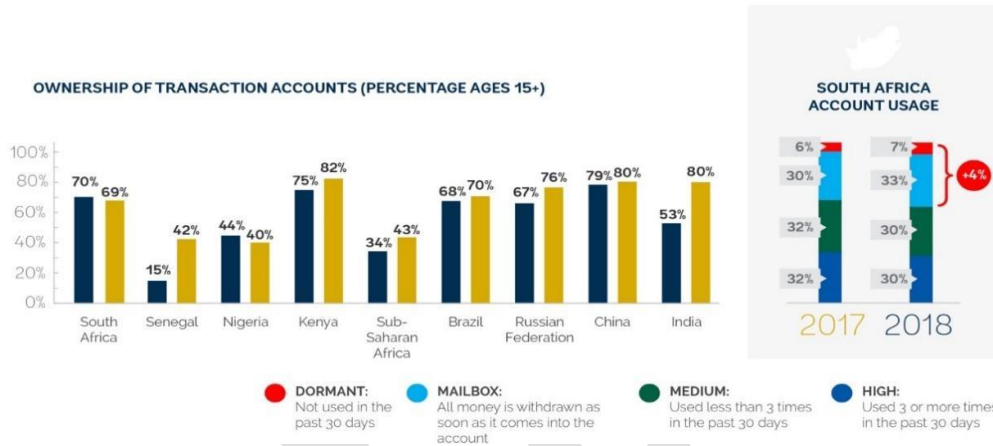
Figure 13: Ownership and usage of transactional accounts for adults (percentage for ages 15+)



Source: World Bank Global Findex Survey; South FinScope Survey 2018

Though 60 percent of South African adults reported having made or received digital payments, the usage of debit cards (other than for cash withdrawal) and other electronic payment instruments remains low. Even among individuals holding a transaction account with a bank, 33 percent still withdraw all their money as soon as it is deposited.⁶⁸ Only 20.6 percent of adults used mobile phone or internet to access an account compared to 72 percent in Kenya and 29 percent in Senegal. Moreover, of the percentage of adults paying for utility bills, only 32 percent used an account while 64 percent used cash only.⁶⁹

Figure 14: Adults having made or received digital payments during the past year (percentage for 15+)



4.2.1. Role of Banks in provision of DFS

South Africa has a large and sophisticated banking sector that is investing significant resources in digitization. As at end of 2017, the banking sector which is dominated by five⁷⁰ major banks had assets accounting for 108 percent of GDP. Many banks have digital strategies to modernize their delivery channels and enable use of digital data for decision making purposes. In 2016 major banks in South Africa spend between 10 percent and 18 percent of operating costs on IT expenditure.⁷¹ Disruptive innovation in the traditional deposit-taking space has seen more digital banks enter the market, these include Discovery, Tyme and Bank Zero⁷².

In response to changing customer needs, many banks have modernized their delivery channels to facilitate provision of digital banking mechanisms through the internet banking and mobile banking applications. A wide range of electronic payment instruments are offered (payment cards, electronic fund transfers etc.) and the volume of electronic transactions has been on the rise over the past years with electronic fund transfer largely replacing cheques and widely used by employers to pay salaries.

In South Africa, only locally registered banks may issue e-money, since issuing e-money is considered as deposit-taking.⁷³ Hence, despite a high mobile phone penetration, mobile money market is still in its infancy with only 19 percent of South Africans (ages 15 years +) having a mobile money account. Non-

68 FinScope 2018.

69 Global Findex, 2017

70 Standard Bank, FNB, ABSA, Nedbank and Investec

71 COEFS, Impact of Fourth Industrial Revolution on South Africa Financial Services

72 However, it should be noted that these banks might still require certain on-boarding requirements to be conducted in person

73 E-Money can be further differentiated into prepaid cards, online money and mobile money.

banks attribute the low percentage to the legal framework that requires non-banks to offer their services jointly with a bank, which reduces profitability and flexibility in their product and service offering. Existing mobile money solutions are not interoperable, resulting in a limited network size and/or customer acceptance. The relatively high share of the population that has a transaction accounts reduces the incentive to open mobile money accounts. However, the high propensity of over-the-counter domestic remittances indicates that there are payment service needs currently unmet by transaction account offerings by banks.

Despite broad range of DFS service and products offered, usage of DF services and products remains low due to factors ranging from high infrastructure cost to low customers awareness and preference for cash. As the World Bank South Africa Retail Banking Diagnostic (2017) highlighted, product design and fees on transaction accounts by major banks do not distinguish between low-income and high-income customers thus making these products costly for low-income customers. In addition, consumers may be reluctant to use internet or mobile banking due to high cost, including the cost of data / airtime to access such electronic services, as highlighted in the financial infrastructure section of the report. Importantly, for at least a portion of the population, and not necessarily because of low income, there is likely to be a strong preference for human interaction, whether due to a lack of understanding, or lack of trust or comfort, with electronic channels.

4.2.2. Role of Fintech and non-banks in DFS

Digital developments have also been observed in other areas of the financial system from lending to capital markets. Fintech has the potential to increase access to financial services through digital channels and by reducing barriers to entry. In line with the Bali Fintech Agenda we have used the term fintech to describe the advances in technology that have the potential to transform the provision of financial services spurring the development of new business models, applications, processes, and products. South Africa's fintech industry is small – with a current estimation of 219 firms⁷⁴ - but growing and gaining international recognition. The large majority of fintechs in South Africa provide services already provided by traditional financial services providers such as banks. However, fintechs aim to provide these services faster and cheaper, often servicing low income consumers who have been historically excluded. There are however several barriers to growth and scale such as the funding environment and the shortage of skills as highlighted in the digital entrepreneurship and digital skills sections of the report.

The use of smartphones as mobile point of sale devices is reducing the cost and complexity of payments. As with other regions across the world, mobile payments have been the first area to be disrupted by the new wave of emerging technology. Solutions like Snapscan and Zapper are eliminating the need for point of sale devices altogether. These are being supported by innovative security measures such as location-based identification, biometrics, and card tokenization which protects customers and increases confidence in digital channels.

Bank-fintech collaboration in South Africa has matured as the fintech market developed. This contrasts with the early approach which was to acquire fintech to limit their growth. The market is now seeing much more collaboration in this sector from bank-sponsored fintech accelerators to partnering with startups, which is also leading to the development of more business to business (B2B) solutions such as those for digital ID or cybersecurity. Another interesting feature that has been associated with the development of

74 Fintech Landscaping report forthcoming: National Treasury, World Bank, Genesis

fintechs is the growth of banking-as-a-platform where a platform sometimes housed by a bank draws in products and services from an array of innovative third-party providers that exist outside the core banking architecture.

Besides fintech, several banks use third-party agents to facilitate customer acquisition and product usage while several banks use retail stores (e.g. Shoprite, Pep, Pick'n Pay) to facilitate transactions. Services provided by these retailers consist essentially of domestic money transfers, cash back from bank accounts (including social grant payouts), third-party bill payments, and the sale of co-branded access-type accounts. For example, ABSA bank has a relationship with Pep whereby co-branded PEP plus debit cards can be purchased at Pep via an off-the-shelf debit card. The Pep staff at the till undertake the necessary customer due diligence requirements.

Third-party agent models have not been sufficiently leveraged to reach the 'last mile' and improve access for financial consumers in South Africa. While data gaps and limitations do not allow for a robust comparison of agent networks across countries, it appears that South African banks have not fully leveraged the potential of third-party agent models to reduce transaction costs by using existing infrastructure to reach financial consumers.

4.2.3. Policy and Regulatory Environment

In 2018 National Payment System Framework and Strategy Vision 2025 was launched and National Payment System (NPS) policy document was issued. The strategy focuses on a broad range of reforms including promoting competition and innovation, interoperability, flexibility and adaptability and financial inclusion. To achieve this objective the SARB using its statutory payment system oversight and regulatory powers has initiated the review of NPS legislative and regulatory framework and has issued policy paper on required changes to the NPS Act and related regulatory framework.

The Payments Association of South Africa (PASA) a payment system management body with delegated authority from the SARB is the main regulatory body for retail payments in South Africa. PASA's mandate is to authorize retail payments system operators to operate in the South African NPS. PASA is governed by a constitution that defines its functions, structures and activities as a self-regulatory body. Currently PASA has 28 members, all of which are banks with two exceptions: Diners Club and Postbank which are "designated clearing system participants". In addition, PASA has authorized 4 PCH system operators (Visa, MasterCard, BankservAfrica and Strate) and 80 payment system operators.

Importantly, the 'twin peaks' regulatory and supervisory model adopted in 2018 has key implications for NPS supervision. The reform has led to establishment of a new regulator, namely the Financial Sector Conduct Authority (FSCA) that will be responsible for market conduct issues that impact customers in the payment environment. The definition of the scope of the FSCA's involvement in the payment system is yet to be finalized and included in the relevant regulatory provisions. ⁷⁵

Policy and Regulation - Market Entry

The non-banks role in payment space is constrained due to regulatory barriers. The South Africa Banks Act limits the activities of taking deposits and provision of payment services to banks. Article 1 of the Act clearly sets out definitions for a deposit and the business of a bank which clearly delegates payment

⁷⁵ Review of the National Payment System Act 78 of 1998, Policy Paper, September 2018, SARB

intermediation to banks and prohibits 'non-banks' from accepting deposits, unless sponsored by a bank. Under the NPS Act, non-banks can operate as third-party payment providers to process payments that are due to third parties.

Policy and Regulation - Delivery Channel and Innovation

An Intergovernmental Fintech Working Group (IFWG) has been established to provide a mechanism for policy makers and regulators to jointly understand fintech developments and create an enabling Fintech policy. IFWG is comprised of representatives from the National Treasury, the South African Reserve Bank, the Financial Sector Conduct Authority, and the Financial Intelligence Center (FIC). Based on initial consultations with industry and civil society, including fintech firms, the IFWG formed workstreams, including on private crypto assets, peer to peer lending, innovation policy and engagements (including the formation of innovation hubs).

The IFWG is working on Fintech policy and strategy for South Africa to develop a conducive regulatory environment. Moreover, a position paper on crypto assets was developed by SARB in 2014 which highlighted benefits and perceived risks. Based on extensive consultations coordinated by IFWG a consultation paper on crypto assets released for comment in January 2019.

Innovation hubs are being considered to stay apprised of fintech developments while providing an environment for collaboration. Three structures have been proposed as part of the Innovation Hub: an Innovation Accelerator, a Regulatory Guidance Unit, and a Regulatory Sandbox. The Innovation Accelerator as currently modelled will be an internal SARB structure, led by the Fintech Unit, to fast-track new processes or approaches. The Regulatory Guidance Unit is intended to provide non-binding guidance to fintech and financial sector private sector actors navigating the regulatory framework. A Financial Sector Regulatory Sandbox is also proposed to enable live testing of innovations in a controlled environment while dialoguing with the regulator. Both the Regulatory Guidance Unit and Regulatory Sandbox will be jointly owned by the IFWG. The development of these structures is ongoing.

The South African NPS has achieved full interoperability of ATM infrastructure through the SASWITCH service provided by BankServ Africa. However, in their quest to facilitate person to person (P2P) transfers and purchases of goods and services, banks and other non-bank players have developed innovative products that have led to a proliferation of proprietary payment instruments (e.g. mobile money, prepaid cards) and proprietary payment solutions (e.g. domestic remittances, transit payments) which are not interoperable.

The use of Quick Response (QR) code payment schemes is also fast finding its way into the South African market; however, these schemes are also not interoperable. Unless significant interoperability is achieved adoption of this technology by consumers and merchants may fail to achieve scale. Although some efforts are reported to be under way by some providers to address this, an industrywide initiative may be ideal to achieve full interoperability. An opportunity to establish interoperability at the technical/operational level based on a commercial model which attracts under- and unserved end customers has therefore not been exploited.

Exclusivity arrangements are present in the market and will continue to hamper competition. Western Union and MoneyGram are the dominant players in the money transfer operator space and have included exclusivity clauses in their agent agreements with banks and exchange bureaus. The existence of exclusivity agreements prevents remittance service providers from competing on the price and quality of

services offered and acts as a barrier to entry of new remittance service providers, and stifles opportunities for promoting more efficient use of existing infrastructure.

The cost of compliance with customer due diligence (CDD)/know your customer (KYC) requirements has always been viewed as onerous by the banking industry, yet the cost of non-compliance can have far reaching financial implications. A collaborative initiative by the banking industry to introduce KYC centrally managed services is underway and this is expected to bring efficiency and reduce costs.

South Africa legislation allows for simplified KYC requirements up to certain thresholds; however, a review is needed to ensure these thresholds are not creating barriers to access and usage.⁷⁶ “Exemption 17” applies to low-value transactions in general and creates a second tier of compliance that aligns compliance requirements with lower risk. In addition, SARB guidance note also provides exemption for mobile banking and new forms of remote banking. The maximum limit for low-value transactions and debits from such an account is up to R1,000 per day above which full verification is required. For cross-border remittances, the exemption applies to transactions of funds not exceeding R3000 per day and R10 000 in a calendar month. The aim of this exemption is to reduce the costs involved in remitting funds and thereby encouraging remitters to use formal channels for funds transfers.

Policy and Regulation - Managing Risks of Digital Finance

Currently, the consumer protection framework, does not cover non-bank financial service providers, including payment services. The Conduct of Financial Institutions (COFI) Bill which is envisaged to provide comprehensive market conduct requirements under which the FSCA will operate was published for public consultation in December 2018. It is important that the bill provide adequate provisions on market conduct supervision including for payment service providers. In addition, FSCA is currently developing product standards to improve disclosure requirements for various banking products, it would be important to develop such standards for digital financial products.

The protection criteria for e-money customers’ funds is provided in the SARB Position Paper on Electronic Money. In line with the requirements of the Bank Act, the Position Paper requires that banks managing e-money products hold these in a separately identifiable e-money account for each holder of e-money and comply with the relevant sections of the Banks Act and its Regulations. In addition, a bank, as the holder of an e-money deposit, must, on demand, redeem the electronic value held on the instrument for central bank currency, at par. Issuers of e-money are also required to ensure that e-money users are made aware of the conditions of use, the liability of the issuer and what recourse the holder of the e-money would have in relation to the issuer.

In 2017, SARB issued guidance note on cyber-resilience encouraging banks to adopt international practices related to cyber-resilience.⁷⁷ Based on SARB on-site information technology reviews of banks, key findings suggest that maturity of IT risks at some banks require further improvement. In addition, though banks have adopted internationally recognized best practices and IT risk frameworks, these frameworks still need to be tailored to South African banks’ specific needs. Importantly the findings suggest a lack of adequate cybersecurity skills, both locally and internationally. Owing to the increasing

⁷⁶ The exemptions to the general integrity principles for low-value transactions are established under the Financial Intelligence Center Act.

⁷⁷ The guidance note was issued following the issuance of CPMI and IOSCO guidance on cyber-resilience for financial market infrastructures in June 2016

nature and complexities of cyberattacks, most banks have increased their resources, financially and/or otherwise, to counteract the onslaught of cybersecurity. In addition, industry collaborations and information sharing with other industry players is reiterated as being crucial.⁷⁸

4.2.4. Infrastructure: Retail Payments Infrastructure

South Africa's National Payment System (NPS) is well developed and has benefited from many years of dedicated payment systems reform efforts. The main players in the retail payments landscape comprise: banks and non-bank service providers including payment clearing house system operators, system operators and third-party payment providers.

Non-bank service providers' access to the payment system is not automatic and has to be authorized subject to specific requirements. BankServ Africa, a privately-operated automated clearinghouse (ACH) is the main player responsible for processing retail payments in South Africa. It is responsible for switching and clearing interbank obligations for retail payments such as electronic fund transfers (EFT), cheques, card, internet and automated teller machine (ATM) transaction. Because of its systemic nature, BankServ Africa has been designated by the SARB as a financial market infrastructure (FMI) meaning that it must comply with international standards and best practices for such infrastructures, to which the SARB subscribes.

4.2.5. Infrastructure: Credit Infrastructure

The credit reporting system is fairly developed and has sufficient depth particularly for individuals. There are currently 29 companies registered as credit bureaus under South Africa law, with four of the companies – TransUnion, Experian, XDS, and Compuscan – serving as the major credit bureaus. The four credit bureaus principally report individual credit information and collect both positive and negative credit data systematically from banks, financial institutions, utility companies and retailers.⁷⁹ The banks and financial institutions can access borrowers credit information online. The credit bureaus provide credit scores that banks and financial institutions can use to assess credit worthiness. These four bureaus are associate members of the South Africa Credit and Risk Reporting Association (SACRRA), which has established certain rules to improve data quality (e.g. type of data, frequency of updates, definitions, etc.).

Given limited coverage of credit data for businesses and high level of informality in MSME sector, digitization of MSME businesses and use of alternate data could help improve coverage. The estimated total size of South Africa's MSME market, including formal and informal enterprises, is 5.78 million of which only 14 percent is formalized.⁸⁰ Thus much of the economic and financial activity of MSMEs is not recorded that can be used for credit assessment. However, these MSMEs as well as unbanked individuals are leaving vast digital footprints and data trails. Every time the individuals and MSMEs use cloud-based services, browse the internet, use their mobile phones, engage in social media, use e-commerce platforms, or manage their receivables, payables, and recordkeeping online, they create digital footprints. Credit providers can leverage on this alternative data including transactional (payments) data, behavioral data and social media data to determine capacity and willingness of a borrower to repay loans.

78 SARB Banking Supervision Report 2017

79 However South Africa has large number of registered credit providers at approximately 6,679. Of these only 2,003 are currently submitting their credit data through the transmission hub and many small credit providers are still not providing credit data.

80 The Unseen Sector A report on the MSME Opportunity in South Africa, IFC and World Bank

4.2.6. Leveraging recurrent payments to increase usage of DFS

Digitizing large-volume recurrent payment streams offer an opportunity to promote better use of accounts and other delivery channels while improving transparency and safety. In South Africa social grants, remittances and utility bill payments are among key channels used by lower income segments.

Social Grants

About 26 percent of adults in South Africa receive a social grant compared to Sub-Saharan Africa average of 7 percent.⁸¹ As reported by Global Findex data 2017, 74 percent of social grant recipients received their payment through an account at a financial institution or through a mobile phone. As the World Bank's 2016 report highlights,⁸² as with many other similar programs throughout the world, a large share of recipients withdraws the full amount of grant on the same day that the funds are available.⁸³

Several factors may contribute to low usage of accounts and require in depth assessment beyond the scope of this report. Potential reasons include concerns earlier concerns raised on unlawful debits from grant beneficiaries accounts, keeping grant in the account may be interpreted as an indication that beneficiary is no longer alive or high balance could be an indication that beneficiary does not need payment immediately. Another reason could be high fees on cash withdrawal and limited functionality available through the South Africa Social Security Agency (SASSA) accounts and cards.

Promoting convenient and affordable use of SASSA account may enable recipients to increase the usage of account and its electronic payment features. This includes the possibility to use the account for payment of utilities, airtime, to send or receive payments or make merchant payments at low or no cost. In addition, the possibility to save in the account if so desired could be encouraged. Further it must be ensured that effective consumer protection service, redress mechanism and financial awareness training in connection to account is available to understand the various features and functionalities of their accounts.

Remittances

About 51 percent of South Africa adults sent or received domestic remittances during the past 12 months of which significant percentage still use over the counter service provider or cash.⁸⁴ According to Findex 2017, about 56 percent of adults who sent or received domestic remittance used an account which is comparable to Sub-Saharan Africa average of 51 percent but is much lower compared to 89 percent in Kenya. Of note, though use of mobile phone to send or receive remittance increased to 38 percent in 2017 from 18 percent in 2014, it is much below 95 percent in Kenya. The use of mobile phone provides a convenient and low-cost channel to remit money. A significant percent used over the counter service provider such as retailers (32 percent of senders or recipients) and cash (16 percent of senders or recipients).

The cross-border remittance market holds significant potential but remains largely informal. The international remittance flows of approximately ZAR 25-30 billion are primarily destined to Zimbabwe and

81 The Global Findex Database 2017

82 Achieving Effective Financial Inclusion in South Africa: A Payments Perspective, World Bank 2016

83 Based on SASSA report, as reported by South Africa Post Bank, 85 percent of the amount was withdrawn within first week for November-December 2018.

84 The Global Findex Database 2017

Lesotho.⁸⁵ Charges are substantial with the average remittance cost along formal channels estimated at 17 percent of the value sent – nearly 10 percent above the global average.⁸⁶

Key aspect limiting further expansion in the use of account to channel remittances including prevalence of close-looped systems. The Mzansi money transfer service between big four banks and Postbank, which was established as interoperable domestic remittance service, failed to succeed in getting significant market share. Cross-border remittance services are generally also closed-loop as remittance service providers in the originating country (South Africa) partner with limited number of disbursing agents in the receiving country.

Utility and other bill payments

About 47 percent of South Africa adults paid utility bills during the past 12 months however 64 percent of payers made the payment using cash only. Only 32 percent used an account to pay the bill compared to 85 percent in Kenya which is quite low considering that many banks offer bill payment options through account. One key factor is lack of reliable and convenient platforms as well as incentives provided by utility companies to enable customers to pay directly to them via their accounts vis-à-vis through intermediaries in cash.

4.3. RECOMMENDATIONS AND NEXT STEPS

Overall South Africa has made significant progress on digital financial services and non-traditional players including fintech are gradually transforming the market. Going forward, it would be important to upgrade the regulatory environment to reduce barriers to entry to retail payment systems and support to development of fintech ecosystem. The interoperability of person to person payment instruments and solutions needs to be improved to promote usage. With the expansion of digital delivery channels by banks and fintech, there is need to improve consumer protection and simplified KYC. The use of alternate data is gaining traction and could help in access to credit for MSMEs, particularly in the informal sector. Below are key recommendations.

Need to reduce barriers on access to retail payment systems. As part of the ongoing review of NPS, Banks Act and relevant legislation the SARB and National Treasury needs to amend the legislation to (i) enable access to the NPS to all licensed/authorized entities either through a direct membership or through indirect membership and (ii) recognizing payments as an activity distinct from deposit taking. In addition, review of current policy on limiting the issuance of e-money products to only banks is need with the aim to foster and channel both bank and non-bank payment initiatives. Following review an Emoney directive needs to be issued. The governance and membership of PASA needs to be reviewed including to allow fair access to non-banks.

Need to support the development of the fintech ecosystem with specific emphasis on financial inclusion. The IFWG need to issue periodic clarifications or guidelines on regulatory interpretations specifically regarding the treatment of innovative activities, e.g. cloud computing or use of AI for financial services. The policy framework needs to provide possibility of a regulatory "sandbox or hub" to provide a testing environment to support the development of fintech that specifically supports financial inclusion.

85 Technoserve (2017), Domestic Remittances in South Africa

86 World Bank (2017), Remittance Prices Worldwide

Promoting open, interoperable and interconnected systems and products to expand usage. Given the proliferation of proprietary payment instruments and payment solutions which are not interoperable, SARB needs to develop and issue regulation mandating interoperability and adoption of open standards to enable existing closed-loop systems to become open-loop systems or to be able to become interoperable with the open loop systems. There is scope to enhance the open looped systems to enable licensed entities to offer transaction accounts to their customers to enhance financial inclusion. Also, effective regulatory coordination on technology adoption such as promoting the use of a national USSD code for seamless interoperability would be useful.

Improving consumer trust in digital financial services. With the establishment of market conduct authority, there is need to develop product standards covering digital financial products and introduce simple complaint handling procedures and redress mechanism for users of digital financial services that are currently lacking. In addition, review of KYC thresholds for basic transaction accounts, cross border remittances and mobile banking is needed to ensure these thresholds are not create barriers to uptake.

Alternative sources of credit and means of assessing credit are gaining traction. To encourage these developments, it would be important to implement pilots as envisioned by the National Credit Regulator to test the use of alternate data to improve credit risk assessment particularly of informal businesses and unbanked individuals and develop framework based on pilot to expand credit information on individuals and MSMEs. Digitization of MSMEs would also facilitate credit expansion particularly to informal businesses.

Leveraging large volume recurrent retail payments could expand usage particularly within the low-income consumer segment. Promoting convenient and affordable use of SASSA account (such as for payment of utilities, airtime, to send or receive payments or make merchant payments) at low or no cost could help increase the usage of accounts and its electronic payment features. There is a need to introduce interoperability in domestic remittance services and introduce incentives to use transaction account and/or mobile money account for sending/receiving remittances.

4. DIGITAL ENTREPRENEURSHIP

4.1. BACKGROUND AND IMPORTANCE OF DIGITAL ENTREPRENEURSHIP

Vibrant digital entrepreneurship is a key pillar of a strong digital economy, in turn a source of new products and services, business models, and markets. Digital entrepreneurship, seen to encompass the launch of new digital ventures either offering new products or leveraging existing technologies and business models⁸⁷⁸⁸, also including digital private sector platforms⁸⁹, has the potential to contribute to overall competitiveness and job creation. A strong entrepreneurship ecosystem⁹⁰ that influences the creation and success of such digital ventures is instrumental in translating innovations into businesses, ultimately supporting wealth creation and higher standards of living for a country⁹¹.

South Africa's underlying digital entrepreneurship dynamics are quite positive. South Africa is already a key player in Africa for digital entrepreneurship, serving as a "hub" for many initiatives and investments, and as an essential entry point for major global digital players, including, among others, Google, Airbnb, Amazon Web Services, and IBM Research Lab. A strengthening tech ecosystem has enabled the emergence of digital startups and platforms across technology segments. A round of recent successful tech startups have raised over USD 100M⁹², and there is an expanding number of medium-sized South African technology companies, a growing share of which are also black-owned. In addition to creating jobs, digital entrepreneurs have helped drive social impact in areas such as health (e.g. HearX), transport and logistics (ParcelNinja), and education (GetSmarter). Successful digital entrepreneurs also reinvest in the ecosystem through funds such as Team Africa Ventures.

However, due to key weaknesses in specific policy, available financing and support, digital entrepreneurship is not reaching full potential, and South Africa's leadership is being increasingly challenged on the continent. The lack of some key ingredients and pressing gaps in regulation are holding South African digital entrepreneurs back. These include insufficient availability of digital skills, elevated infrastructure costs and limited reach, limited access to early stage finance, some specific legislation detrimental to business operations, insufficient coordination of entrepreneurship support initiatives, both public and private, including spatially, and limited diversity and inclusivity of the sector as a whole. At the same time, other ecosystems on the continent are developing strongly. Botswana recently ranked number 1 in Sub Saharan Africa in the global entrepreneurship index⁹³, while Kenya and Nigeria also have strong ecosystems, as attested by the recent string of high profile exits of digital startups; relative African

87 The term 'Digital Entrepreneurship' most commonly refers to the process of creating a new—or novel—Internet enabled/delivered business, product or service. This chapter focuses on startups that bring new digital product or services to market. Welsum, v. D., World Bank Group, "Enabling Digital Entrepreneurs" 2016.

88 These are typically defined as young (under 5 years) firms that are pursuing growth

89 Digital Private Platforms can be defined as "multi-sided marketplaces with business models that enable producers and users to create value together by interacting with each other and by facilitating matching, searching, exchanging, transactions, and so on". (World Bank Group, Information and Communications for Development 2018: Data Driven Development, accessible at <https://openknowledge.worldbank.org/handle/10986/30437>)

90 The background paper's methodology and analytical process rely on the DE4A diagnostic toolkit, which is based on the Babson Entrepreneurship Ecosystem model. This model captures the most widely held understanding of entrepreneurial ecosystems, including the factors that constitute them and how they work, namely: policy, finance, support organizations, culture, human capital, and markets

91 Global Innovation Index ranking, World Intellectual Property Organization (WIPO), 2018

92 These include: Thawte, Fundamo, Nimbula and GetSmarter (Timm, S. 2017. "Are these the 10 all-time biggest exit deals for SA startups?" VentureBurn <https://ventureburn.com/2017/06/biggest-sa-exit-deals-digital-all-stars/>) with a few recent large exits e.g. LobsterInk being undisclosed.

93 Global Entrepreneurship and Development Institute, 2018. "Global Entrepreneurship Index 2018"

newcomers such as Ghana, Tunisia, and Tanzania, have been continuously improving in Global Entrepreneurship Index (GEI) rankings in recent years.

4.2. DIAGNOSTICS FINDINGS: CURRENT STATE OF DIGITAL ENTREPRENEURSHIP

4.2.1. Policy Framework and Business Environment for Digital Entrepreneurs

Both national and provincial governments are playing a strong role in the development of digital entrepreneurship in South Africa; but current policies fail to reflect changing global operating conditions in the industry, while policy action suffers from lack of coordination and insufficient monitoring. Although South Africa's Doing Business could be improved overall (82nd out of 190)⁹⁴, overall support for entrepreneurship is quite pro-active, through a number of specific agencies (e.g. Technology Innovation Agency) and programmes (e.g. Technology & Human Resource in Industry Programme, Support Programme for Industrial Innovation, SA SME Fund), at both the national and provincial levels - with the Western Cape and Gauteng provinces being the most dynamic. The SA SME Fund⁹⁵, launched by the President in March 2019 as a partnership between the national government and corporate South Africa for example, foresees that R1,4 billion will be invested into SMEs and startups through pre-selected fund managers with an established track record to kick start economic growth. However, those initiatives often suffer from insufficient adequacy to the specific needs of the sector, especially in the early phases of business development; implementation, coordination and fragmentation remains a significant issue, leading to confusion for entrepreneurs and support organizations; and policies lack robust monitoring and evaluation frameworks, leading to a likely sub-optimum allocation of resources. The national government's e-Government strategy (examined in chapter 3) although going in the right direction, has not yet significantly reduced the administrative burden on digital startups.

Furthermore, some of the existing policies turn out to be either difficult to implement in practice and would need to be adapted, or have an adverse effect on the operations of digitally enabled startups. The following paragraphs will examine in turn: (i) R&D tax incentives; (ii) IP legislation and requirements; (iii) exchange controls; (iv) VAT & Corporate tax issues; (v) ICT and related sector policies; and (vi) labor legislation.

The R&D tax incentive scheme has a cost recovery model that does not benefit SMEs or startups which do not pay taxes until they are profitable, resulting in none of the initial development costs being tax exempt in practice. The SA government provides tax relief for companies engaging in R&D, allowing them to claim up to 150% of qualifying costs against their income tax and accelerated depreciation. This incentive was designed to encourage private-sector investment in scientific and technological research and development activities and to help the country achieve a target for R&D expenditure of 1% of GDP, but is not designed for high value and research intensive technology startups, which typically do not break even in their first years of operations; it could thus be usefully adapted. The recently released DST

94 <http://www.doingbusiness.org/content/dam/doingBusiness/country/s/south-africa/ZAF.pdf>. President Ramaphosa has indicated he wants SA in the top 50 countries in 3 years time in his second State of the Nation Address (<https://www.gov.za/speeches/president-cyril-ramaphosa-2019-state-nation-address-7-feb-2019-0000>)

95 South African SME Fund, 2019. <https://sasmefund.co.za/>

White Paper on Science Technology and Innovation (STI)⁹⁶ does call for better incentives related to R&D expenditure for SMEs and startups, which is a positive development.

The Intellectual Property from Publicly Funded Research Act (IPR Act)⁹⁷ provides protection to inventors and universities, but additional regulatory approval and non-exclusive IP assignment into spin-outs has resulted in little private sector investment into university developed innovation or government funded startups⁹⁸. The IPR Act applies to any IP (including know-how but excluding copyright in copyrighted works) created with public funds through government grants or in a university, or in a science council environment. The IPR Act ensures that the inventor or creator of the IP and the institution have rights to the IP, but also requires the National IP Management Office (NIPMO) to approve any transaction; thus, exclusive or complete assignment of the IP to an entity is difficult. As spin-outs do not own the IP outright or because of lengthy approval processes by NIPMO, investor risks regarding IP are increased (as well as costs related to deal structuring and legal fees). Owing to scarce successful commercialization of university-based IP, the private sector is hesitant to fund commercialization or market expansion of any company or IP subject to the Act. The DST White Paper on Science Technology and Innovation (STI)⁹⁴ also calls for a review of the IPR Act, which is likely to be welcomed in the industry.

As exchange control approval is required to move, license or assign IP offshore, digital entrepreneurs tend to directly register their companies offshore as soon as they start their businesses. Any startup or digitally enabled businesses who wants to trade, operate or raise funding internationally needs reserve bank approval and is subject to the Exchange Control (ExCon) Act⁹⁹, which impacts the way in which it manages and exploits its IP. This is significant as IP provides the legal framework through which companies and research institutions can create, protect and commercialize their research, innovations, software and technologies. The Act restricts South African residents from (among other things) selling, assigning or licensing intellectual property (IP) to foreign residents, and paying royalties to foreign residents, without prior approval from the SARB. As a result, digital entrepreneurs who are building scalable, international companies, need to compete globally, and enter into global partnerships, register all IP and the main company offshore as soon as they start their business. As a result, tax payable on income or exit does not accrue to the country. Amendments to the ExCon Act state that an authorised dealer can approve arms length transactions or the creation of an offshore company to raise foreign funds for operations (subject to conditions) for unlisted SA “technology, media, telecommunications, exploration and other R&D companies”. These amendments represent an improvement but implementation costs rest with authorised dealers within banks.

Digital startups are unable to claim the Value Added Tax (VAT) they pay when starting their businesses, and corporate tax rates are not necessarily adapted to startups. As VAT registration is only required for companies with a turnover of R1 million per annum, many SMEs are unable to claim this early on, thus the operating costs on which VAT is paid to vendors are often covered by funding which has been secured in exchange for equity. The corporate tax rate for companies ranges from 0% (below R79 000 income p.a.) to 28% (from R550 000 income p.a. upwards) regardless of size. Smaller businesses (less

96 Department of Science and Technology, 2018. “Draft Paper on Science Technology and Innovation (STI), 2018

97 Department of Science and Technology, 2008. “Intellectual Property Rights from Publicly Financed Research and Development Act (51/2008)” University of KwaZulu Natal website.

98 Technology Innovation Agency, 2018. “Technology Innovation Agency Annual Report 2017” Technology Innovation Agency website.

99 South Africa Reserve Bank, 2019. “Currency and Exchange Manual for Authorised Dealers, 2019-04-18”

than R1 million per annum) do have the option of paying turnover tax of between 1 - 3% which can be much simpler. For high growth digital startups however, there is little tax relief for them when they are formed or when they are generating profits, at which point they will be taxed in the same bracket as corporates.

Labour related policies and regulations makes digital startups reluctant to hire full-time employees. The Labour Relations Act is applicable to all companies operating in SA regardless of size, and startups are reluctant to take on the administrative (taxes etc.) and financial burden of hiring staff too soon. As a result many staff at startups are part-time, on short term contracts or consult to the business so that they are not seen as formal employees. Thus, startups that have the potential to create further jobs may be hesitant or take longer to do so.

4.2.2. Support Organizations

A large number of support programs and organizations has enabled the development of clusters of innovations in specific sectors through dedicated accelerators and sector specific financing. South Africa counts 300+ active support organizations for entrepreneurs according to the latest available estimates. These notably include service providers such as innovation districts, incubators, accelerator programs, innovation hubs, and co-working spaces, as well as event organizers and foundations. Whereas only 10%-15% of them are thought to target digital entrepreneurs specifically, sector-specific dynamic clusters are developing, some attracting substantial foreign and domestic investment with growing entrepreneurial success, such as Yoco in fintech, HearX in health, GetSmarter in edtech, and Aerobotics in agritech¹⁰⁰.

The impact of organizations' support on digital business creation, growth and sustainability is however limited by insufficient tailoring. First, support is concentrated on the very early- to early-stage spaces of business development, with limited funding available and less robust support for later stages; it is also concentrated in the affluent urban areas of Gauteng and the Western Cape, leaving large swathes of potential digital entrepreneurs isolated. Second, the quality of services provided by many support organizations is considered quite low overall, including due to the lack of relevant mentors and of meaningful monitoring and evaluation processes. And third, growth stage digital acceleration programs could be better tailored both to the South African context (longer lead times before reaching the fundraising stage) and to facilitate access to markets beyond South Africa.

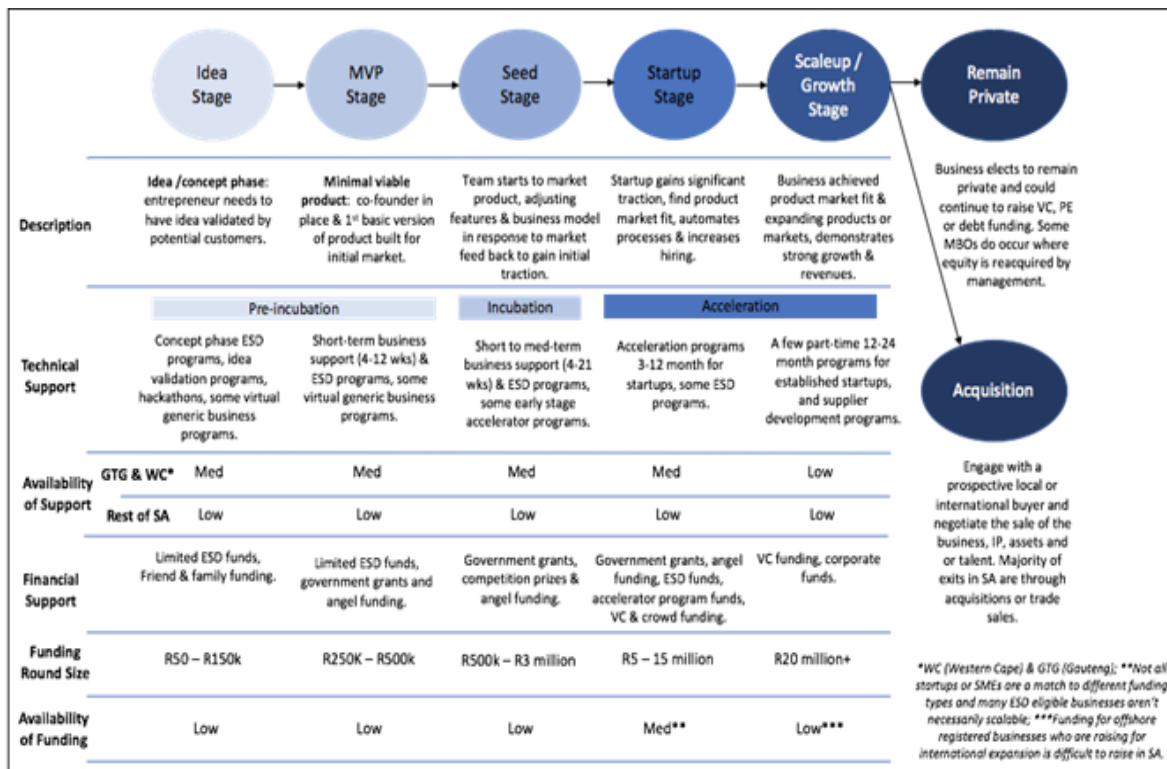
The long-term financial sustainability and funding of support organizations and programs may become an issue. Most of them are highly dependent on the otherwise successful Enterprise and Supplier Development program (ESD), which has unlocked ZAR 12 billion (USD 900 million) in capital through compulsory contributions from large companies.

4.2.3. Financial Capital

Digital ventures in South Africa face financing gaps throughout most of their lifecycle. The availability of finance for digital entrepreneurs in South Africa is generally low (Figure 15), in the context of difficult access to credit for SMEs overall, with a Getting Credit ranking of 73/190, significantly lower than Kenya (8) and Nigeria (12).

100 Detailed case studies of some of these digital startups are included in the Digital entrepreneurship background paper

Figure 15: Summary of the South African financial capital landscape for digital entrepreneurship at various stages



Source: authors

The South African government has various financing and incentive programs for early stage entrepreneurs, but most of these are not suitable for digital entrepreneurs. More than 50 national programs targeting SMEs have been identified, with an estimated 2018 financial year budget of about R18 Bn (of which 48 percent debt finance and 35 percent grants). Most of these programs target very early stage businesses, and only 4 percent target technology SMEs. Minimum trading requirements, cost-sharing clauses or collateral requirements are among criteria not adapted to digital startups, and there is little data on blended finance, most used in many parts of the world.

Angel investors would be most suited to help fill the early stage funding gap for digital startups; there has been more robust growth of later-stage funding through Venture Capital funds, driven by one key piece of legislation, but most of this funding is not going to digital entrepreneurs, and there are strong constraints to further expansion that need to be removed. Angel investors typically contribute more than just financial capital to a startup: by being actively involved, mentoring the founding team, providing strategic or expert advice and introductions to customers etc. Despite the high risk involved, there are few incentives to attract them. Angel investor networks could also be supported to increase effectiveness for funding digital startups. VC financing on the other hand has seen significant growth in both number and value in recent years, reaching 159 deals and R1,16bn in 2017. Amendment of Section 12J of the Income Tax act is responsible for the fast increase in new Venture Capital Companies (VCCs), which has resulted in 165¹⁰¹ new VCCs being registered with over R3.4 billion committed by February 2018, with

101South African Revenue Services, 2019. List of Approved Venture Capital Companies

informal estimates that this will reach R5 billion in 2019¹⁰². Recent announcements of several large VC funds targeting both South African and African startups are expected to further close the finance gap at the later stage. However, access might remain an issue for black owned companies with weaker networks and expertise, VCCs are restricted to invest into a South African-registered entity (excluding offshore IP and entities) and cannot invest in Fintech by design, and their small size and limited staff capacity are key constraints for further growth. This stresses the need to increase the participation of institutional investors in local VC funds, as currently the funds are relying on a limited number of high net-worth individuals.

	South Africa	Kenya	Nigeria	Senegal	Mexico
Venture Capital availability [1 = extremely difficult; 7 = extremely easy], WEF Global Competitiveness Report, Executive Opinion Survey, 2017	2.87	3.03	1.80	2.57	3.05
Access to credit (ranking from 1 (highest) to 190), Doing Business 2019	73	8	12	144	90

4.2.4. Markets

South Africa is a growing digital market, notably due to the steady digitization of industries and highly sophisticated financial services. The digital market in South Africa is expanding, providing market opportunities for existing and new digital businesses. From 2016 to 2018, smartphone penetration grew almost twofold to 81.7%, and fixed broadband subscriptions around fourfold to 7.5 million. Transactions are conducted more and more digitally. These developments have helped the creation of new business models and services locally, while major global digital platform actors such as Uber and Airbnb have used South Africa as an entry point. The steady digitization of industries and the high level of sophistication in banking and financial services have also been encouraging the growth of Business-to-Business (B2B) digital products and services. Lastly, policy efforts to support opportunities for digital entrepreneurs, especially from previously disadvantaged communities (e.g. through B-BBEE and ESD), and to adopt digital technologies (e-governance), are further market levers.

E-commerce and digital private platforms are an expanding segment of the digital entrepreneurship landscape, but limited information exists as of yet analyzing their role and impact. It is estimated that private platforms currently have close to 1.3M workers in South Africa¹⁰³ and revenue in the e-commerce market is estimated at around US\$3bn in 2019, with annual growth rates projected of around 10% per annum. with the usage of digital channels for transactions growing accordingly¹⁰⁴. South Africa rates better in UNCTAD's E-commerce Index compared to Kenya, Nigeria and Senegal (Table 2). This has attracted investments into new business models and services including digital platforms such as SweepSouth, Takealot, and Parcel Ninja (see case studies in digital entrepreneurship background paper). Also, some of the largest global digital platforms are using South Africa as an entry point to the continent, including Uber which launched operations in 2013, Netflix in 2016, Spotify in 2018, and Airbnb. Challenges faced by digital private platforms mirror those already outlined for digital entrepreneurs, with an

¹⁰² van Zyl, K. 2018 "SARS Section 12J Venture Capital Companies — Hype Versus Substance"

¹⁰³ insight2impact Africa's digital platforms database (May 10, 2019)

¹⁰⁴ For example, according to Global Findex, between 2014 and 2017, the % adults who used the Internet to pay bills or to buy something online in the past year grew from 7.62% to 14.13%. <https://globalfindex.worldbank.org/>

emphasis in areas such as data privacy and cybersecurity. E-commerce is dampened by restrictions on trading history and costs (3-4% of a transaction) for processing online payments, persistent logistics costs and issues, and some import restrictions.

Overall, market growth and access could still be significantly improved by improving data access and shortening payment cycles. The high cost of broadband data remains a challenge for most South Africans, penalizing key potential growth segments in the digital sector. Long procurement and payment cycles with business buyers also disadvantage smaller, younger, or less well funded players. Government efforts to develop e-services for businesses have only translated into timid actions and results so far, although South Africa is still a leader on the continent, and small businesses find it very challenging currently to win government contracts. Finally, ICT services exports data still show limited global reach while the local market remains limited compared to richer countries outside the continent, despite some successes, also due to infrastructure and persistent inequalities.

	South Africa	Kenya	Nigeria	Senegal	Mexico
ICT service exports (% of exports BOP), 2017, WITS data	16.9	13.19	5.21	36.73	0.29

4.2.5. Entrepreneurship Culture and Talent

The perception of entrepreneurial culture in South Africa is on the rise and quite positive overall, helped by a recent increase in high profile business exits by local digital entrepreneurs, but remains suboptimal due to insufficient collaboration and diversity. Strong startup communities host an abundance of networking events, talks and workshops, which help inspire, and train new entrepreneurs. There is growing participation of previously disadvantaged individuals, and more businesses target disadvantaged communities, with positive social impact. However, the digital entrepreneurship sector remains overwhelmingly white, male, and middle class, even though public and private initiatives such as B-BBEE and dedicated women-led angel investment networks are starting to bridge some gaps. Collaboration between organizations across the ecosystem remains limited, for example between the largest hubs in Western Cape and Gauteng, in spite of strong complementarities.

Limited supply of digital talent remains a key weakness of the South African digital entrepreneurship ecosystem. The paucity of talent is a significant and acute problem at all skill levels, not helped by South Africa’s full bottom rank (139/139) in terms of quality of Math and Science education according to the World Bank. Rapid skills programs with promising results have emerged but have faced funding and accreditation issues. The competition for higher-end talent is especially fierce in the corporate sector at large, further exacerbated by current South African visa requirements on the one hand, and foreign initiatives to drain talent such as the French Tech visa – which makes talent needed for (global) growth unaffordable for most digital entrepreneurs – on the other hand.

	South Africa	Kenya	Nigeria	Senegal	Mexico
Percent of firms with female participation in ownership (Enterprise Survey, latest available)	22.6	48.7	16.2	22.9	25.7

4.3. RECOMMENDATIONS AND NEXT STEPS

Clarifying the Regulatory and Policy Frameworks for Digital Entrepreneurship

Identifying and prioritizing a set of digital entrepreneurship policies with clear department leadership would facilitate the growth of digital entrepreneurship. Building on the national 4iR initiative, reviewing existing instruments and policies (through for example a public expenditure review, which could investigate the impact of different existing policy instruments) and developing a comprehensive and consistent set of policies such as done by the Irish government or others¹⁰⁵ would help develop the sector. Strengthening M&E mechanisms of existing policies would better inform both the public and private sectors on the impact and utility of different instruments and accelerate the scaling-up of successful initiatives.

Reforming certain aspects of the business environment to make it more digital entrepreneur friendly would also unlock sectoral growth and job creation. Amending exchange control requirements and processes relating to IP as well as foreign investment into, and sale of, domestic companies would help keep growing digital companies anchored in South Africa. Enabling digital startups to defer R&D tax breaks against taxable income up to 3 years, such as done in Australia, would allow them to fully benefit from further engaging in innovative research. Easing labor legislation for employees in young digital companies could drive employment growth further in the sector. Lastly, reforming regulations to allow IP to be fully assigned to spin out companies could increase private sector investment into university-developed innovation or government funded startups.

Further Strengthening the Digital Entrepreneurship Ecosystem

Increasing the quality and quantity of available digital skills through both long-term investment and shorter-term actions is crucial to continued growth. The paucity of digital skills is a key and acute constraint to the growth of digital entrepreneurship, and more broadly the digital economy. In the short run, scaling out existing successful programs such as the Digital Skills Academy or mLabs Southern Africa and other PPPs, could go part of the way to bridging the gap in general and digital skills. Furthermore, facilitating the coming into the country of foreign highly skilled digital entrepreneurs or professionals through “tech visas” such as done in France, could also positively impact the sector by bolstering the creation of new companies and the mentoring of South African entrepreneurs.

Quality of support provided to entrepreneurs could also be improved, including for better inclusion, scale, and access to foreign markets boosted. Results-based funding is an effective way to improve services quality, especially at the critical ideation and seed stages. Strengthening linkages between Gauteng and Western Cape ecosystems and continuing to address the rural/urban divide can improve learning,

¹⁰⁵ Startup acts are a new policy tool that some countries, including India, Argentina, Tunisia and Italy, have introduced, with around ten countries currently exploring Acts or legislative tools for startups.

inclusion, and scale, and help build out regional and pan-African programs for later stage digital entrepreneurs to increase access to international markets and mentors.

Expanding Access to Funding

Increasing incentives for angel investors and supporting the structuring of angel networks is critical to drive investment into early-stage digital businesses. In line with what was implemented for VC funds through section 12J, incentives ought to be increased to encourage early stage investments in digital entrepreneurs. Angel investors typically provide additional support in terms of mentorship, experience, and networks, beyond the capital invested. Effective schemes implemented elsewhere such as the UK Enterprise Investment Scheme (EIS) and Seed Enterprise Investment Scheme (SEIS) could usefully be replicated or adapted. Also, supporting the setup and structuring of angel networks has proven instrumental in raising the number and enhancing the quality of angel investors.

De-risking investment could be usefully part of financing schemes for early-stage digital entrepreneurs. De-risking mechanisms targeted to digital entrepreneurs, including through blended finance by governments and intergovernmental agencies on the model of the CORFO program in Chile, which has a successful blended finance mechanism, could encourage an increase in the availability of early stage funds for digital entrepreneurs.

Continuing Active Support to Diversity in Digital Entrepreneurship

Active support to diversity in the digital entrepreneurship sector should be continued. Significant strides have been made in encouraging previously disadvantaged communities to break into and succeed in digital entrepreneurship, notably through the B-BBEE legislation, which has given both a financial incentive and access to markets for these communities. The number of women in the sector, and in digital entrepreneurship more specifically, remains however low. Notwithstanding a number of skills training and upgrading programs, it would be useful to further incentivize support organizations to increase tailored support provided to women and black-led digital businesses. Examples of programs could include DigitalUndivided and Project Diane, in the US, for diversity, and She Starts, Australia and We In Social Tech, in the UK, for women.

5. DIGITAL SKILLS

6.1. BACKGROUND AND IMPORTANCE OF DIGITAL SKILLS

Foundational for a digital economy to flourish, developing a digitally competent workforce and digitally literate citizens who can reap the benefits that the digital society brings will greatly help South Africa's digital economy development.

In the absence of an African framework for digital skills development, this chapter draws from existing frameworks to conceptualize digital skills. The Digital Skills Pyramid used by the World Bank broadly groups digital skills into three layers: Digital user skills; Digital specialist skills; and e-Business skills. Digital user skills include those necessary for users of digital platforms, software, or devices. For everyone to participate in a digital economy, it is essential that all citizens have the opportunity to develop digital literacy skills that allow them to live, work, learn, and participate in a modern society. Digital specialist skills are those needed to produce digital software and hardware, design and maintain systems, and conduct research. E-business skills are those associated with digital entrepreneurship, creating innovative business models, and marketing of digital products and services. Another example is the European Union, which suggested a more comprehensive framework, the DigComp 2.0¹⁰⁶. This framework identifies five areas of competences with 21 specific competences: information and data literacy, communication and collaboration, digital content creation, safety and problem solving. More recently, UNESCO added two more competences to the DigComp 2.0 framework, to include competences related to devices and software operations, and career related competencies.

South Africa recognizes the potentially significant impact a digital economy could have on its economic growth and its citizens' development. Moreover, the country recognizes the foundational role that digital skills play in building such an economy.

South Africa has a well-developed policy landscape that guides skills development: The Skills Development Act of 1998 set in motion development of various policy documents from different government departments in response to the urgent need to rectify past injustices of racial exclusion, as well as catering to the needs of a newly formed and growing democracy. Unfortunately, until very recently, these departments seldom collaborated, and policy documents were developed in isolation.

There is recognition of the importance of digital skills from the highest governing levels: the President officially recognized the importance of digital skills in 2002. For the next two decades, several policies, strategies, plans and interventions on national and provincial levels were developed and implemented to address infrastructure, resources, and to create opportunities for youth. These efforts were laudable, but largely uncoordinated. Recent international calls for countries to prepare for the 4iR gave rise to renewed recognition of the importance of technology and digital skills for a growing economy in South Africa. This has led to the establishment of the Presidential Commission on the 4iR, as well as other commitments, such as the radical technological transformation of the schooling system within the next six years. The Commission should tie together the work that has been done by different departments and lead a collective and more coordinated effort towards digital skills development.

106 EU DigComp 2.0: The Digital Competence Framework for Citizens. <https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework>

Research informs policy and practice in digital skills development. Different large-scale research projects related to digital skills development or the broader 4iR developments are taking place. The DTSP is conducting environmental scans to determine the extent of digital skills development needs among the general population, organizations, and government. This also implies monitoring and evaluation to track development over time, as well as a sense of accountability flowing from that knowledge. The DHET conducts biennial research to identify the occupations in highest demand to guide institutions to adapt to changing needs. The 2018 list included 25 ICT-related occupations in high demand. Finally, the DST is leading research related to 4iR developments.

South Africa has extensive unused human capital on which it can draw. The country ranks 126th out of 157 countries on the Human Capital Index, which is far below what would be expected from its per capita income level. To some extent, this can be attributed to the poor quality of schooling and persistent resource and race-based inequalities in education. Combined with a 'Not in Education, Employment, or Training' (NEET) rate of over 30%, low labor market participation (55%), youth representing almost two thirds of the unemployed, and an underqualified workforce (20% with tertiary qualification, 32% with secondary education and almost half of the workforce not having a grade 12 certificate), there is much unused potential to develop.

There are some good examples of collaboration taking place: Public-private collaborations, particularly between provincial governments and universities (as public entities) and private institutions are increasing. In addition, several initiatives, ranging from programs to empower youth with ICT skills, to embedding digital skills in all forms of education and everyday life, are taking place under leadership of provincial governments or private companies.

There is a variety of qualifications on offer: various public and private providers are offering a range of different courses and using different models of learning (e.g. online tutoring, face-to-face sessions, peer learning, mentoring, boot camps, etc.). These courses also vary in duration, cost, and whether the outcome of the course results in an accredited qualification, certification, or possible placement in partner companies.

South Africans are slowly getting connected: many South Africans are engaging with social media, and predominantly through mobile technology, while the drive to get all citizens (and schools in particular) connected to the internet is progressing well.

6.2. DIAGNOSTIC FINDINGS: CURRENT STATE OF DIGITAL SKILLS

Inadequate and Insufficient Supply of Digital Skills: South Africa ranks 116th out of 140 countries in the Global Competitiveness Report's assessment of digital skills among the population (3.5 out of 7)¹⁰⁷. Contributing factors might include limited access to digital devices or the internet, low production of ICT graduates from the formal post-school sector, and the slow pace of adoption of formal ICT curricula with rapid developments in the field. Because they do not have key skills available from potential employees, companies miss out on innovation opportunities¹⁰⁸. In the private sector, many shorter courses or coding

107 WEF. 2018. The Global Competitiveness Report.

108 PWC annual CEO survey. 2019.

boot camps focus on producing large numbers of qualifications, yet candidates only receive three or four months of coding training, which might not be enough. Adequate practical experience is important.

6.2.1. Digital Literacy

Specific digital skills need to be identified within the levels of digital skills. DTPS has made considerable progress in conceptualizing digital skills, establishing the iKamva National e-Skills Institute (iNeSI), and initiating environmental scans to determine the need for digital skills among the broader public, in organizations, and within government. The DTPS is also in the process of developing a digital skills strategy that will inform a national approach to developing such skills.

Digital skills development in schools still has a long way to go. There are still major gaps in access to devices and connectivity in schools, as well as concerns about teacher training in effective technology use. To date, around 34% of schools have a computer laboratory and almost 70% have some form of access to internet. While the Department of Basic Education (DBE) uses several partners to provide teachers resources and technical skills to use technology in teaching, the training is sporadic and not universally standardized. Such training is also criticized by educational technologists because it mainly focuses on technological skills training and does not teach teachers to embed technology into teaching practices to enhance learning. Moreover, there seems to be a lack of a collective understanding of what digital skills entail and whether they should be introduced as stand-alone curricula in school or embedded throughout the broader curriculum.

The quality of basic education remains a key constraint for the South African education and training system and labor market.¹⁰⁹ Central to these quality concerns are learners' low literacy levels and underperformance in mathematics. Moreover, there do not seem to be clear pathways between school-level and post-school education in ICT-related subjects. Very few learners also have access to ICT electives from Grade 10 because of lack of infrastructure, resources, or teachers. Limiting opportunities for learners to engage with technology provides a partial explanation of underuse of the human capital potential that the country has, particularly among the less advantaged youth. It also contributes to criticisms from the private sector that learners are not developing the skills they need to enter into the workplace or to pursue further studies. For example, the quality of Mathematics education is ranked 128th out of 137 countries in the WEF Global Competitiveness Ranking¹¹⁰. Further, of the 800,843 learners who wrote the National Senior Certificate examination in 2018, 172,043 (21%) obtained a bachelor's pass and only 58% passed Mathematics with a score higher than 30%.

6.2.2. Professional Digital Skills

The production of post-school graduates does not meet labor market demands. The low number and quality of graduates produced by both TVET Colleges and higher education institutions does not meet the demand of the sector. For example, close to 3,000 vacancies exist in the top 10 most-difficult-to-fill ICT positions¹¹¹. In contrast, fewer than 7,000 students graduated in 2016 with general ICT-related degrees.

In addition, students enrolling for ICT-related degrees in higher education are not graduating. Of the students enrolled in 2014 for undergraduate diplomas/certificates and three-year bachelor's degrees in

109 Labour Market Intelligence Project. 2016. Skills supply and demand in South Africa.

110 http://reports.weforum.org/pdf/gci-2017-2018-scorecard/WEF_GCI_2017_2018_Scorecard_EOSQ130.pdf

111 MICTseta: https://www.mict.org.za/downloads/MICTSETA_SSP_2018_to_2023_Draft.pdf

ICT, only 14%, and 13% respectively completed their qualifications in 2016¹¹². In general, the percentage of students who enroll for three-year ICT degrees and graduate after six years in the system is 41%.¹¹³

Curricula are not responding fast enough to meet rapid changes in demand. TVET Colleges and universities are criticized for having outdated curricula, and not being responsive enough to fast-changing skills demands.

A lack of coherent, national leadership and collaboration leads to lack of coherence in institutional offerings. On a national level, the slow pace of responding to digital skills needs is a concern. For example, since the first official focus on developing digital skills in 2002, several policies, strategies, plans, and initiatives have been developed and implemented. However, due to lack of coherent coordination between departments and the variety of other important skills that need to be developed as a matter of urgency, collective recognition of the importance of digital skills is only resurfacing now. Further, the lack of coherent focus on how the digital economy is developing has resulted in only pockets of innovation in partnerships or degree offerings. For example, eleven universities in the country are offering programs and modules in 4iR and related fields of artificial intelligence and robotics¹¹⁴. However, no real collective efforts to link qualification offerings with emerging and changing job demands have surfaced.

6.2.3. e-Business Skills

Only some universities are recognizing the link between entrepreneurship, business, and ICT skills. Some have made ICT degrees more flexible to include business subjects as electives, while others have included ICT subjects as electives into commerce faculties. However, these changes are not systemic and only selected institutions are responding to the need to develop entrepreneurial and business skills with ICT skills.

6.3. RECOMMENDATIONS AND NEXT STEPS

Coordinate the conceptualization and implementation of the different levels of digital skills. A coordinated effort between the different governmental departments including DTPS, DHET, National Skills Authority (NSA), DBE, and provinces is needed to build on the work that has been done, and to identify which specific skills in each of the three levels need to be developed. Policy guidance that clarify conceptual needs will lay the foundation for practical interventions. Realistic policies are also needed to guide the technological transformations envisioned for the country, to guide how digital skills should be implemented at scale to reach all citizens and empower those who are unemployed or undereducated. These policies should emphasize quality, accountability, and monitoring and evaluation.

Make use of educational platforms, such as Technical and Vocational Education and Training (TVET) colleges and Community Colleges, to develop digital literacy in unemployed youth. Many learners do not complete schooling, do not have funds for further education, and end up unemployed or in low-paying, informal employment. Digital literacy development should not be limited to schools; it could also be made

112 CRA: <https://cra-sa.com/publications/south-africa-survey/south-africa-survey-2019>

113 Council on Higher Education. 2018. Vital Stats 2016.

114 <https://www.skillsportal.co.za/content/careers-high-demand-needed-thrive-4ir>

available to the broader public through partnerships with TVET and Community Colleges, as well as private sector initiatives to make sure everyone is included in digital skills development.

Define clear developmental pathways between schooling and post-school education and training. While all South Africans should be educated to be digitally literate, there should be clear pathways aligning basic skills development with more sophisticated professional pathways. The identification of skills needed for emerging interdisciplinary job demands should underpin the options learners have.

Explore innovative ways of including digital skills in the wider curriculum and to scale up private-sector led initiatives. The process of developing, aligning, testing, training, and implementing new formal curricula (in schools and post-school institutions) is too lengthy to be responsive to the fast-changing demand. Innovative ways of training through partnerships (public/private, inter-sectoral, intra-sectoral, regional, and so on) should be considered as part of meeting this need. South Africa has no shortage of private-sector initiated models for rapid digital skills development, which may be scaled up through PPPs.

Equity of access to resources should be foregrounded. The persistent inequalities of the education system will not be rectified if only urban and well-resourced schools have access to good teaching, smart classrooms, computers, internet, and a wider selection of subjects from which to choose. Additional opportunities through external partnerships should be made available to learners, teachers, schools and institutions from rural or disadvantaged areas.

Emphasize formalized teacher training in general, as well as use of technology to enhance learning. This goes beyond showing teachers how technology works. Partnerships with educational technology consultants and closer collaboration with teacher training centers and universities to align formal teacher education with the technological revolution envisioned in schools is very important.

Implement post-school curriculum reform pertaining to qualifications related to professional digital skills. Innovative ways of speeding up the responsiveness of formal qualifications to the needs of the labor market should be explored and developed. Examples of partnerships between public and private sectors show great potential to help in this regard.

DHET, DTPS and SETAs could play a larger role in identifying cross-sectoral professional digital skills and providing guidance to develop interdisciplinary skills. The DHET and NSA could also provide more guidance to post-school institutions to align their curricula (the skills and knowledge being developed) with labor market needs beyond the jobs-in-demand list. For example, incorporating the range of cognitive and socio-emotional skills that are emerging as in demand for the field. Such efforts will widen the reach of professional digital skills in other disciplines. Innovations using technology to enhance advancements in disciplines such as agriculture, health, or manufacturing all need professional digital skills. Having professional digital skills combined with disciplinary knowledge enables translation between technology and contextual needs. Innovative ways of creating opportunities for students in these disciplines to engage in professional digital skills could make significant contributions to the digital development of disciplines.

Increase the number and the quality of IT graduates: The poor throughput of students enrolled for ICT degrees should be investigated to identify where the problem lies. For example, it could be that the articulation gap is too wide for students to adjust to university curricula, students might not find the

content relevant for the work they want to pursue, or they might even find faster alternatives to reach the same level of competence and drop out.

Formalize the entrepreneurial link between ICT and business studies within and beyond higher education. The trend of merging ICT subjects with business degrees or vice versa could be broadened and incorporated into qualifications offered by TVET Colleges and the MICT SETA. Curricula could also be reviewed to optimize the relevance of complementary subjects to enhance entrepreneurship, for example, including digital entrepreneurship in the development of innovative business models, or including the marketing of digital products and services in marketing degrees.

Innovative ways of including e-business skills in curricula or short courses are needed. A flourishing digital economy needs more than users, developers, and maintenance of technology. It requires entrepreneurship and innovation to expand the delivery of products and services. Therefore, innovative ways to enhance entrepreneurship and innovation need to be in place, some of which might include: flexible curriculum structures in ICT or business degrees; reviewing the relevance of curriculum content; tying startup funding to hybrid degree completion; and investing in public-private partnerships through which students could gain business experience or engage in short courses to develop business (or ICT) skills.

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7. CONCLUSION: A WAY FORWARD

Globally, the digital economy has become an important driver of economic growth, innovation, and improved service delivery. This is also true for South Africa. Digitalization is revolutionizing how people bank, travel, access health care services, access public services, and do business. The number of internet users worldwide tripled from 1 billion in 2005 to 3.2 billion in 2015. The contribution of the digital economy is expected to grow from 15.5 percent to a quarter of global GDP between 2016 and 2026. Every dollar invested in ICT infrastructure between 2016 and 2018 is estimated could yield USD 5 by 2025. ICT is outperforming several sectors in South Africa, and already contributes around 17 percent of service exports and close to 3 percent of GDP (currently more than the contribution of agriculture)¹¹⁵. Internet penetration in South Africa is the highest in Sub-Saharan Africa at 54 percent, smartphone penetration is high at 81 percent, and the country remains ahead of regional peers in the Global Competitiveness Index, notwithstanding growing competition from the likes of Tunisia, Kenya, Egypt, Nigeria, and Mauritius; emerging markets such as Brazil, Mexico, Turkey, and India are still ahead.¹¹⁶

The diagnostic findings show much promise for improved continental leadership on the digital economy agenda but highlight the need to speed up implementation on many fronts for all South Africans to benefit. This is in particular the case in digital infrastructure and skills, where there is an urgency to push forward key reforms and stimulate private investments to address key challenges. Fast tracking implementation of digital public platforms will be important for improving service delivery and driving up demand for digital services, including the development of a next-generation digital identity system to help provide trust to underpin online transactions in South Africa's growing digital economy. Regarding digital entrepreneurship and financial services, South Africa needs to play to its strengths, working on incentives and regulations for improved growth.

Starting with infrastructure, South Africa should further enable private investment by working to improve the policy and regulatory environment. Competition in the broadband market needs to be enhanced, while alleviating concerns around mobile spectrum capacity and improving network performance. Promoting rural connectivity and more affordable data prices should continue to be priorities, alongside stimulating growth in high-speed fixed-line adoption. To address fragmentation and improve coordination, South Africa should urgently consider updating its national broadband policy with realistic targets and implementation models based on international best practices. The country should ensure the independence and capacity of the regulator, fast-track 4G licensing, enforce stricter rules on infrastructure sharing, and reconsider its universal access fund model. This would return South Africa to a path towards universal internet access, in turn leading to investment in other segments of the digital economy.

Reforms to develop digital public platforms should be stepped up. The implementation of national and provincial digital government strategies needs to be adequately resourced, for instance through private participation. To reduce fragmentation and proliferation, government should also improve the coordination and communication among Departments, SOEs and agencies driving this agenda, clarifying the role of each player at the national level. Leveraging the asset of a very strong foundational ID system South Africa could build a next generation digital ID system that allows South Africa to participate in the global digital economy (Europe's eIDAS for example). Finally, the government needs to take a holistic view of interoperability challenges, by defining a set of interdisciplinary measures required for further data sharing and openness, and appointing a central entity that will take stock, monitor and evaluate the development of digital government services.

115 Statistics South Africa (2017) Statistical Release P04414 Available online <http://www.statssa.gov.za/publications/P0441/P04414thQuarter2018.pdf>

116 World Economic Forum (2018) Global Competitiveness Report

Key recommendations regarding digital financial services center around increasing the usage of these platforms. South Africa should lower the barriers on access to retail payment systems and support the development of the fintech sector. Other key recommendations to consider on the supply-side include promoting regulation mandating open, interoperable and interconnected systems and products, so as to enhance efficiency and expand usage. These efforts would leverage on some of recent demand-side interventions such as the establishment of the market conduct authority, expected to improve consumer trust in digital financial services. Policy makers should also encourage alternative sources of, and means of assessing, credit, particularly for informal businesses. Leveraging the large volume of recurrent payments could expand usage of accounts, particularly within the low-income consumer segment.

A number of reforms are also needed to realize the potential of South Africa's promising digital entrepreneurship ecosystem. The government should strengthen the business environment for digital entrepreneurs through policies and regulations addressing constraints such as exchange controls, unclear Intellectual Property assignment, ill-targeted R&D tax breaks, limitations affecting digital payments for e-commerce businesses, and insufficient labor flexibility for young digital firms. In addition to strengthening e-business skills, the government could also consider introducing a tech visa allowing for the easy sourcing of skills. Finally, to scale up and reach global markets, South African digital entrepreneurs need expanded funding; this could be provided through de-risking mechanisms, as well as the setting up of supporting networks and incentives for angel investors.

Weaknesses in terms of skills need to be addressed to unlock investment into other segments. As it stands, South Africa is already experiencing an exodus of ICT skills. While tackling weaknesses stemming from the low quality of education is a long-term agenda, a number of reforms such as better coordination of the conceptualization and implementation of the different levels of digital skills, greater utilization of educational platforms, such as Technical and Vocational Education and Training (TVET) colleges and Community Colleges, the clarification of developmental pathways between schooling and post-school education, and the design of training informed by industry demands, could yield significant short-term outcomes. The fast-changing nature of the ICT sectors argues for setting up private participation in rolling out relevant digital resources in schools and reforming curricula so as to keep it relevant to industry needs. Such reforms to curricula should include formal e-business studies to prepare South Africa's digital entrepreneurs.

Overall, in order to unleash further benefits from the digital economy, South Africa would benefit from a holistic approach to address the constraints affecting the DE4A pillars, including strong public sector engagement that could enable further private participation. The new Presidential Commission for the 4th Industrial Revolution could become an important coordination forum in this respect. Efforts to establish common policy orientations and improve internal coordination between government departments and key agencies, as well as the monitoring and evaluation of existing policies would be beneficial. The private sector has a key role to play in South Africa's digital economy, highlighting the importance of improved dialogue between the government and private operators on prevailing digital challenges. With current fiscal challenges in particular, the government should increasingly adopt an enabling role, leveraging private sector expertise and facilitating increased private sector participation in delivering on public policy objectives under all foundational pillars of the digital economy.

ANNEX 1: TABLE OF RECOMMENDATIONS

Element	Key recommendations include
<p>Digital infrastructure</p> <p><i>Fast, high-quality and affordable broadband internet is a key foundation of the digital economy.</i></p>	<ul style="list-style-type: none"> ● Update the national broadband policy with realistic targets and implementation models based on international best practice. Instead of continuing to rely on SOEs as implementation vehicles for SA Connect, the Government could use its anchor role on the market more proactively, by aggregating its demand for connectivity and have this delivered through bulk procurements. ● Ensuring ICASA’s independence and capacity under the new merged national department is key. The regulator needs clear mandate confirming its field of play, to help alleviate concerns around its independence and expedite stalled actions such as 4G licensing. ● Prioritize fast-tracking spectrum assignment for 4G use to increase network capacity and alleviate constraint that the operators currently face and to take a proactive stance towards 5G licensing. The government could implement spectrum caps or spectrum set aside as part of the auction process to encourage market entry by operators with lower access to capital or set more demanding coverage requirements for existing MNOs ● If the Government proceeds with the WOAN and introduces it again as part of the ECA Amendment Bill, there needs to be careful consideration of the model to avoid monopolistic outcomes in the wholesale market, maximize private investment and ensure continued incentives to innovate. ● Make efforts to encourage further positive developments in the fixed-line broadband market. Promotion of infrastructure sharing, pro-competition open access principles, implementation of transparent wholesale pricing and determination of regulatory remedies could help the market grow.
<p>Digital platforms</p> <p><i>Platforms enable public and private sector organizations to devise new or better outcomes for citizens.</i></p>	<ul style="list-style-type: none"> ● Improve coordination and communication among Departments and Agencies driving this agenda at the national level. Important for the center of government to clarify the specific role of each key entity involved in the digital government at the national level, drawing from international best practices. ● Adequately resource the implementation of the national and provincial digital government strategies. Review the available resources at both the national and provincial level. If a budget shortfall is indeed identified, then fostering public-private partnerships could be one of the possible solutions. ● Taking a holistic view of interoperability challenges to remove some of the existing bottlenecks. Review the legal and regulatory review to ensure that the Departments and Agencies are legally allowed to share data, push mainstream APIs to ensure that the databases of various Departments and Agencies can communicate with each other on a selective as-needed basis, and implement a change management strategy to target behavioral constraints for further data sharing and openness. ● Improve digital capacity within public sector by rethinking the offerings of government training institutions such as the National School of Government (also under DPSA). ● Monitoring and evaluate the development of digital services to improve their efficiency, cost-effectiveness, and citizen-centricity. This will avoid duplication and will aid in further improvement and efficiency of e-services. Eventually, it will also help to make digital service delivery more citizen-centric.
<p>Digital financial services</p>	<ul style="list-style-type: none"> ● Reduce barriers on access to retail payment systems. Amend the legislation to (i) enable access to the NPS to all licensed/authorized entities either through a direct or indirect membership

<p><i>Individuals and households need convenient and affordable channels by which to pay, save, and borrow.</i></p>	<p>and (ii) recognizing payments as an activity distinct from deposit taking. Review the current policy on limiting the issuance of e-money products to only bank.</p> <ul style="list-style-type: none"> ● Promote open, interoperable and interconnected systems and products to expand usage. SARB needs to develop and issue regulation mandating interoperability and adoption of open standards to enable existing closed-loop systems to become open-loop systems or to be able to become interoperable with the open loop systems. ● Improve consumer trust in digital financial services by using the market conduct authority to develop product standards covering digital financial products and introduce simple complaint handling procedures and redress mechanism for users of digital financial services that are currently lacking. In addition, review of KYC thresholds. ● Leverage the large volume recurrent retail payments to expand usage particularly within the low-income consumer segment by promoting convenient and affordable use of SASSA account at low or no cost could help increase the usage of accounts and its electronic payment features.
<p>Digital entrepreneurship</p> <p><i>A pool of supported, skilled entrepreneurs leads to new products, services, business models, markets, and jobs.</i></p>	<ul style="list-style-type: none"> ● Identify and prioritize a set of digital entrepreneurship policies with clear department leadership. Building on the national 4iR initiative, review existing instruments and policies, and develop a comprehensive and consistent set of policies (grouped under a policy statement such as done by the Irish government or others) would help develop the sector. ● Reform certain aspects of the business environment to make it more digital entrepreneur friendly. Amend exchange control requirements and processes relating to IP as well as foreign investment into domestic companies, enable digital startups to defer R&D tax breaks against taxable income, ease labor legislation in young digital companies and reform regulations to allow IP to be fully assigned to spin out companies. ● Improve the quality of support provided to entrepreneurs, including for better inclusion, scale, and access to foreign markets boosted. Use results-based funding, strengthen linkages between Gauteng and Western Cape ecosystems and continue to address the rural/urban divide to improve learning, inclusion, and scale, and help build out regional programs for later stage digital entrepreneurs to better access international markets and mentors. ● Increase incentives for angel investors and supporting the structuring of angel networks is critical to drive investment into early-stage digital businesses, drawing on section 12J and international best practice. ● De-risk investment targeted to digital early-stage entrepreneurs, including through blended finance by governments and intergovernmental agencies on the model of the CORFO program in Chile. ● Continue active support to foster more diversity in the digital entrepreneurship sector, including through incentivizing support organizations to increase tailored support provided to women and black-led digital businesses drawing on international best practices.
<p>Digital skills</p> <p><i>The development of a vibrant, dynamic, and inclusive digital economy requires a deep labor pool.</i></p>	<ul style="list-style-type: none"> ● Coordinate the conceptualization and implementation of the different levels of digital skills to build on the work that has been done, and to identify which specific skills in each of the three levels need to be developed. ● Develop digital literacy in unemployed youth by making use of educational platforms such as Technical and Vocational Education and Training (TVET) colleges and Community Colleges. ● Define clear developmental pathways between schooling and post-school education and training. The identification of skills needed for emerging interdisciplinary job demands should underpin the options learners have.

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| | <ul style="list-style-type: none">● Explore innovative ways of including digital skills in the wider curriculum and to scale up private-sector led initiatives. Leverage and scale-up private-sector initiated models for rapid digital skills development through PPPs.● Foreground equity of access to resources. Additional opportunities through external partnerships should be made available to learners, teachers, schools and institutions from rural or disadvantaged areas.● Emphasize formalized teacher training in general, as well as use of technology to enhance learning, including through partnerships with educational technology consultants and closer collaboration with teacher training centers and universities.● Implement post-school curriculum reform pertaining to qualifications related to professional digital skills. Examples of partnerships between public and private sectors show great potential to help in this regard.● DHET, DTPS and SETAs could play a larger role in identifying cross-sectoral professional digital skills and providing guidance to develop interdisciplinary skills.● Increase the number and the quality of IT graduates by investigating where the problem lies in the poor throughput of students enrolled for ICT degrees.● Formalize the entrepreneurial link between ICT and business studies within and beyond higher education, including by broadening the trend of merging ICT subjects with business degrees or vice versa. |
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ANNEX 2: REFERENCES

- Accenture. 2018. "Creating South Africa's Future Workforce".
https://www.accenture.com/t20180201T173907Z_w_/za-en/acnmedia/PDF-70/Accenture-Creating-South-Africa-Future-Workforce.pdf?lang=en
- Accenture. 2019. Digital Transformation Initiative | Accenture. [online] Available at:
<https://www.accenture.com/us-en/company-event-wef-2017-digital-transformation-initiative>
- Bizcommunity. 2019. President appoints commission on fourth industrial revolution.
<https://www.bizcommunity.com/Article/196/831/189620.html>
- Business Media Mags. 2018. "Is Fibre Lighting Up the Townships".
<http://businessmediamags.co.za/business/made-in-sa/is-fibre-lighting-up-the-townships/>
- Businesstech. 2019. Amazon Web Services to open new data centers in South Africa.
<https://businesstech.co.za/news/cloud-hosting/279877/amazon-web-services-to-open-new-data-centres-in-south-africa/>
- Centre for Risk Analysis. 2018. "This is the digital version of the Survey for 2019". <https://cra-sa.com/publications/south-africa-survey/south-africa-survey-2019>
- Competition Commission of South Africa. 2019. "Data Services Market Enquiry. Provisional Findings and Recommendations".
- Competition Commission of South Africa. 2019b. "Data Services Market Enquiry. Final Report".
- Council on Higher Education. 2018. "Vital Stats 2016: Monitoring & Evaluation",
https://www.che.ac.za/media_and_publications/monitoring-and-evaluation/vitalstats-public-higher-education-2016
- Council for Scientific and Industrial Research. 2018. Spectrum requirements for Wholesale Open Access Network (WOAN). Released as part of the DTPS Invitation to Provide Written Comments on the Proposed Policy Directions to the Authority on Licencing of Unassigned High Demand Spectrum 27 September 2018.
- Deloitte (nd) "Industry 4.0: Is Africa ready for the digital transformation?"
- Dutta, S., Lanvin, B. and Wunsch-Vincent, S. 2018. The Global Innovation Index 2018: Energizing the World with Innovation. World Intellectual Property Organization,
https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2018.pdf
- EU Science Hub - European Commission. 2019. The Digital Competence Framework 2.0 - EU Science Hub - European Commission. <https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework>
- FinScope. 2018. "How South Africans are leveraging informal and formal financial markets".
http://finmark.org.za/wp-content/uploads/2019/01/FMT_Fsc_Leavebehind_CB4.pdf
- Global Entrepreneurship and Development Institute. 2018. "Global Entrepreneurship Index 2018"

Government Publications. 2015. National Cybersecurity Policy Framework for South Africa | Government Publications. <http://www.governmentpublications.lib.uct.ac.za/news/national-cybersecurity-policy-framework-south-africa>

Gov.za. 2019. President Cyril Ramaphosa appoints Commission on Fourth Industrial Revolution | South African Government. <https://www.gov.za/speeches/president-cyril-ramaphosa-appoints-commission-fourth-industrial-revolution-9-apr-2019-0000>

Hjort J. and Poulsen J. 2018. "The Arrival of Fast Internet and Employment in Africa". NBER Working Paper No. 23582

ICASA. 2018. "Bi-Annual Report on the Analysis of Tariff Notifications Submitted to ICASA for the Period 1 July 2017 to 31 December 2017".

ICASA. 2019a. "State of the ICT Sector Report."

ICASA. 2019b. "Information Memorandum for International Mobile Telecommunications Spectrum Assignment"

IFC. 2018. "The Unseen Sector A report on the MSME Opportunity in South Africa".

Insight2impact. (2019). Africa's digital database platform.

ITU. 2018. The economic contribution of broadband, digitalization and ICT regulation. <https://www.itu.int/pub/D-PREF-EF.BDR-2018>

Katz R.L. 2013. The impact of South Africa Connect on jobs and the economy. Presentation in the Broadband Workshop (DoC) 11-12 November

Labour Market Intelligence Partnership. (2016). Skills supply and demand in South Africa. <http://www.lmip.org.za/>

MICTSETA. 2016. "Skills Sector Plan 2018 to 2023". https://www.mict.org.za/downloads/MICTSETA_SSP_2018_to_2023_Draft.pdf

National Cybersecurity Policy Framework. 2015.

PWC. 2018. Industry 4.0 | PwC's Strategy&. <https://www.strategyand.pwc.com/industry4-0>

PWC. 2019. Annual Global CEO Survey <https://www.pwc.com/gx/en/ceo-survey/2019/report/pwc-22nd-annual-global-ceo-survey.pdf>

Research ICT Africa 2018 The State of ICT in South Africa, Policy Paper No.5, Series 5, Accessed online https://researchictafrica.net/wp/wp-content/uploads/2018/10/after-access-south-africa-state-of-ict-2017-south-africa-report_04.pdf

Research ICT Africa. 2019. Research ICT Africa Mobile Pricing (RAMP). https://researchictafrica.net/ramp_indices_portal/

Research.ukzn.ac.za. 2008. http://research.ukzn.ac.za/Files/IPR_from_PFR_D_Act_No_51_of_2008_1.sflb.pdf

Sanderson, C. 2019. NAPAfrica IXP ranks in top 15 globally • Teraco Data Environments. [online] Teraco Data Environments. <https://www.teraco.co.za/news/napafrica-ixp-ranks-top-15-globally/>

Sanren. 2019. SANReN – South African National Research Network. <https://www.sanren.ac.za/>

SARB. 2017. “Banking Supervision Report”.

SARB. 2018. “Review of the National Payment System Act 78 of 1998”, Policy Paper, September 2018

SAVCA. 2018. “SAVCA Venture Capital Industry Survey: Covering the 2017 calendar year”

SARB. 2019. [online] Available at:
<https://www.resbank.co.za/RegulationAndSupervision/FinancialSurveillanceAndExchangeControl/Documents/Currency%20and%20Exchanges%20Manual%20for%20Authorised%20Dealers.pdf>

SARS. 2019. Venture Capital Companies.
<https://www.sars.gov.za/ClientSegments/Businesses/Pages/Venture-Capital-Companies.aspx>

Sasme. 2019. Home Page - Sasme. <https://sasmefund.co.za/>

Skills Portal. 2019. “Careers in high demand needed to thrive in 4iR”.
<https://www.skillsportal.co.za/content/careers-high-demand-needed-thrive-4ir>

South Africa Connect. 2013. “Creating Opportunities, Ensuring Inclusion: South Africa’s Broadband Policy. 2013.”

Speedtest.net. 2019. Analyzing India’s 4G Availability: Including a Look at the 15 Largest Cities.
<https://www.speedtest.net/insights/blog/india-4g-availability-2019/>

Statistics South Africa. 2017. “Gross Domestic Product: Fourth Quarter 2018”, Statistical Release P04414 <http://www.statssa.gov.za/publications/P0441/P04414thQuarter2018.pdf>

TechCentral. (2019). Huawei Cloud now available in South Africa – TechCentral.
<https://techcentral.co.za/huawei-cloud-now-available-in-south-africa/87985/>

Technoserve. 2017. “Domestic Remittances in South Africa”.

Telegeography. 2019. Telecommunications market research that's data-driven.
<https://www.telegeography.com/>

Towerxchange.com. 2018. TowerXchange - telecom tower industry the independent community for the telecom tower industry - TowerXchange – telecom tower industry. <https://www.towerxchange.com/>

United Nations. 2018. “e-Government Survey”. <https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2018>

Van Zyl, K. 2018. “SARS Section 12J Venture Capital Companies — Hype Versus Substance.”

World Bank. 2016a. “Achieving Effective Financial Inclusion in South Africa: A Payments Perspective”.

World Bank. 2016b. “Development Report 2016: Digital Dividends”, Washington, DC:

World Bank. 2016c. “Enabling Digital Entrepreneurs”.

World Bank. 2017a. "Remittance Prices Worldwide".

World Bank. 2017b. "Global Findex Survey 2017: Measuring Financial Inclusion and the Fintech Revolution", Washington DC

World Bank. 2018a. "Republic of South Africa Systematic Country Diagnostic. An incomplete transition: Overcoming the legacy of exclusion in South Africa", Washington, DC: World Bank.

World Bank. 2018b. "Doing Business South Africa", Washington DC

World Bank. 2018c. "Innovative Business Models for Expanding Fiber Optic Networks and Closing the Access Gaps".

World Bank. 2019a. "South Africa Economic Update #12: Tertiary Enrolment Must Rise", Washington, DC: World Bank.

World Bank. 2019b. "Unlocking Innovation in South African Public Service".

World Bank. 2019c. "South Africa Country Private Sector Diagnostic. Creating Markets in South Africa: Boosting Private Investment to Unlock South Africa's Growth Potential", Washington, DC: World Bank.

World Bank. 2019d. "South Africa ID Case Study: Identification for Development (ID4D)", Washington, DC: World Bank.

World Economic Forum. 2018. "The Global Competitiveness Report".

World Economic Forum. 2019. http://reports.weforum.org/pdf/gci-2017-2018-scorecard/WEF_GCI_2017_2018_Scorecard_EOSQ130.pdf