SOUTH AFRICA in the DIGITAL AGE

Digital readiness assessment appendix

DETAILED MEASUREMENT OF SOUTH AFRICA'S READINESS TO TAKE UP ECONOMIC OPPORTUNITIES IN THE DIGITAL AGE

DISCUSSION DRAFT FOR BETA TESTING

Appendix to a report by Genesis Analytics in partnership with the Gordon Institute of Business Science and the Pathways for Prosperity Commission on Technology and Inclusive Development

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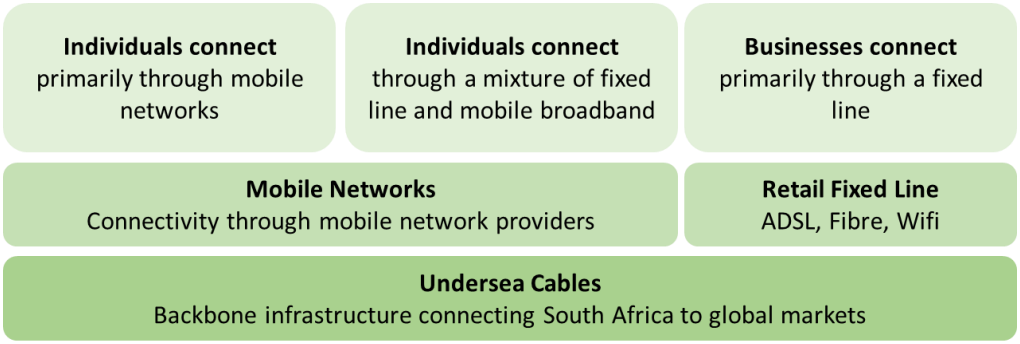
Universal Digital Access

Digital infrastructure, networks and universal access to the internet are foundational requirements for a digitally-enabled economy as they allow businesses and individuals to participate in emerging economic opportunities. This access is predicated on the availability of infrastructure, the quality of internet connections, well-functioning telco regulation and the affordability of data and devices. These are the conditions measured in this pillar with a snap-shot of internet usage preceding the condition measurement.

Infrastructure

South Africa is the continental leader in ICT infrastructure and is connected to the internet through multiple high-speed undersea cables, fixed network operators and mobile network services. Readiness for leveraging digitally enabled opportunities is dependent on the availability of this digital infrastructure by enabling business and individuals to quickly adapt to the rapid changes created by the agile nature of the digital economy. South Africa's physical digital infrastructure is evaluated in terms of electricity coverage, undersea cable infrastructure, fixed line coverage, and mobile network coverage.

Figure 2: A snapshot of the current infrastructure market structure



Source: The State of the ICT sector in South Africa, 2017

Electricity coverage

Competing in the digital age requires an efficient and sustainable supply of electricity that matches rising demand. South Africa is yet to achieve universal electricity access with 85% of South Africans and 67% of the rural population having access to electricity in 2016[1].

[1] World Bank (2019)

Policymakers are tasked with extending access to this 15% while combatting challenges in energy sustainability and stability of supply .

Eskom - South Africa's electricity public utility - is currently facing major supply constraints. Many individuals and businesses are intermittently left without electricity as Eskom seeks to stabilise the power grid. These shortages in electricity supply are due to inadequate coal reserves, poor maintenance and other structural issues at Eskom. South Africa ranks below BRIC nations and the global median in the quality of electricity supply and has a deteriorating measure of the quality of electricity infrastructure, again below the majority of BRIC comparators and global averages.[2]

Load-shedding has detrimental effects on the economy and especially the poor. Load shedding threatens jobs, forces businesses to pause operations, compromises people's standards of living and creates suffering for consumers through financial losses as power surges damage appliances[3]. Individuals and businesses with low levels of income can afford few alternatives for charging and powering electronic devices and may therefore be disconnected from digital opportunity. In an effort to achieve financial stability, electricity costs have accelerated in real terms since 2007 creating undue burdens for business and costs for consumers[4]. Financial support to the SOE has had a massive burden on the fiscus which will persist over the next 3 years at nearly R70 billion a year[5]. While the presidency has noted its intention to decouple the entity into an independent generator, transmitter and distributor, it is uncertain whether this will achieve financial stability of the collective entity.

Ensuring universal internet access and that the supply of electricity is sustainable requires reduced reliance on coal and strengthening generation from alternative power sources. The Renewable IPP procurement programme recognises that South Africa can leverage the high level of renewable energy potential to sustainably increase power supply. This programme has led to more domestic investment by independent power producers over the past 4 years than the rest of Sub-Saharan Africa over the past two decades. Since the programme's inception in 2013, there have been 102 projects with a production capacity of 6378 megawatts. One of the outcomes of the programme has been the decline in average energy prices.[6] The programme was however put on pause for almost 3 years because of political volatility. However, in April 2018 the programme resumed, with Eskom entering into an agreement for 27 large-scale renewable energy projects. Investors will be looking for policy

[2] WEF (2018). Global Competitiveness Index/
[3] Online Media (2019) Various news articles.
[4] Deloitte (2017). An Overview of Electricity Consumption and Pricing in South Africa
[5] Online Media (2019) – *Eskom gets R69bn in financial support over 3 years* – Fin24
[6] Eberhard & Naude (2017). The South African Renewable energy IPP procurement programme

certainty in the new integrated resources plan and signals that programmes such as the IPP will not be subject to the same levels of political volatility as before.[7]

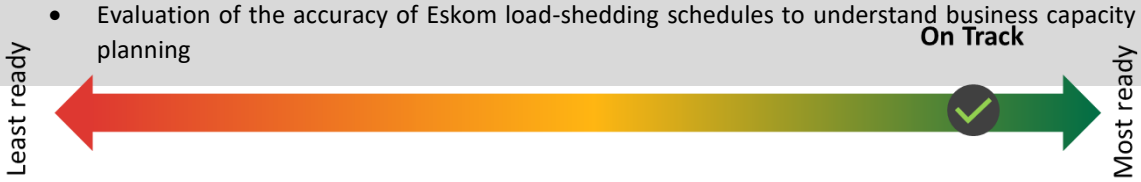
Undersea cables

With an international internet bandwidth of 149.5Kb/s per user, South Africa is ranked 18

Evaluating the quality, scale and dynamics of electricity coverage combines public perception, expert opinion and survey findings. Given the infrastructure's universal relevance and technical operation, data sources are robust and readily available for local measures and for international comparability

Supplementary data and empirics:

- The development of a nationally accepted estimate of the cost of load shedding for society. Dimensions should include geography and distinction between business and consumers.
- Evaluation of the accuracy of Eskom load-shedding schedules to understand business capacity for planning



of 139 countries and well placed to compete in the global digital market. Undersea cables are required to support South Africa's increasing demand for broadband as they transport 98% of global data[8]. Six undersea cables connect South Africa to the rest of the world. Investment in new cable infrastructure has significantly reduced the price of international bandwidth while a forthcoming undersea cable connecting South Africa to Brazil is expected to decrease South Africa's latency by up to 140 milliseconds[9].

High speed internet is a comparative advantage that improves the speed and quality of internet access for all. While this may not be directly relevant for everyday users it will benefit individuals accessing markets that require an individual or a business to do real time, high frequency operations such as trading.

Given that undersea cables have technical specifications and connectivity of countries is widely known the analysis is data driven and objective.

Fixed line coverage

South Africa has the continent's most extensive ICT infrastructure driven by investments in fixed line coverage and the growth of fibre networks. South Africa ranks 139 of 190 countries

[7] Online Media (2019) - *IPP procurement programmes a powerful tool and investor confidence cannot be understated* - Business Day
[8] Online Media (2018) - *New Cape Town/Brazil subsea cable to boost SA broadband* - BIZCommunity
[9] Online Media (2018) - *Boosting SA broadband : New subsea cable will connect Cape Town to Brazil* - BizNews

in fixed line penetration[10] - significantly higher than continental comparators. Fixed line and fibre networks are most prominent in high-income metropolitan areas with fibre-to-the-home (FTTH) servicing only 2% of internet connected households, and urban areas 15 times more likely to have fixed line coverage than rural areas[1112]. Disparities in access between rural and urban populations are therefore large however far smaller than other African markets[13]. Lack of rural infrastructure and its high costs therefore make fixed line connections inaccessible for low income and rural businesses who must rely on less stable mobile networks and data bundles as an alternative. This disadvantages SMMEs and businesses seeking to compete in the digital world if they operate outside of metropolitan areas or have levels of income - only 46% of SMEs have no access to fixed line internet[14].

Copper fixed line has seen a decline in usage due to the move from voice to data directed towards mobile broadband services and rising FTTH coverage. Telkom alone saw a 38% increase in mobile broadband use. In contrast to copper fixed lines, FTTH is seeing healthy growth with 35 operators entering the fibre-to-the-home (FTTH) market since 2014 In addition to the existing 8,000km Vumatel fibre and 10000 Dark Fibre Africa fibre, major investments were made by mobile operators. South Africa now has over 60,000 km of unduplicated fibre and over 80,000 km of duplicated fibre.

Survey data assessing individual access to fixed line networks is robust and nationally representative. While the readiness condition reflects the extent of fixed line coverage, more could be done to assess the relevance of this measure for businesses seeking to compete in the digital world as alternatives connections offer increasing quality. Data relating to business access isx drawn from a narrow survey.

Supplementary data and empirics:

- A nationally representative survey of business perspectives on ICT access. This would contain measures of the cost burdens of the various options and the self-perceived preference across options.

[10] ITU (2019). Fixed Broadband Access data
[11] RIA. (2017). The State of ICT in South Africa
[12] ITU (2019). Fixed Broadband Access data
[13] RIA. (2017). The State of ICT in South Africa
[14] SME South Africa (2018). An Assessment of South Africa's SME Landscape

Mobile network coverage

Most South Africans access the internet through mobile connections that leverage South Africa's high levels of mobile network coverage. Approximately 99.9%[15] of South Africa's population have access to mobile networks - in 2018 South Africa's largest operator, Vodacom, had 3G and 4G network coverage reaching 99.97% and 80% of the population respectively while MTN's 3G coverage reached 98% of the population. 4G coverage has accelerated rapidly as only 53% of the population were covered in 2015[16]. Mobile network access is particularly important as 43% of connected households do so through a mobile phone. [17]South Africa's mobile operators continue to make substantial investments in network infrastructure to carry the high volume of data transmitted by bandwidth hungry applications. In the 2017/2018 financial year total capital expenditure by the three leading operators equated ZAR 21.6 billion[18]

The entrance of MNOs such as Cell C, Telkom ('8ta') and Rain has increased competition in the mobile market to the benefit of consumers. MNOs have embarked on initiatives such as Cell-C zero-rating WhatsApp and Vodacom and MTN zero-rating Twitter, Facebook and other educational content. Rain - a data-only network who entered the market in 2018 – is expected to launch 5G this year which places South Africa on par with global adoption of 5G networks[19].

The coverage of mobile networks was cross-verified between reports from mobile operators, the World Bank and the ITU – a globally recognised source. The ITU offers ease of cross-country comparison, however Research ICT Africa demonstrates that some of the ITU's measures may be subject to bias.

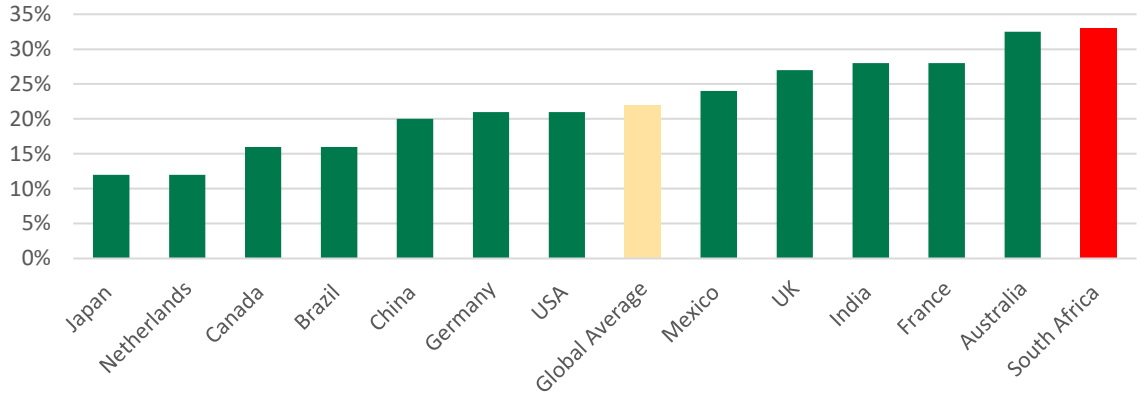
Quality and reliability

South Africa fares unfavourably in the quality, speed and reliability of connections that enable participation in the global digital market. South Africa's fixed line broadband internet speed and quality of connectivity is more than 50% below the global average at 20.1 Mbps, placing South Africa at an unfavourable position compared to competitors such as China, Brazil and USA[20]. Approximately 41% of small businesses indicated that slow, unreliable

15 WEF (2017). Global IT Report
16 ICASA (2018). 3rd Report on the State of the ICT Sector in South Africa
17 RIA. (2017). The State of ICT in South Africa
18 Operators annual reports 2017/2018
19 Online Media (2019) - *Rain and Huawei launch South Africa's first commercial 5G network* - BusinessTech
20 Ookla (2019). Speedtest Global Index

connectivity is a barrier to participation in the digital economy however these speeds are rising[21]**.** Furthermore the National Treasury has allocated R1.9 billion to South Africa Connect to invest in high-speed internet connections.

Figure 5: Share of respondents reporting a slow internet connection[22]



Source: Regus, 2017

Mobile broadband connections offset these challenges as they are in certain instances faster than fixed-line connections and are generally reliable. Average mobile download speeds are estimated at 29 Mbps. These are above global averages and place South Africa at 54 of 138 markets[23]. Vodacom and MTN continue to improve their 3G and LTE network quality with MTNs 4G network having the capacity to offer speeds of 70 Mbps. ICASA conducts Quality of Service assessments across provinces which measures call and data service quality and reliability. Voice related assessments illustrate a moderate frequency of missing stringent quality targets and disparities in quality between provinces. KPIs such as speed and stability are used in the assessment of data services also illustrate variation within and between provinces. While differences in performance between service providers are highlighted, no frame of reference is provided to meaningfully assess service quality.

The quality and reliability of ICT networks should be measured relative to users' specific needs – digitally enabled business reliance on fixed lines require high speeds while consumer reliance on mobile networks require acceptable speeds. Latency measures have been conducted for South African mobile network operators however these need to be benched against customer perceptions of network quality.

Supplementary data and empirics:

- A narrow survey measuring customer and business perceptions of network operator service quality.
- Consolidation of ICASA quality reports to enable trend analysis and ease comparison between reports. This should be coupled with the above to asses whether quality meets customer demands.

[21] Online Media (2018) - *How technology is reshaping South Africa's small business economy*, Xerox & World Wide Worx
[22] Regus (2017). The workplace revolution
[23] Ookla (2019). Speedtest Global Index

Telecommunications regulation

The primary legislation governing the electronic communications sector in South Africa is the Electronic Communications Act 36 of 2005 (the "ECA"). The Act together with the Electronic Communications Amendment Act 1 of 2014 covers all aspects of the regulation of electronic communications markets including licensing, infrastructure deployment and access, the management and assignment of frequency spectrum, technical standards, interconnection and competition. In addition, the Independent Communications Authority of South Africa (ICASA) was established in 2000[24] to regulate the electronic communications sector and perform the duties envisaged in the ECA.

Notwithstanding this regulatory regime, it is generally acknowledged that there are significant regulatory bottlenecks and competition issues that are hindering affordable access to electronic communication services. These issues were most recently highlighted in the Competition Commission's April 2019 Provisional Findings and Recommendations in the Data Services Market. [25] The report highlights the following regulatory bottlenecks as hindering affordable access:[26]

First, a lack of spectrum and cost-based facilities access is driving high mobile service provision costs. Significant delays in the release of high-demand, low frequency spectrum by ICASA for use by mobile networks has resulted in increased costs for such operators. This is because mobile network operators must compensate for the lack of spectrum via increasing capital expenditure on physical base station infrastructure to cope with rising data traffic demands on their networks. In addition, service provision costs are also impacted by a lack of cost-based passive infrastructure sharing on the part of large incumbents. Whilst ICASA has previously put in place regulations governing facilities access, these regulations do not cover all facilities (such as ducts and poles), they do not deal with constructive refusals nor do they regulate the price at which access is provided.

Second, competition could be improved, particularly in the case of mobile markets, by regulating wholesale access. Retail electronic communication markets have remained relatively concentrated over time with market failures and a lack of wholesale access regulation tending to exacerbate first mover advantages. In particular, in the case of mobile markets the terms on which roaming agreements and wholesale network access has been provided by incumbents to smaller players have historically not been conducive to the introduction of effective competition. This is also supported by the fact that the 2017 ICASA Priority Markets Study found that wholesale fixed line access, upstream infrastructure (national transmission and metropolitan connectivity and relevant facilities) and mobile

[24] ICASA Act 13 of 2000
[25] Competition Commission, Data Services Market Inquiry: Provisional Findings and Recommendations, 21 April 2019.
[26] Competition Commission, Data Services Market Inquiry: Provisional Findings and Recommendations, 21 April 2019, p.8-19.

services are markets that are likely to exhibit ineffective competition and hence should be prioritised for potential regulatory market reviews.[27]

There have been a number of indications that the sector regulator is seeking to address the identified regulatory bottlenecks[28] however, past experience and current regulatory and policy uncertainty suggests that change is unlikely to be forthcoming. Indeed, the ICT policy and regulatory landscape has been complicated by Departmental restructuring and the withdrawal of the Electronic Communications Amendment Bill from parliament. Importantly, the latter was set to be sector-changing legislation that sought to translate current Government policy into legislation and also reduce what are seen as onerous pre-conditions for regulation. Its withdrawal is thus likely to lead further delays in implementing regulatory imperatives.

Telco regulation was analysed by an expert team of competition economists and relies both on nuanced insight and interpretation of regulation.

Affordability

The ability for South Africans to use the internet to access economic opportunities depends on the affordability of internet-enabled devices and data. South Africa ranks below the world median and BRICS averages for the affordability of ICT services[29] and suffers particularly in terms of data costs. Given these high costs, lack of momentum and relevance data has in everyday lives, the readiness gap remains large and static. Market structure, regulation and policy will be key players in driving cheaper data prices.

Data

Poor price competition among MNOs is driving the high costs of prepaid mobile data bundles. The cost of data is high relative to continental comparators - the cheapest domestic 1GB of prepaid mobile data bundle costs 600% more than the cheapest 1GB in Egypt and 134% more than BRICS nations.[30][31] Mobile data costs are a hindering factor for the poor and average income individuals who are subsequently unable to access the full experience and benefits of the internet. Approximately 15% of individuals reported that the main reason for limited use of the internet was the cost of data while others estimate that more than half of

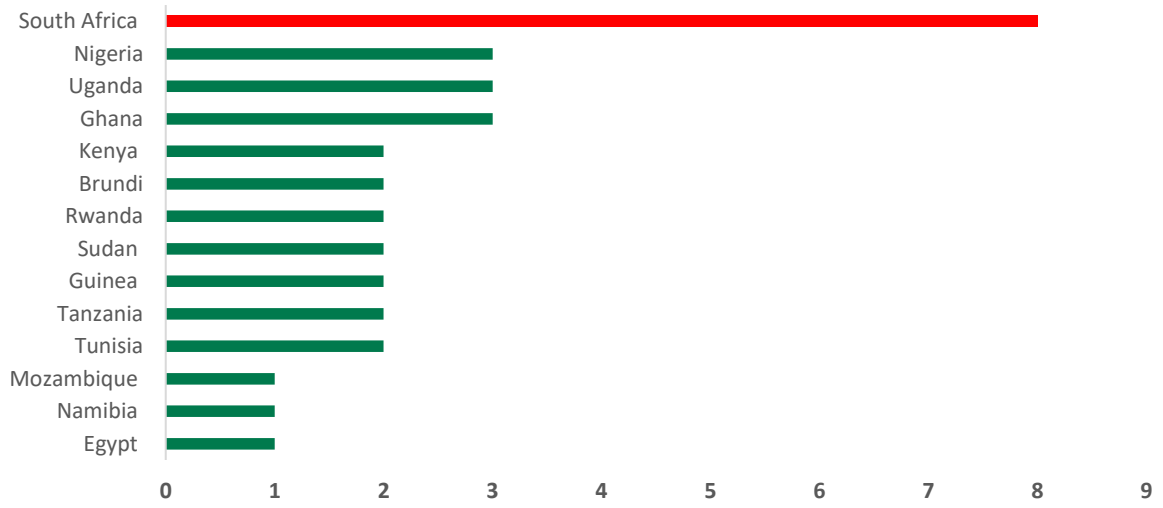
[27] ICASA, Summary of the Findings on the Inquiry into Priority Markets in the Electronic Communications Sector, 17 August 2017, Government Gazette Vol. 638, No. 41847 p.7.
[28] These include undertaking both a Priority Market Study to identify markets that should be prioritised for regulation and subsequently initiating its own Data Market Inquiry (currently underway).

[29] WEF (2017). Global Information Technology Report
[30] RIA. (2017). The State of ICT in South Africa
[31] Online Media (2018) - *High Data Costs Challenged – Low Income Households Hit the Hardest* – CityPress

South Africans would need to spend 15% to 40% of their income to buy 1 Gb of data[3233]. While data costs fell from 2014 to 2015, this decline halted and continues to remain too high.[34]

An oligopolistic market which lends to poor pricing competition between mobile operators contributes to the high data costs. The mobile network's Herfindahl-Hirschman index - a measure of market concentration – reflects a concentrated market with Vodacom's data revenue share at 40%, followed by MTN at 34% and Cell C at 30%.

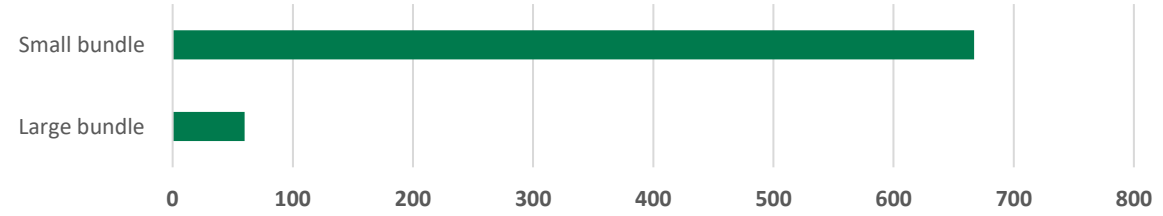
Figure 4: Cost of 1GB in African countries (USD)



Source: RIA After Access Survey, 2017

Low-income earners are paying disproportionately higher costs for small packets of data as costs are higher for smaller bundles. Rain aims to provide consumers with cheaper data using a flat rate pricing strategy[35]. However, Rain currently has coverage in a limited number of urban areas.

Figure 5: Price per Gigabyte of data (ZAR)



Source: Jamlab, 2018

The lack of access to competing infrastructure for low income consumers decreases data competition, allowing MNOs to charge exorbitant prices. Fixed line and fibre connectivity are low to non-existent in some low income and rural communities. Businesses in areas without fixed line connections struggle to compete because they are reliant on expensive

[32] Online Media (2018) - *High Data Costs Challenged – Low Income Households Hit the Hardest* – CityPress
[33] Online Media (2018) - *Data Must Fall: Inquiry hears how exclusionary data prices are* - IOL
[34] RIA. (2017). The State of ICT in South Africa
[35] Rain.co.za

mobile connections – 1 GB of mobile data is double the price of a GB of ADSL data.[36, 37] The data must fall campaign is seeing traction in assessing the competition dynamics in the data market.

Municipalities are providing residents with free, capped WiFi to increase access for marginalised individuals to affordable and high-quality internet[38]. South Africa leads the continent in the provision of free internet access to citizens with more than 2,000 hotspots in nearly 60 cities[39]. *The City of Tshwane* had more than 1 million unique devices using free WiFi in 776 public hotspots in 2018. The municipality provided residents with 1,500 km of free broadband fibre capped at 500MB, allowing individuals to use the network for learning, working and job-hunting. *The City of Johannesburg* provides free WiFi at over 300 hotspots capped at 300MB per user with unlimited access to services. *The City of Cape Town* entitles user to 250 MB of data and unlimited access to government websites. Residents can buy data cheaper than through MNOs -R700 MB costs R5, 2GB costs R15 and 7GB costs R45. *The City of Durban* provide residents with access to free WiFi with a key focus on providing this service in townships and rural areas where the majority of access-constrained individuals reside.

Public discourse, cross-country comparison, and assessments of data pricing all allude to the unaffordability of data for the majority of South Africans and the subsequent impact this has on inclusivity. While these measures provide evidence that there is a data affordability gap, more can be done to quantify the impact of this gap.

Supplementary data and empirics:

- Survey data should seek to quantify the impact of data costs by measuring the share of income spent on data across a range of digitally enabled and non-digitally enabled jobs. This should equally be conducted for business and surveyed annually.
- These findings would help unpack the data requirements across these different jobs and opportunities.

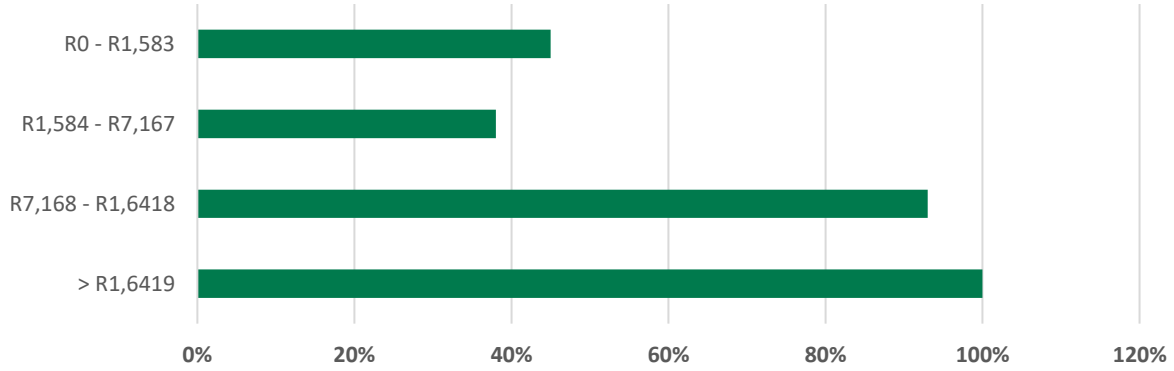
Devices

Mobile phones are the most popular devices used to access the internet however the high cost of smartphones relative to disposable income inhibits universal access. Approximately 72% of the population use a mobile phone as the sole device connecting many low-income individuals[40]. While smartphones are becoming cheaper, they are still unaffordable for lower income individuals. This is despite the 41% fall in average prices since 2012[41]. This impedes internet access as 36.2% of non-internet users cited the lack of internet connected devices as the main inhibitor to internet access. A geographic divide also exists in terms of smartphone

[36] Online Media (2018) - *1GB mobile data prices in South Africa – No price drops in sight* - Mybroadband
[37] Online Media (2018) - *MWEB to charge R49 for 1GB of ADSL data* - Mybroadband,
[38] National Treasury (2018). Service Delivery review
[39] ITC (2018). Business Ecosystems for the Digital Age
[40] RIA. (2017). The State of ICT in South Africa
[41] GSMA (2018) The Mobile Economy – Sub-Saharan Africa

ownership, with 54% of the urban population owning smartphones versus 33% of those in rural areas.[42] The total figure for smartphone access falls far short of the OECD average of 70% to 80%[43].

Figure 3: Smartphones penetration by income [44]



Source: RIA After Access Survey, 2017

While smartphone penetration may appear high, most consumers have low-feature smartphones which fit the narrow smartphone definition and have limited capabilities. Smartphones have WiFi connectivity, web browsing capabilities, a high-resolution touchscreen display and the ability to use apps. Approximately 61% of smartphone sales in South Africa in 2018 were low-end smartphones costing less than R1,500.[45] Most of these low-end devices use AndroidGO, an operating system for devices with low RAM, slow internet connection and low-end CPU. These phones therefore have limited capabilities - for example, the phone can use WhatsApp but cannot support a banking app.[46] Individuals seeking to access income generating opportunities that require smartphone capabilities are therefore disadvantaged. Inequality in opportunity is therefore embedded along the same dimensions as inequalities in smartphone penetration – income, geography and gender.

Smartphone distribution networks that limit the benefits of price competition between mobile phone brands may be contributing to inflated device costs. Markets such as China have multiple producers of affordable smartphones that compete with established smartphone producers like Apple, Samsung and Huawei[47]. However, the distribution chains in South Africa are focused on pricier smartphones from established brands, and many of the new market players are not distributing their phones in South Africa. As these smartphones are imported from outside the Southern African Custom Union, they are subject to a 10% luxury item mark-up and an ad-valorem luxury good excise duty of 9%.[48] Removing this excise duty could have a considerable effect on the price of devices. In addition to this, scaling

[42] RIA. (2017). The State of ICT in South Africa
[43] RIA. (2017). The State of ICT in South Africa
[44] Note: *The initial income bracket is inflated as the survey includes students at secondary and higher education institutions in the no-income band*
[45] More than 13 million new smartphones were sold in South Africa last year – and almost two-thirds cost less than R1,500 according to Business Insider, 2019
[46] Android platform (2019). SocialCompareBeta
[47] Online Media (2018) - *The Chinese smartphone companies taking on Apple and Samsung like never before* - Mybroadband
[48] SARS (2019). Duties and Taxes for Importers.

affordable devices manufactured in South Africa such as the Mara smartphones, could improve access to affordable, high-quality smartphones.[49]

Measures of device penetration are robust and derived from Research ICT Africa – an entity funded by the IDRC and dedicated to measuring and assessing ICT access and dynamics. This is combined with insights drawn from alternative sources however these measures can be supplemented to understand the specific requirements users need in terms of functionality and therefore better determine the scale of the gap.

Supplementary data and empirics:

- Interviews with consumers and businesses operating platforms would provide insight into device requirements. This would unpack the degree to which low functionality phones are an impediment and could be overlaid with the insights of local phone producers to coordinate development.

[49] Online Media (2019) - *South Africa to build first 'affordable' smartphone* - BusinessTech

Human Capital

The South African labour market has historically struggled with labour mismatches. There are not enough graduates learning relevant skills for a digitally oriented economy.[50] South Africa ranks 88 of 130 countries in the WEF Human capital report, let down by performance measures for young adults [51]. In 2016 the total number of graduates in public Higher Education and Training (HEI) institutions was little over 200,000, which is a 39.7% increase from 2009. Private HEI contributed 40,000 graduates in 2016 with nearly a third graduating with a bachelor's degree or advanced diplomas.[52] However, graduates trained in these areas often lack practical, work relevant skills. This skill shortage has led to job vacancies and has hindered economic growth.

South Africa has many educational pathways and skills development programmes that can be leveraged to scale the supply of quality skills. Higher education institutions, Technical and Vocational training as well as micro-credentialing institutions are the most common educational pathways in South Africa. These pathways provide a broad spectrum of options for South African learners and differ by the type of programmes offered, entrance requirements, delivery methods and tuition costs.

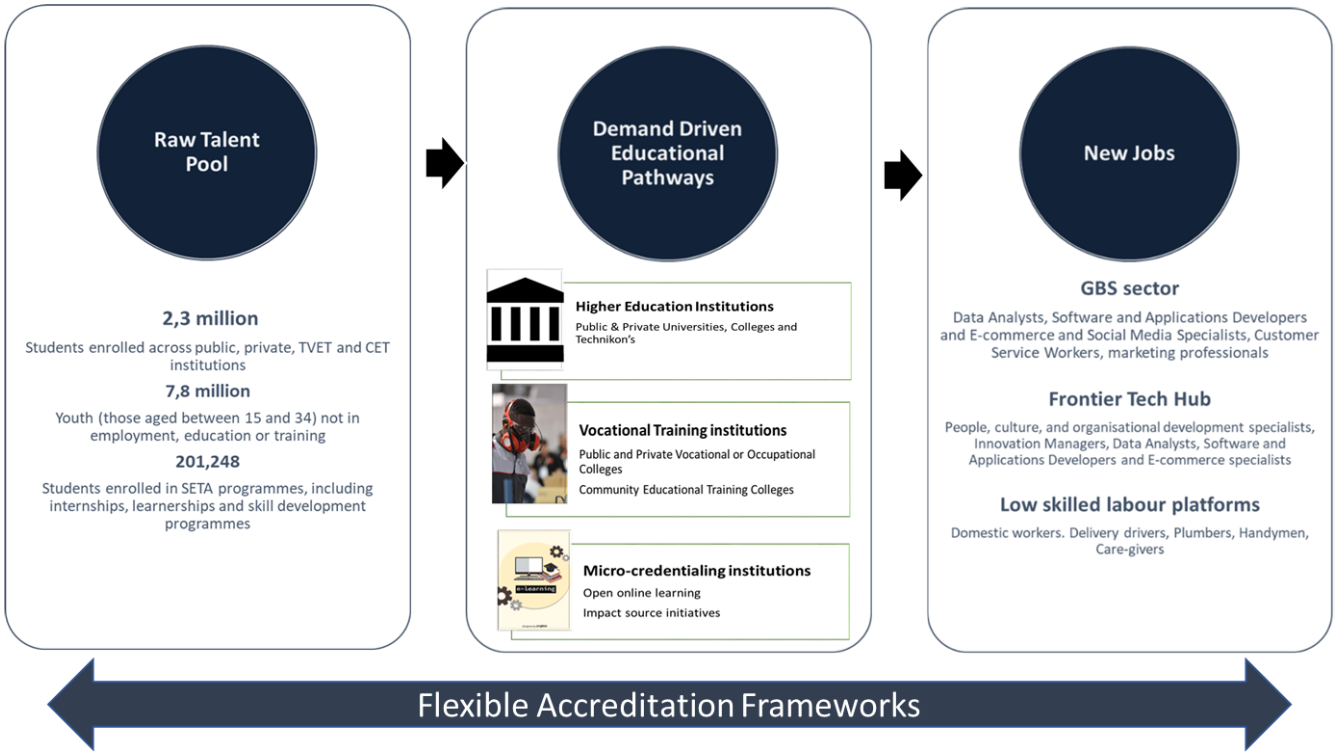
Post-school education and training pathways include 26 public higher education institutions, 123 private higher education institutions, 50 Technical and Vocational Education and Training (TVET), 279 registered private colleges and 9 community education and training (CET) colleges. A number of micro-credentialing institutions such as Careerbox, EOH, Maharishi Institute and the Mentec Foundation are also emerging. Open online learning platforms such as Coursera, Allison, LinkedIn learning and Udemy are seeing significant growth.

However, this wide range of educational pathways is not necessarily resulting in effective youth job placements. The graduate unemployment rate is about 33.5% for those aged

[50] Genesis Analytics Team Analysis 2019
[51] WEF (2017). Human Capital Report
[52] DHET (2016) Statistics on Post-school education and Training in South Africa

between 15–24, and 10.2% among those aged 25–34 years.[53] Students are being prevented from transitioning into educational pathways that translates into a jobs due to issues in accessing educational pathways, poor articulation between pathways and a lack of flexible and demand driven content.

For the supply of quality and relevant skills to increase considerably, there are a number of enablers that need to be measured. This includes consideration of the availability of a large raw talent pool, including the quality of basic and secondary schooling. Secondly that this talent pool can be drawn into demand-driven educational pathways that are fit for purpose. Lastly that these pathways are supported by a flexible accreditation framework.



Basic and secondary schooling

The output of South Africa's basic and secondary schooling is dangerously low, stemming both from critically poor enrolment and completion rates. As of 2016, 16% of children aged 5-14 where not enrolled in any form of basic or secondary schooling. As a benchmark, the OECD country average is close to 100% for this age group, and South Africa ranked last amongst 43 OECD partner countries.[54] Moreover, only 30% of students who enroll in grade one actually make it to and pass matric with weaker progression likelihood for previously

[53] Statistics South Africa, 2018
[54] OECD (2018) Education GPS http://gpseducation.oecd.org/CountryProfile?primaryCountry=ZAF&treshold=10&topic=EO

disadvantaged races[55]. Between grade 11 and grade 12 alone, 29% of male and 13% of female students stopped their schooling.[56]These poor completion statistics are reflected in the fact that 19% of people between 25 and 64 have no schooling beyond grade seven.[57] These two factors compound to create a crisis, leaving large percentages of the youth without even basic educational training.[58]

Even for those who enrol in, and complete, primary education, the quality provided is very poor. South African basic education systems are not effective at instilling even the most fundamental numeracy and literacy skills. As of 2016, 78% of grade 4 learners were classified as illiterate by The Progress in International Reading Literacy Study. This makes South Africa the worst performing nation of the 50 that were measured.[5960] Similarly, Nationally representative surveys (TIMSS-N 2015) show that 61% of Grade 5 learners could do basic mathematics, while the quality of maths and science education is considered by surveyed executives as far below BRICS averages.[6162] This poor quality does not improve as learner's continue through basic and secondary schooling. In 47% of high-schools no pupil performed at the intermediate international mathematics benchmark. To contrast, this occurred in only 2% of high schools in Botswana. [63] Moreover, in 2017 only 29% of students pass matric with high enough marks to qualify for university entry.[64]

There are instances of high performing public schools and a generally better performing private schooling sector however capacity in these public schools is limited while private schools are mostly accessible to a narrow portion of the population. The private schooling sector has its own curriculum, is better staffed and resourced, and less prone to overcrowding. In 2018, the system had matric pass rates of nearly 98% in contrast to the 78% of public schools. Access to private education is constrained by substantially higher costs[65].

Analysis of primary and secondary educational performance relies on insights drawn from StatsSA analysis of nationally representative samples and cross-country benchmarking. There is a rich availability of data relating to educational outcomes however little analysis of tech related skills of the youth.

Supplementary data and empirics:

- A pilot survey to assess the baseline digital skills level of students in hard areas such as coding, and softer areas such as awareness of the risks of the internet.
- Cross-country assessment of the success and impact of curriculums introducing digital-relevant subjects such as coding and robotics.

[55] StatsSA, 2016, Education Series Vol III
[56] StatsSA, 2016, Education Series Vol III
[57] StatsSA, 2016, Education Series Vol III
[58] StatsSA, 2016, Education Series Vol III
59 Kubheka (2017) 78% of Grade 4 Pupils in SA Are Illiterate – Online at EyeWitness News
60 PIRLS (2016) International Results in Reading
61 Spaull (2019). Hijacked by the urgent, we neglect the important
[62] WEF (2018). Global Competitiveness Survey
63 PIRLS (2016) International Results in Reading
64 Education Statistics (2019). South African Market Insights, https://www.southafricanmi.com/education-statistics.html
[65] Online Media (2019). – *How Matric Results reflect the inequalities of public and private education* – News24

Raw talent supply for emerging jobs

South Africa has a large raw talent pool that can be leveraged to scale the supply of quality skills. The total raw talent pool is around 10.3 million. This includes unemployed youth and the total number of enrolments in the various educational pathways. According to the Department of Higher Education Training (DHET) there were about 2.3 million students enrolled across public, private, TVET and CET institutions in 2016. There were also about 200,000 students enrolled in SETA programmes, including learnerships, internships and skills development programmes. Approximately 30% of these students were enrolled in SET Programmes.[66]The biggest source of this raw talent pool is the 7.8 million youth (aged between 15 and 34) that are not in employment, education or training.

The Oxford School of Economics in their report on Global Talent consider South Africa among the 10 countries expected to produce the largest skills supply by 2021. This puts South Africa in 4th position in the global rankings after India, Indonesia and Columbia in terms of skills that can be effectively tapped into.[67] Whereas nations such as Japan and Canada suffer from an aging population, South Africa is unlikely to be in shortage of talent and is at a demographic advantage[68]. South Africa also has a large number of unemployed high school drop-outs and matriculants.[69]This large raw talent pool can form part of the input into demand driven educational pathways as the demand for new types of skills increases and new economic opportunities emerge. However, this large supply of raw talent is an indication of the availability of individuals who can be trained and not necessarily an indication of the quality of skills. Education is required to deepen and enrich the capabilities of these individuals.

Estimates of South Africa's age-related demographic trajectory are fit for comparison with other markets and derived from a reliable source. The assessment acknowledges the risk of a growing youth population if income opportunities do not scale comparatively, however the assessment approaches the measure from an opportunity lens.

[66] DHET (2016).Statistics on Post-school education and Training in South Africa
[67] Oxford Economics (2012) Global talent 2021-How the new geography of talent will transform human resource strategies.
[68] Oxford Economics (2012) Global talent 2021-How the new geography of talent will transform human resource strategies.
[69] Human Resource Development Council for South Africa (HRDC) (2014). TVET Colleges In South Africa: Pathways Work-stream

Access to educational pathways

The costs of attending traditional education pathways are substantial and act as a barrier for many youth. These costs include tuition fees, accommodation, meals, books, stationery and transport. These costs have traditionally risen at 2% above CPI while StatsSA has estimated that nearly 51% of youth 18 to 24 do not have the funds to pay their tuition[7071]. Many students in South Africa are unable to afford these costs and have to apply to the National Student Financial Aid Scheme (NSFAS) which is targeted at students who come from low-income households. However, many students still don't receive funding with 25% of students applying to NSFAS being rejected in 2019[72]. Financial constraints in TVETs are not as binding as in Universities due to subsidies from government that cover 80% of the costs of official college programmes while NSFSAS and bursaries are available to cover the remaining 20% for qualifying students.[73] This saw a quarter of a million students in TVETs supported in 2016[74].

Government has been deepening its financial commitment to HEIs and broadening student access to funding. In 2015 tuition fees as a share of the total income received by HEIs had increased to 37% from 27% in 2006.[75] This was coupled with increasing HEI operating costs, resulting in an increased reliance on tuition fees. There have been some significant strides to improve access, with government committing to increase its contribution to HEIs by R17.6 billion over three years from 2016. This may improve South Africa's ranking at 62 of 94 countries in the share of government spending dedicated to higher education – somewhat below BRICS averages[76]. The government has also adjusted the qualifying criteria for NSFAS grants to increase the number of qualifying students.

Micro-credentialing institutions are a cheaper and more accessible alternative pathway, with qualifications offered at a fraction of the cost of a traditional qualification. However, access into some micro-credentialing institutions and e-learning programs is limited by access to digital devices and connectivity.[77]

[70] StatsSA (2019) Higher Education and Skills in South Africa
[71] StatsSA (2016) Tertiary Education Inflation Index
[72] NSFAS Online FAQ
[73] Hofmeyr et al (2017)-Post-school education: Broadening alternative pathways from school to work.
[74] NSFAS (2017). Annual Report
[75] StatsSA (2016)-Tuition fee trends over time: what do the data show?
[76] UNESCO (2019) SDG Statistics
[77] Keevy & Chakroun (2018) Digital Credentialing: Implications for the recognition of learning across border

The measures used combine insights from the HSRC, StatsSA and reports from entities directly involved in the funding of students. Public focus on educational pathway funding provides a rich and deep foundation of sources. While the scale of funding has been captured, further assessment could be conducted to understand the effectiveness of funding.

Supplementary data and empirics:

- Cross-country analysis of the returns to education investment with select case-studies investigating the processes undertaken to achieve high output relative to input
- National cross-institutional investigation of a similar nature to the above to assist in piloting and targeting interventions.

Higher education institutions

South Africa has a number of high-quality universities as reflected in a number of global rankings. In the Times Higher Education (THE) World Universities Rankings in 2019, four of the top five universities in Africa are South African.[78] The University Ranking by Academic Performance (URAP) ranks five South African universities within the top 500 in the world.[79]

A significant premium is placed on an upper secondary qualification leading to higher pay and more likely employment. Youth aged 25-29 with a college qualification are 14% more likely to be employed, while those with a university qualification are 36% more likely to be employed.[80]Similarly, students that hold a college or university qualification will likely earn more.

HEIs are producing skills relevant in the digital age however more scale is required. There has been an upward trend in the number of graduates in Science, Engineering and Technology (SET) resulting in the majority of graduates coming from these programmes at 29.1%. UNESCO estimates that South Africa ranks 60 of 93 countries in the share of students graduating with these degrees.[81]

Although the quality of university education in South Africa is high, universities are large and often bureaucratic organisations that are not prone to flexibility or agility. There are issues with University curricula which are too inflexible to meet the labour market's demand for rapidly changing skills.[82]University curricula is outdated with the current structure

[78] Times Higher Education (2019) Times Higher Education's World University Rankings
[79] Informatics Institute (2019) *University Ranking by Academic Performance*
[80] Branson, Hofmeyr et al (2017)-Post-school education: Broadening alternative pathways from school to work.
[81] UNESCO (2019) SDG Statistics
[82] Branson, Hofmeyr et al (2017)-Post-school education: Broadening alternative pathways from school to work.

adopted nearly a century ago[83]. Out of all the higher education pathways, universities are considered the most inflexible due to their scale and legacy operations. [84]

The output of university graduates is constrained by capacity and poor throughput. Universities only provide educational opportunities to a small portion of young South Africans. The majority of youth in South Africa do not enrol in any post-school education – only 10% of youth (1.2 million students) are in a university or college[85]. Despite the opening up of tertiary education funding, universities still have a fixed capacity, and a number of students that are in the system do not end up graduating. Almost half of higher education students do not complete their qualifications, according to a Council on Higher Education report in 2016 while access, success and completion is worryingly racially skewed[8687].

Measuring the quality of HEIs is derived from commonly accepted international rankings. While the methodologies of these rankings vary, the strength of South African HEIs is validated by the high intensity and quality of academic publications relative to continental comparators. There is opportunity to improve the assessment of curriculum and graduate quality as this information is derived from academic publication and is narrowly surveyed.

Supplementary data and empirics:

- Primary research derived from interviews of academics and business to unpack the interplay between the two in curriculum design and the perceived shortfalls in graduate readiness for the labour market and

Technical and vocational education and training

South Africa has a large TVET sector with complex institutions, offering a range of curricula with funding from a number of different sources.[88] TVETs have the most significant curriculum issues among the educational pathways: these institutions have limited autonomy in their education and training provision which affects their ability to develop relevant pathways to (self) employment, occupations and further learning. Some lecturers have also lost relevant ties to industry and are not always up to date with the latest occupational skill demands.[89] Frequently lecturers have emerged through the technical qualification route and have little to no practical experience at all[90].

[83] Council for Higher Education (2013). A Proposal for Undergraduate Curriculum Reform in South Africa
[84] Interviews with Stakeholders conducted by Genesis Analytics, February-March 2019.
[85] DHET (2016).Statistics on Post-school education and Training in South Africa
[86] Council for Higher Education (2013)., A Proposal for Undergraduate Curriculum Reform in South Africa
[87] Council on Higher Education (2016) Vital Stats Public Higher Education 2014
88 DHE (2018) TVET Sub-Sector Report for the 2019/2020 Sector Skills Plan
[89] Human Resource Development Council for South Africa (HRDC) (2014) TVET Colleges In South Africa: Pathways Work-stream
[90] DHE (2018) TVET Sub-Sector Report for the 2019/2020 Sector Skills Plan

More than half of learners in TVET colleges are not getting any work experience at all.[91]This is a significant impediment as students with practical experience have 82% better odds of findings work[92]. Colleges are not effectively managing the development of practical skills, either in the workshops or in workplaces. As such there are only a few TVET colleges that are demand driven and reflective of the interests and requirements of business.[93] A ministerial task team is investigating the overhaul of the TVET system in response to these challenges.[94]

The transition from TVET qualifications into other higher education institutions like universities is constrained by the lack of cooperation between these two sets of institutions. Some universities are reluctant to enrol graduates with a National Certificate-Vocational (NCV) and argue that this qualification is equal to a matric.[95] This forms part of a lack of clarity regarding entry and exit routes in and out of TVETs, specifically whether it be to HEI or (self) employment. The private sector also holds negative perceptions about the quality of these graduates creating challenges for these graduates to find employment. This inadequate articulation between qualifications, and amongst programmes that span more than one sub-qualification framework leads to dead ends for learners.

TVET assessment combines expert insights from the Council on Higher Education and interviews with key stakeholders along the TVET value chain.

Supplementary data and empirics:

- Employer interviews to unpack the specific, perceived shortfalls of TVET graduates and institutions.
- A pilot survey tracking TVET graduate performance in the labour force with adequate representation across institution and curriculum to determine relative strengths and weaknesses. Student tracking and destination studies would be beneficial across all educational pathways.

Micro credentialing institutions

There is growing appetite for new and existing demand driven micro-credentialing institutions that have been successful in producing accelerated skills for businesses. Micro-credentialing institutions are considered the most flexible and demand driven with some being sector specific and others being open content providers.

However these institutions have been unable to scale due to inflexible accreditation mechanisms and a lack of funding. Many micro-credentialing institutions battle for recognition under the national qualification framework (NQF) or Sector Education & Training

[91] DHE (2018) TVET Sub-Sector Report for the 2019/2020 Sector Skills Plan
[92] DHE (2018) TVET Sub-Sector Report for the 2019/2020 Sector Skills Plan
[93]Interviews with Stakeholders conducted by Genesis Analytics, February-March 2019.
[94] Interviews with Stakeholders conducted by Genesis Analytics, February-March 2019.
[95] Interviews with Stakeholders conducted by Genesis Analytics, February-March 2019.

Authority (SETA) accreditation framework.[96] The NQF creates an integrated national framework for learning achievements across institutions. Under the NQF, degrees can only be attained from universities (traditional, comprehensive or university of technology), while diplomas and certificates are attained from universities and colleges. SETAs provide funding for sector specific skill development programmes but requires that programmes fall under their accreditation standards.[97] It appears that there is no clear plan to integrate emerging micro-credentialing programmes into the SETA accreditation standards, and without this accreditation, businesses find it difficult to access SETA funding to scale training partnerships with these micro-credentialing institutions.[98] The lack of SETA accreditation of cost-effective micro-credentialing institutions may be a contributor to inflated skills training costs for business - South African business spends nearly 4 times the payroll expenditure required by the Skills Development Levies Act while firm investment in staff training is on par with BRICS nations ranking 55 of 140 countries[99][100][101].

The global move towards digital credentialing and more specifically micro-credentialing has critical implications for the recognition of learning across pathways. The acceptance of micro-credentialing initiatives in South Africa is behind global trends. This limits the opportunity alternative educational pathways provide for absorbing the large availability of raw talent and placing them in jobs. For emerging digital jobs and jobs that will emerge further into the future, accreditation mechanism will need to become more flexible to respond to the rapidly changing labour market demands and to allow the training sector to offer a variety of demand driven training programmes.

Conclusions are drawn from interviews with key stakeholders from Micro-credentialing institutions and published academic articles. The insights and ranking is derived from an intelligent interpretation and synthesis of available information.

Supplementary data and empirics:

- A nationally representative survey evaluating micro-credentialing penetration and uptake in individuals. This will help determine the extent to which they are used s supplementary sources of education or as substitutes of traditional pathways
- A narrow survey of business evaluating perceptions of micro-credential quality and relevance.

[96] Makura & Nkonki (2017)-Constraints and enablers of articulation from further education and training colleges to Universities: Perceptions from South Africa

[97] Interviews with Stakeholders conducted by Genesis Analytics, February-March 2019.

[98] Interviews with Stakeholders conducted by Genesis Analytics, February-March 2019.

[99] WEF (2017). Global Competitiveness Index

[100] Interviews with Stakeholders conducted by Genesis Analytics, February-March 2019

[101] Online Media (2019). - *South African Board for People Practices - State of the South African Training Industry Report.* – TD Magazine

Retaining and Attracting Critical Skills

South Africa suffers from a critical skills gap that will be challenging to close in the short term. Three sources of labour mismatch plague the South Africa economy and contribute to this gap[102]. Firstly, there is a *demand mismatch* where there is surplus low skills labour and a demand for high-skill labour. Secondly there is an *education supply mismatch* where there are an insufficient amount of graduates with key skills in STEM being produced by educational pathways. Finally, there is a *qualification-job mismatch* which sees graduates taking up work that does not reflect their qualification. This gap is an impediment to business with South Africa ranking 77 of 140 globally in business ability to find the skills required for vacancies,

and 76% of businesses finding the recruitment of critical skills a challenge[103][104]. Closing this skills gap through education is a time-consuming process – a study conducted in 2010 suggests that creating an additional 34,000 engineers, technologists, draughtspersons and technicians would take 100 years given HEI educational capacity[105].

This skills gap is at risk of widening as graduates leave South Africa and professional seek new opportunity abroad. The Department of Home Affairs Estimates that 7% of the country's professionals emigrated between 1989 and 2003 and that the decision to do so is increasingly shared amongst races and less concentrated among the white population[106]. A global survey of 450,000 people revealed that if everyone in the sample could migrate to their destination of choice South Africa would experience a 16% net loss of skilled labour[107]. In contrast New Zealand would have a net gain of 231%. This survey data is supported by the findings of The Enterprise Observatory of South Africa which found that for every one skilled migrant moving to South Africa, eight migrate out. [108] South Africa is therefore struggling to retain critical skills, ranking 75 of 125 countries in ability to retain talent.[109] This holds true for graduates, of which a recent survey found 50% of to-be graduates planned to work abroad.[110] How long they planned to work abroad was not surveyed.

South African business are exploring flexible work arrangements to ease hiring challenges. Hiring flexible workers allows employers to source high quality talent without a long-term commitment. In South Africa, more than 70% of business people are expecting to see an increase in demand for flexible workspace – above the global average of 66%[111]. Nearly 73%

[102] HSRC (2016). Skills Supply and Demand in South Africa
[103] XPateWeb (2017). Critical Skills Survey
[104] WEF (2017). Global Competitiveness Index
[105] Online Media (2018) – *How to fill SA's Immediate Critical Skills Gap* – BizCommunity
[106] Online Media (2017) – *Government Plans to Track all South Africans who leave the Country for Longer than 3 Months* -Business Tech
[107] Gallup (2018). Migration Survey
[108] SA Migration International (2019). South Africa's massive immigration problem
[109] WEF (2018). Global Competitiveness Index
[110] PPS (2016) Student Confidence Index
[111] Regus (2017). The Workplace Revolution

of South African employers believe flexible work arrangements increase productivity while nearly 15% are using this as a means for skills retention[112][113]. Business demand for flexible work is being met by a growing interest from current and emerging job seekers as South Africans are increasingly valuing flexible, non-traditional work[114].

Foreign talent could be a temporary means of preventing the continued widening of this critical skills gap though this requires supportive legislation. In response to the skills-gap, local businesses are pursuing foreign talent with 76% of surveyed firms believing international sources provide a solution to expert vacancies[115]. However South Africa is at a disadvantage when it comes to attracting foreign talent. This occurs along two dimensions. Firstly, high crime rates, economic volatility and comparatively high costs of living diminish our competitiveness and relative attractiveness as a destination[116]. Secondly, migration policy is antiquated and inadequate: while a critical skills list has been developed, this list is outdated; cumbersome bureaucratic processes impede the successful application of skilled individuals seeking to migrate to South Africa, and; South Africa lacks proactive programs and mechanisms for profiling, targeting, attracting and recruiting critical skills. In 2016 the DHA acknowledged that "South Africa has not yet put in place adequate policies, strategies, institutions and capacity for attracting, recruiting and retaining international migrants with the necessary skills and resources"[117].

Reliance on foreign skills may crowd-out local job seekers however not doing so comes at the risk of foregone opportunity. Incoming migrants create competition for local job seekers however they also bring with them expertise from foreign markets that can be utilised immediately and diffused locally. Business and government can reduce reliance on foreign talent by creating an attractive environment for local graduates, creating incentives for local graduates exploring foreign markets to return home and drawing expatriates back to South Africa. While countries such as Vietnam, India and China are actively seeking to recruit people from their diasporas, there seems to be no such activity in South Africa[118]. Instead emphasis seems placed on creating barriers to exit.

The measure combines data driven insights with anecdotal evidence. Local estimates of current and historical net-migration activity are widely disputed among stakeholders however it is generally agreed that skilled outward migration is a continued concern. Insights from the perspective of business and students are furthermore derived from small sample surveys.

Supplementary data and empirics:

- Nationally representative surveys evaluating to-be graduate aspirations and intended reason for seeking overseas work opportunity.
- Narrow survey of business detailing the motivations behind seeking foreign talent to determine whether there is a skills deficit of talent available in South Africa or if it is purely driven by shortage

[112] JCSE (2018) ICT Skills Survey
[113] Regus (2017). The Workplace Revolution
[114] Vodafone Global survey, 2018
[115] XPateWeb (2017) Critical Skills Survey
[116] Owusu-Sekyere *et.al.* (2016) A critical skills attraction index for South Africa, Human Sciences Research Council,
[117] Owusu-Sekyere *et.al.* (2016) A critical skills attraction index for South Africa, Human Sciences Research Council,
[118] Online Media (2018) – *Why SA Needs a More Migrant Friendly Policy While also luring back expats,* Biznews

Organised labour in the digital age

South African labour is well represented by trade unions however there are tensions between unions and members, and unions and business. South Africa has a rich history of labour representation with labour unions representing one of the most important institutions in civil society. Trade union membership slide from a peak of 45% in 1997 to approximately 30% in 2018[119][120] - on par with OECD and BRICS averages (with the exception of China)[121]. Falling representation has been attributed to a host of factors such as instances of corruption leading to distrust, increasingly oligopolistic structures and a growing disconnect between members and representatives[122][123]. Nonetheless these entities have been and continue to be important players in the guardianship of labour rights – nearly 25% of salary increments were

negotiated by unions alongside employers in 2015. However there is evidence of significant business-union tension - labour-employer relations are considered highly confrontational, with South Africa ranked as having the most confrontational relations on the globe.[124] This measure has however been improving since 2015.

The attitudes of unions towards digitisation are split between those that consider them an opportunity and those that consider them a threat.[125] Anecdotal evidence suggests that there are two overarching approaches to digitisation in South African unions - some continue to preserve legacy processes instead of embracing new technological changes, while others are welcoming digitisation and putting forward measures to ensure their workforce is well equipped for the changing world of work**.**

Labour unions are defining the strategic imperatives needed to guard the wellbeing of labour in the digital age. A host of unions were represented at the Johannesburg Institute for Advanced Studies (JIAS) dialogue on the future of work. The dialogue participants expressed the need for unions to promote training and preparation for new forms of work, advocate for conducive labour regulation and bring business and union interests into alignment.

These strategic imperatives are being acted upon as demonstrated by the positive approach a number of unions have to the introduction of technology in production systems. While these unions acknowledge that there may be job losses due to the fourth industrial revolution, many recognise the importance of digitization. These proactive unions are seeking ways to re-skill their workers to meet the needs of a digitally enabled economy and embracing modernised processes: the NUM is involved in discussions to introduce robots in deep mines;

[119] StatsSA (2018) QLFS
[120] Online Media (2014) - *The Downward Spiral of SA Unions,* Mail & Guardian
[121] OECD (2019) Union Membership Statistics
[122] Online Media (2014) - *The Downward Spiral of SA Unions,* Mail & Guardian
[123] HSRC (2014) South African Social Attitudes Survey
[124] WEF (2017) Global Competitiveness Report
[125] Online Media (2018) - *How SA fared on global labour-employer relations* - Talent 360

Numsa promotes the upskilling of its members to operate the robotic technology introduced in the production process, and; the Southern African Clothing Textile Workers Union is finding ways in which it can use big data analytics to better serve its members.[126] SADTU also welcomes the digitisation of classrooms stating that it is a necessity that all schools should have the basic infrastructure however, digitalization efforts should be done with caution so as to not widen the gap between well-resourced schools and underprivileged schools.

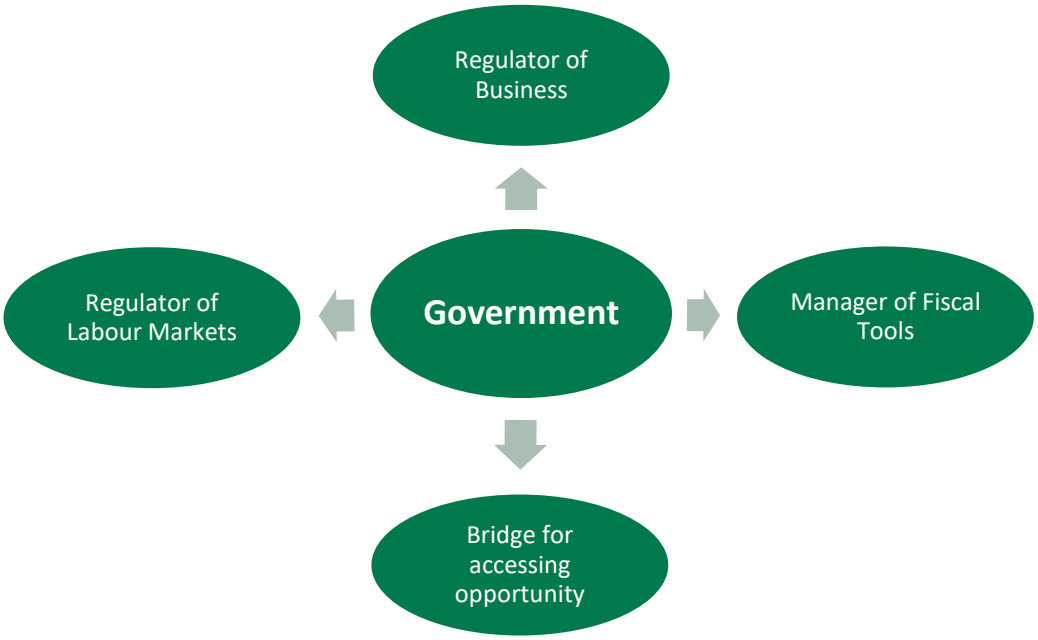
However, some unions seek to maintain the status quo and believe that the fourth industrial revolution is a "threat and not a programme to up-skill and empower workers"[127]**.** Negative perceptions of the impact of digitisation need to be addressed to embed an appreciation of the process as a tool to enhance lives and make processes simpler and more effective. Successful investment in the skills, technologies and ecosystems needed to compete will increase the likelihood of achieving net labour and economic benefits as opposed to net losses.

While union membership is readily available assessments of the economic impact of unions on the economy and for labour are scant. Determination of labour attitudes to digitisation relies on anecdotal evidence and the views presented by unions themselves.

[126] Online Media (2018) - *Cosatu's vicious cycle of decline* - BusinessLive
[127] Online Media (2019) - *Unions react to potential job losses at Standard Bank* - IOL

Government Support

Government's ability to support the realisation of emerging economic opportunities is measured along five key roles the state plays. These roles cut across multiple levels of the state and are depicted below.



First, ***government as the regulator of business*** assesses the relevance and effectiveness of competition policy for the digital age, the quality of guardianship of intellectual property and the enforcement of data regulation. The second role, ***government as the manager of fiscal tools,*** assesses South Africa's ability to tax digital firms. ***Government as a bridge for accessing opportunity*** is the third role which measures local government ability to expand economic opportunity beyond metros and enable local business to foster employment opportunity. The final measure, ***government as a regulator of labour markets,*** assesses labour regulation's ability to cater for emerging forms of work.

Government as the Regulator of Markets

Competition Policy in the Digital Age

Competition policies around the world may require revision and rigorous enforcement to cater for the exponential and disruptive nature of digital businesses. Disruptive innovators can have drastic impacts on the distribution of market power in a very short period and lead to the entrenchment of dominant digital firms[128]. Three characteristics of the digital business model provide incumbent digital firms with competitive advantages that make them difficult to dislodge and create incentives for anti-competitive behaviour[129]. Firstly, there are extreme returns to scale with drastically falling costs relative to customers served. Secondly, network externalities entrench incumbent firms and create significant barriers to emerging competitors. Thirdly, data plays a key role as both an input and output. OECD[130] research details the need to make changes to the standard and burden of proof in enforcement due to the high costs of under-enforcement. A bias to over-enforcement is advised – actions of dominant firms to reduce the competitive pressures they face should be forbidden in the absence of clear consumer welfare gains even if consumer harm is difficult to clearly measure; in highly concentrated markets with high barriers to entry it may be necessary to require incumbent firms prove their actions pro-competitive.

Competition commissions may need to play an increasingly active role in the oversight of markets. Given the dynamism of digital firms, the uncertain impacts they may have on competition and consumer welfare and range of markets they can impact, it may become increasingly necessary for competition commissions to conduct inquiries into markets in which these firms operate on a case by case basis[131]. This acknowledges the peculiarities of emerging digital firms whereby the blanket application of regulation may unfairly discriminate against innovating firms to the detriment of consumers. These agencies will need to interject when appropriate and investigate when necessary.[132]

South African competition policy and its enforcement is of a high quality and has contributed to an environment that motivates innovation. The Competition Act of 1998 is the bedrock legislation governing competition policy and law in South Africa. The Act seeks to promote efficient and competitive markets that guard consumers, achieve social and economic welfare gains and provide businesses of all sizes with equitable opportunity to compete[133]. The act saw the establishment of The Competition Commission of South Africa (CCSA), Competition Tribunal and Competition Appeal Court entities in the oversight of South

[128] Ndlovu, UBER vs. METERED TAXIS: A COMPETITION ISSUE OR A REGULATORY NIGHTMARE, 2017
[129] OECD, Competition Policy for the Digital Age, 2019
[130] *Ibid.*
[131] Ndlovu, UBER vs. METERED TAXIS: A COMPETITION ISSUE OR A REGULATORY NIGHTMARE, 2017
[132] *Ibid.*
[133] Competition Commission of South Africa (2019) – Online

African markets. These three entities have been largely effective in achieving their mandate. A novel study by Truen and Rateiwa demonstrates the relationship between innovation and growth in South Africa and then confirms that competition policy and the actions of the CCSA have had positive impact on the extent of innovation and contributed to an environment that stimulates firms to innovate[134].

Amendments to the competition act improve the CCSA's ability to monitor and regulate digital firms and the markets that they disrupt. The Competition Amendment Bill was recently signed into law. The Bill strengthens the CCSAs powers in terms of market inquiries and the ability to involve itself actively in markets. The Bill empowers the CCSA to make recommendations to the Competition Tribunal and mandates the CCSA publish a report to the minister detailing recommendations[135]. In addition, the burden of proof is shifting to dominant firms to demonstrate that pricing is not anti-competitive. This action seems aligned with the OECDs recommendations. While it is yet to be seen whether the amendments will lead to better oversight of digital business, oversight of digital firms is not alien to the CCMA – the SA Meter Taxi complaint against Uber as operating anti-competitively was rejected by the Commission in 2016; the CCSA market inquiry into data services from 2017 to 2019 illustrates the CCSA's ability to engage with the nuances of digital markets[136].

Assessment of the condition relies on interpretation of policy changes relative to emerging best practice. The quality and effect of South African competition draws from general sentiments and an innovative empirical study. A small set of indicators of the competition environment are available for international comparison however these would serve as proxies.

Supplementary data and empirics:

- Interviews with competition commission officials to asses self-perceived capacities and anticipated trajectory of competition law and enforcement in South Africa.

Intellectual Property Regulation

South Africa has historically been an effective guardian of intellectual property however the policy framework has been argued by some as fragmented and leading to low quality patents. Intellectual property is perceived by business to be well protected in South Africa, ranking far above global averages and BRICS comparators[137]. Policymakers have noted that temporary monopoly should only be granted when appropriate and when it does not reduce consumer welfare, and recognise that guardianship of the right to returns for innovation are foundational to the pursuit of a knowledge economy[138]. South Africa's historical IP system was fragmented and reliant on a 'depository' IP system. The general sentiment in research

[134] Truen & Rateiwa (2017) Competition Policy and Innovation: What does evidence in South Africa Show?
[135] Online Media (2019) -*South Africa: What the New Competition Amendment Act Means for South Africa's Economy* -Mondaq
[136] Competition Commission of South Africa (2019). Media Address on the Provisional Report of the Data Services Market Inquiry
[137] WEF (2017). Global Information Technology Report
[138] Online Media (2018) - *Phase 1 of South Africa's IP Policy – What you need to know* – Adams & Adams

conducted on the SA IP system seems to suggest that the depository system undermines genuine innovation as patents are granted when meeting thin formal requirements and only ever examined if challenged in litigation[139][140]. This system provided market exclusivity regardless of patent quality to the detriment of consumers. The regulatory framework furthermore drastically favoured patentees to the expense of competitors and public interest by placing the onus for proving a patent is invalid on the party seeking to prove its invalidity[141]. Research by the IP Unit details that the depository system in conjunction with limited publicly-available data leave few avenues for assessing the quality of patents under this regime.

South Africa's IP policy framework is being revised to meet standards comparable with international benchmarks however expert capacity in regulators is required to prevent backlogs. Input from UNCTAD and the UN has seen Phase 1 of the Intellectual Property Policy of RSA completed, recommending transition to a substantive search and examination system[142]. This system uses expert examiners to judge whether evidence presented by patent applicants complies with a robust framework that justifies the grant of IP[143]. A substantive system is used in innovative BRICS comparators such as China, India and Brazil.[144] Completing coverage of the policy across all industries is being complemented by support to CIPC in bolstering the expertise required of the reform – the SSE framework is expertise intensive[145]. In the absence of adequate staff and slow turnaround, the motivation for local application may be depressed. Additionally, capacity to support applications or simplification of processes may help reduce application costs – R15,000 to R30,000 may be spent on the filing costs of a legal practitioner.

Assessment of the condition relies on findings of expert researchers and analysis of the incentives and dynamics of IP systems to conclude likely impacts. Conclusions are in accordance with the IP Unit (UCT). Empirical measurement of IP policy effectiveness has been noted by the IP Unit as challenging given data availability.

Supplementary data and empirics:

- Access to records of patent applications to assess the relative ease/difficulty of obtaining a patent historically. These records should be made readily available moving forward to track future performance. This would be complemented by application and success rates for patenting South African inventions in other jurisdictions.

[139]Intellectual Property Policy of the Republic of South Africa, 2018
[140] Online Media (2018) - *CIPC to Introduce Substantive Search and Examination* - DeRebus
[141] IP Unit (2017). Innovation and Intellectual Property in South Africa: The Case for Reform
[142] Online Media (2018) - *South Africa approves new IP Policy with Guidance from UN Agencies* – IP Unit UCT
[143] Online Media (2018) - *CIPC to Introduce Substantive Search and Examination* - DeRebus
[144] IP Unit (2017) Innovation and Intellectual Property in South Africa: The Case for Reform
[145] IP Unit (2017) Innovation and Intellectual Property in South Africa: The Case for Reform

Data and Cyber-Security Regulation

South Africa's Cyber-Security regulatory framework is in the process of update though impending legislation prioritises punitive measures without enforcing preventative action. South Africa ranks 4th on the continent and 56th of 156 countries in the ITU cyber-security index[146]. This index is a composite weighting of 25 measures and suggest South Africa fares strongly in terms of its cyber-criminal legislation and moderately in terms of its cyber-security legislation. The National Cybersecurity Policy Framework (NCPF) was approved by cabinet in 2012 and finally published in 2015. The NCPF indicates government recognition of the threat of cybersecurity and articulates government's overall strategic priorities and coordination objectives. This has led to the establishment of the National Cybersecurity Hub – a platform for interaction between government, civil society and industry – and the National Cyber-Security Advisory Council – advisors to government on cybersecurity policies. The Cyber-Crime's (CC) bill has been passed by the National Assembly and is soon to become law[147]. The bill is a welcome refresher: cyber-crime has often been dealt under common law, and; the Electronic Communications and Transactions Act which initially restricted cyber-criminal offences is outdated[148][149].

The current bill prioritises punitive measures as it deals with offences, jurisdictional rights and authority of persecution locally and internationally. While the bill requires key infrastructure operators (as declared by the minister of finance such as financial institutions and communication service providers) report intrusions to SAPS within 72 hours, it neglects the second key guard against cyber-crime – prevention[150]. The CC bill was originally conceptualised as the Cyber-Crimes and Cyber-security Bill however its current content does not impose security obligations. Whether the bill will be appended to deepen its coverage or motivate business to proactively guard data is yet to be seen.

The yet to be enforced Protection of Personal Information (POPI) Act will position South Africa well for participation in global data flows, however compliance will be challenging for many businesses, readiness for compliance is unevenly spread and uncertainties of government effectiveness in enforcement have been raised. The final POPI Act was published in December 2018. The act requires entities that use and store an individual's personal information to act responsibly: consent for the use of individually identifiable data must be obtained; detail as to the use of this information must be provided, and; this data must be destroyed upon request and can only be held for a limited period of time. This

[146] ITU (2018). Global Cyber-Security Index.
[147] Online Media (2018). *Cyber Crimes bill inches closer to becoming law* - ITWeb
[148] Online Media (2018). *Cyber Crimes bill inches closer to becoming law* - ITWeb
[149] This found the following offences criminal: hacking, denial of service attacks, phishing, infection with malware, possession or use of hardware/software; identity theft/fraud; electronic theft – Cyber-security laws and regulation – South Africa, ICLG
[150] Cliff, Dekker, Hofmeyr (2019) Technology & Sourcing Alert

legislation is crafted after the General Data Protection Regulation (GDPR) of the EU. The cross-border nature of data and the move to universal data laws is reflected in similarities between GDPR and POPI – locally sourced personal data can only be exported to/shared with nations and institutions compliant with acceptable legislation. POPI therefore brings South Africa to compliance with global benchmarks. This eases local business engagement with data drawn from Europe and other GDPR compliant markets[151]. However, flows of South African data to lower compliant regions and institutions will be deterred while local direct marketing will require consumer consent which may have disproportionate effects on SMMEs[152].

There is a gap in enterprise readiness as many businesses require process and procedure overhauls, financing and expertise to capacitate and be able secure, source and extract data. This is despite Business having had visibility of the act for 6 years and having 1 year to comply following a yet to be announced commencement[153].[154][155]. A sample of business perceptions of POPI illustrates the recognition of the reputational need for compliance at 77%, 62% considering it a high priority, and a strong state of compliance readiness: 34% will definitely be prepared, 33% will likely be prepared, 10% are already compliant, 8% will probably not be ready and 3% will definitely not be ready.[156]. The bulk of businesses consider compliance costly[157] while as at 2015, the bulk of SMMEs were non-complaint underpinning the need for training and support due to the bill's complexity[158]. This gap is paralleled by uncertainty as to effective enforcement: the development of the bill was sluggish while effective enforcement requires the full capacitation of an information regulator.

Data and cyber-security assessments were conducted through interpretation of regulation, expert research and globally comparable indexes. Survey data detailing business readiness for POPIA is drawn from a small sample of businesses largely concentrated in the IT industry which may suggest overestimation of business readiness.

[151] Luck (2014). POPI – is South Africa keeping up with international trends
[152] Botha *et. Al.* (2015). The Effects of the POPI Act on Small and Medium Enterprises in South Africa
[153] Online Media (2019) - *POPI Commencement Date or POPI Effective Date Starts the Clock* – Michalsons
[154] Online Media (2019) - *Only 34% of South African Organisations Ready to Comply with POPI Act* – ITWeb
[155] Kandeh *et. Al.* (2018). Enforcement of the Protection of Personal Information Act: Perspective of Data Management Professionals
[156] Online Media (2019) - *Only 34% of South African Organisations Ready to Comply with POPI Act* – ITWeb
[157] Kandeh *et. Al.* (2018) Enforcement of the Protection of Personal Information Act: Perspective of Data Management Professionals
[158] Botha *et. Al.* (2015). The Effects of the POPI Act on Small and Medium Enterprises in South Africa

Government as the manager of fiscal tools

Taxation Policy and Digital Business

The effectiveness and integrity of the South African Revenue Service (SARS) has been called to question creating uncertainty around its ability to manage local and international tax matters. SARS has come under public pressure given a spate of poor performance and allegations of corruption. These accusations have created concern around the entity's ability to support the fiscus. Although SARS has consistently failed to meet its collection targets for a number of years, this is a debatable measure of performance as macro-economic conditions, inaccurate target-setting and tax-payer apathy may be the cause. Evidence of the entity's woes are better measured in terms of institutional dynamics and on-goings which may in turn impact performance. Firstly, SARS capacity may have been eroded through the loss of expertise and the closure of various investigative divisions[159]. Secondly, the entity was poorly managed under former SARS commissioner Tom Moyane who had little experience. This may have contributed to the former source of failure. Secondly, SARS has been noted as focusing on 'soft-targets' by focusing audit efforts towards registered and voluntarily paying individuals and businesses as opposed to seeking out unregistered and tax avoiding entities[160]. Potentially a function of the lack of expertise. The Cabinet and President Ramaphosa have given these shortfalls due regard and are intervening which suggests the possibility of future improvement.

The operating and ownership models of digital firms providing cross-border services create challenges for tax legislation and taxing entities. Firms such as Uber have developed innovative ways to avoid tax by attributing all revenues to a host of subsidiaries domiciled in low tax or no tax jurisdictions[161,162]. For example, no fares for South African Ubers touch the local Uber subsidiaries as they are transferred directly to Uber's Dutch subsidiary. Drivers receive payment directly from another

The Uber model of mitigating taxes

Uber was established in San Francisco. As the firm began to scale, it created a subsidiary in the Netherlands – Uber C.V. Uber C.V has contracted with Uber to use its Intellectual Property for a royalty fee on revenues and share the costs and benefits of the IP moving forward. Uber subsequently established Uber B.V., also in the Netherlands. All passenger fares outside of the US are paid to Uber B.V. with payment for the driver sent back by yet another Dutch Uber subsidiary. Local Uber subsidiaries provide support services, do not create revenues and therefore leave tax authorities with little means of taxation.

[159] Online Media (2018). – *Saving SARS: Why SARS is Failing and What Can be Done to get it Back on Track* -Bowmans
[160] Online Media (2018). – *Saving SARS: Why SARS is Failing and What Can be Done to get it Back on Track* -Bowmans.
[161] Online Media (2015). – *How Uber Plays the Tax Shell Game* – Fortune
[162] Online Media (2019). – *New VAT rules lead global tax reform* -Mail & Guardian

Dutch subsidiary. This leaves the local Uber subsidiary with limited taxable revenues.

SARS has introduced a 'Digital Tax' to close the gap on untaxed revenues of digital firms. Alongside many other jurisdictions, South Africa introduced a 'Digital Tax' which took effect in April 2019. Multi-nationals providing e-services in South Africa with operations domiciled overseas are required to register with SARS and pay 15% of revenues in VAT. Since its introduction 5 years ago, companies subject to the tax have been broadened to include entities such as Google, Facebook, Uber and AirBnB[163]. These firms may choose to recover these costs through increased pricing. Transportation in South Africa is exempt from VAT however the fees that Uber's subsidiary is charged to run the service will attract VAT. SARS has seen healthy registration activity and expects the tax will be widely successful as digital platforms and companies were involved and provided input into the process[164]. The tax strategy is aligned with the OECD VAT guidelines which forms part of the base erosion and profit shifting (BEPS) initiative. South Africa is part of this initiative which aims to develop a response to the avoidance of taxes of digital firms and highlights the need for the global community to re-examine taxation fundamentals.[165][166] Foreign digital firms operating in South Africa are not subject to any form of corporate tax. The Davis Tax Committee has advised South Africa following the lead of regulation developed in the OECD in this regard[167].

Taxation of robots that substitute human labour has been suggested as a way to offset the negative effects of automation however this remains a debated topic that has drawn little attention locally. Businesses automating processes to substitute for human labour would effectively reduce their tax burden and avoid contributions to social security mechanisms. This is of particular concern in labour intensive, developing markets. The EU investigated and eventually voted against a 'robot tax' while South Korea has excluded key tax incentives for investments made in automation[168]. In South Africa, the topic has yet to spark public debate

Given the susceptibility of the tax base to economic conditions, alternative KPIs are necessary to measure effectiveness. These indicators are drawn from a recognised legal firm. Evaluation of readiness to tax digital firms overlays current policy changes with global trends and best practices.

Government as a bridge for accessing opportunity

Government as a bridge for accessing opportunity is measured along 3 areas: Spatial development ensures those in rural and more geographically isolated areas are not excluded from the benefits of the Fourth Industrial Revolution; sector specific regulation and local government ensure that digital businesses can scale and absorb labour; investment and access to and affordability of transport infrastructure unlocks opportunities that require physical presence or frequent travel.

[163] Online Media (2019). – *New VAT rules lead global tax reform* -Mail & Guardian
[164] Online Media (2019). – *New VAT rules lead global tax reform* -Mail & Guardian
[165] Online Media (2019). – *New VAT rules lead global tax reform* -Mail & Guardian
[166] Online Media (NY)– *Tech Giants Tax Avoidance hurts South Africa's Media* – Tax Consulting
[167] Online Media (NY)– *Tech Giants Tax Avoidance hurts South Africa's Media* – Tax Consulting
[168] Online Media (2018). – *Taxing Robots is a Bad Idea* – ITWeb

Inclusive spatial development

South Africa has a relatively comprehensive and up to date spatial planning policy framework.

- The NDP for 2030 recognizes the importance of creating integrated and inclusive rural economies to create access to economic opportunity outside of large city centres. [169]
- The Integrated Urban Development Framework (IUDF) looks at spatial planning to promote rural urban linkages and turn all cities into engines of growth.
- The Spatial Planning and Land Use Management Act (SPLUMA) provides a framework for spatial planning and gives greater autonomy to city spatial planning efforts.

These policies indicate an updated and robust focus on spatially conscious economic planning however have been unable to correct for the economic imbalances that stem from the legacy of apartheid spatial planning. Concentrated urban centres dominate economic opportunity, accounting for more than half of national gross value add (GVA). Moreover, between 1996 and 2012 job growth was twice as fast in metros and accounted for 74.9% of all new jobs.[170] Therefore, although the policy landscape can be viewed as potential levers for change, a large gap in the state of spatial development persists.

Funding and capacity are a key challenge for successful spatial development. Spatial planning to ensure inclusive economic growth requires incentivizing development in traditionally less developed and economically active areas. It is also reliant on ensuring residents in these areas can access geographically spread opportunities. Ensuring rural areas have access to Wi-Fi, electricity and indeed all infrastructure projects in more isolated locations require investments that are typically larger than in urban areas. The IUDF identified that population pressure and low economic activity is placing increasing financial pressure on local government budgets. In the most recent report from the Auditor General, 31% of all municipalities indicated that they are financially viable.[171] These pressures are worsened by the reduction of national transfers to provinces.[172]

Local and national government are hampered by poor coordination, limiting the efficiency and effectiveness of past spatial planning policies. Coordination around spatial planning is needed to account for locality specific challenges while also aligning to national goals. For example, land ownership is often distributed between national, provincial and local governments. As a result, a local government may have jurisdiction in a place where it neither owns nor controls the land. Those controlling the land may therefore be unaware of the challenges and opportunities of that specific location. Therefore, development plans involving

[169] NPC (2012). National Development Plan 2030 Our Future-make it work
[170] NPC (201). National Development Plan 2030 Our Future - make it work
[171] Brand (2018). Local government in South Africa is in crisis. How it can be fixed, City Press,
[172] National Treasury (2018). Division of revenue and spending by provinces and municipalities

government owned land requires cooperation on common plans between these different structures.

A 2016 policy briefing noted that there were complex and confusing burden sharing policies that have resulted in fragmented, often duplicated rural development policies. These findings are supported by the assessment of local government capacity and coordination by the IUDF which views a lack of coherent local planning and a severe shortage of competent staff as key challenge to executing effective rural development.[173] National government has recognized and responded to the challenge of coordination with programs such as The City Support Program(CSP) [174] [175] and the Intermediate City Municipalities (ICM) program.[176] The effectiveness of these programs, both of which are relatively new is not well documented. ICM is currently only in it's pilot phase.

Positive case studies indicate that some local governments are facilitating innovation outside of concentrated city centres. Western Cape local government worked with the Cape Innovation and Technology Initiative (CiTi) to develop the Khayelitsha Bandwith Barn, a township-based innovation hub, designed to create inclusive technology driven growth.[177] Similarly, the Gauteng provincial government has developed the Innovation Hub.[178] One program offered at the Innovation Lab is the eKasi labs, which sets up innovation and co-creation spaces in township areas. In 2018 alone, 148 companies where incubated in the eKasi labs program.[179] These successful programs indicate that, although small in scale, progress is being made to create inclusive, tech-driven growth.

The persistent disparities in economic performance between regions are available from a host of public sources. However, disparities are not solely a function of policy and reflect underlying economic capabilities and comparative advantages. The assessment recognises this and complements these figures with a review of policy coverage, and research conducted by government and academia on local government challenges.

Supplementary data and empirics:

- Case studies from municipalities that have positively transformed economic outcomes will assist in identifying the conditions for success and failure.

Sector-specific regulation and local government

Local government has performed weakly in enabling business operation at a municipal level. The degree to which local governments have enabled the flexible and efficient

[173] Department of Cooperative Governance and Traditional Affairs (2016), Integrated Urban Development Framework
[174] National Treasury (2018). About Cities Support Program.
[175] CSP works across the national treasury to shift or structure policy in a way that makes it easier for cities to work more efficiently and contribute to economic growth.
[176] Department of Cooperative Governance and Traditional Affairs (2018). Discover the Intermediate City Municipalities Program
[177]Cape Innovation and Technology Initiative (2018). Khayelitsha Bandwidth Barn
[178] Gauteng Growth and Development Agency (2018). Annual Report 2017/2018
[179] Gauteng Growth and Development Agency (2018). Annual Report 2017/2018

operation of businesses serves as a proxy to how efficiently and effectively they will respond to the regulatory needs of tech-enabled business. The IUDF assessment concludes that businesses face highly variant levels of regulatory efficiency and many firms face excessive red tape.[180] The World Bank Doing Business in South Africa report uses several indexes to rank the performance of South African cities on enabling business operation. A key metric is the ease of getting electricity which would be vital for all digital businesses. Cities performed with a high degree of variance, supporting IUDF findings that there is little consistency and indicating that a small minority of cities perform slightly above average on this criterion. The report finds that the greater degree of local autonomy in business regulation, the greater the variance in performance. [181]

Streamlining engagement with business through the digitisation of services may improve local government ability to enable business. The disparities in city-level scores of the Doing Business report would hold true for national measures such as the time taken and number of procedures required for starting a business wherein South Africa fares moderately. [182] The doing business report notes that improvements in this measure are largely driven by efficiencies from the digitisation of applications and processes. While local government may be constrained in the construction of legislation, digitisation of local government processes will improve implementation and enforcement to the benefit of business. There are instances of successful application of this at the local level as well at the national level with SARS, DHA Smart Identification Cards, NATIS, DoH National Health Normative Health Standards Framework, SITA, and eHomeAffairs.

Local governments have not historically fostered a good business government relationship. A proper framework for cooperation and working relationship will allow local governments to be more agile and effective at responding to the needs of digitally-enabled business. An IUDF assessment observed that many municipalities do not meaningfully engage with local business or other economic stakeholders.[183] Moreover, in some instances municipalities have an

Uber – slow and ineffective regulation

Parliament's portfolio committee on transport passed legislation requiring Uber drivers to have taxi permits and

Variation in local government capability is proxied through the World Bank Doing Business Report with conclusions as to business-local government engagement validated against observer opinion and government-led research.

Supplementary data and empirics:

- The World Bank Doing Business Report provides a comprehensive assessment of local government service delivery however supplementary research to bring alignment to the national level assessment is required (i.e. indicators such as 'time to get a business license' etc).

[180] Department of Cooperative Governance and Traditional Affairs (2016). Integrated Urban Development Framework.
[181] World Bank (2018). Doing Business in South Africa 2018
[182] The South African business environment can be challenging and regulatory compliance costly – more than half of surveyed SMEs consider the regulatory environment restrictive and a key inhibitor to growth resulting in nearly 4% of turnover being spent on compliance. Government has recognised the challenges businesses face and proposed a Red Tape Impact Assessment Bill. The Bill seeks to provide for the assessment of regulatory measures developed by executive, legislatures and self-regulatory bodies to identify and reduce red tape for businesses. It further seeks to provide for the establishment of Red Tape Impact Assessment (RIA) Units. However there are concerns as to whether the definition of red-tape is too restrictive to be impactful and the possibility that the RIA will be duplicating efforts of the Socio Economic Impact Assessment Systems (SEIAS) process.
[183] Department of Cooperative Governance and Traditional Affairs (2016). Integrated Urban Development Framework.

actively adversarial relationships with business as they do not pay suppliers on time or at all. Many of these are SMEs. Both local and national government are taking steps to facilitate better cooperation. The Citi Support Program (CSP) was formulated in consultation with the World Bank and with recognized industry experts embedded in business. The impact of these steps is uncertain given that CSP is in it's initial phases however there is confidence of its likely effects and growing interest from the presidency.

Availability and Affordability of Transport

South African's suffer from poor access to affordable transport creates the largest disadvantages for the poor. Approximately 20% of South Africans have access to private transport as vehicle ownership is prohibitively expensive and available to a narrow portion of the population[184]. The vast majority of South African's are dependent on public transport. More than 50% of poor urban residents in South Africa spend more than 20% of their income on public transport,[185] while some households spend up to 43%.[186] These costs are partially attributed to the history of apartheid spatial planning which created a mismatch between housing and jobs[187]. The Victoria Policy Institute defines transportation as affordable when a household spends less than 20% of income on transport while South Africa's Department of transportation defines the threshold at less than 10%.[188] Neither our own nor international definitions of accessible public transport are being met while prices have increased by 6% on BRT and Metro buses for the 2017-2018 financial year. [189] [190] There are instances of businesses subsidising staff transport costs however this is in the vast minority leaving government as a key player in achieving affordability.

The South African government has introduced tax tools to help reduce the transport cost burden, are investigating further areas where taxes may be introduced and provide subsidies for public-transport operators which may be ill targeted. Public transportation along rail and road incurs a 0% VAT rating, reducing the burden of public transport costs. The Department of Transport provides subsidies and grants to public transport operators however these may be ill-focused: the vast majority of subsidisation is targeted at the rail and bus network despite the fact that the taxi network accounts for 71% of commuters.[191] A report by the South African Cities Network investigated the possibility of supplementary taxes on motorists given inadequate revenues for roads relative to road usage. Potential tax areas include a per KM charge, pollution charges and a payroll tax charge on businesses above a certain threshold[192]. Incurring these charges for operators of public transport would further reduce the affordability of public transport.

Expansive, integrated and accessible transport networks provide individuals with access to economic opportunities though in South Africa there remain gaps in geographic coverage.

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[184] StatsSA (2015). Measuring Household Expenditure on Public Transport.
[185] StatsSA (2015). Measuring Household Expenditure on Public Transport.
[186] Piek (2017). Affordability and subsidies in urban public transport: assessing the impact of public transport affordability on subsidy allocation in Cape Town
[187] Piek (2017). Affordability and subsidies in urban public transport: assessing the impact of public transport affordability on subsidy allocation in Cape Town
[188] Piek (2017). Affordability and subsidies in urban public transport: assessing the impact of public transport affordability on subsidy allocation in Cape Town
[189]Deloitte (2018). The Deloitte City Mobility Index
[190]Online Media (2018) - *Rea Vaya and MetroBus fares to go up on 1 July* - City of Johannesburg,
[191] Kerr (2015) Tax(i)ing the poor? Implications of our high commuting costs, econ3x3
[192] Online Media (2018) – *Here's how South Africa could introduce new driving taxes* – BusinessTech

This was recognized by the 2007 Public Transport Strategy (PTS) which envisioned a "wall to wall" integrated network of trains and Rapid Bus Transport (RBT). However, there has been poor policy execution and as of 2017 only 4 of 13 cities receiving national grants, have implemented such systems.[193] The subsequent gaps in access and integration are confirmed by the IUDF assessment of mobility[194] and the 2018 Deloitte global mobility index.[195] Even where such systems exist, they are often unreliable and in short supply - in Cape town, Metro buses experience usage 70% above capacity.[196] South African mobility is particularly bad compared to global standards, as the country was ranked with the longest commute times out of 40 nations.[197]

Some local governments have recognized the need for more accessible public transport. In 2016 the Cape Town city council announced a 5-year plan to reduce the cost of all transport and it's 2030 CITY Vision aims to integrate fragmented systems to reduce both time and cost. Similarly, The Johannesburg Spatial Development Framework 2040 emphasizes the need to allow urban residents to travel to economic opportunities.[198] However, little differentiates these policies from failed policies of the past. A 2017 Government white paper on transport policy found local governments lacked the capacity to either prepare or implement effective transport policy.[199] Problems of capacity are aggravated by complexities in identifying the correct sphere of local government to take on transport mandates. In Gauteng for example, transport is dealt with both at a city and provincial level. As a result, it is not a lack of policies but an incapacity to implement them that may hinder progress in affordable public transport.

Measures of spend on transport are derived from national surveys and affordability a combination of international benchmarks and academic and observer findings. These findings are overlaid with an assessment of local policy and international mobility benchmarks all alluding to barriers to mobility.

[193] Online Media (2017). - *Public transport: Are we getting it right?* - Mail and Guardian,
[194] Department of Cooperative Governance and Traditional Affairs (2016). Integrated Urban Development Framework.
[195] Deloitte (2018). The Deloitte City Mobility Index,
[196] Online Media (2017). - *Public transport: Are we getting it right?* - Mail and Guardian,
[197] Department of Cooperative Governance and Traditional Affairs (2016). Integrated Urban Development Framework.
[198] Deloitte (2018). The Deloitte City Mobility Index,
[199] Department of Transport (2017). Draft Revised White Paper on National Transport Policy.

Government as a regulator of labour markets

Labour market regulators face the challenges of regulating emerging forms of labour and protecting workers in a large informal sector. South African labour regulation is dynamic and evolves to cater for emerging needs. However, enforcement is poor due to a lack of resources while gig economy workers remain excluded from protection.

The informal labour market and frictions in the formal labour market pose challenges for labour regulators. Circumstances of poverty, inequality and unemployment are reflected in the existence of the informal economy and actions of organised labour. Approximately 34% of the employed in South Africa work in the informal sector and operate primarily in trade and services.[200][201] The informal market poses challenges for regulation due to its amorphous structure and lack of visibility. Despite national policy recognition of the informal sector's role in employment, local government can be neglectful and at times hostile: street vendors goods are often confiscated, business owners are subject to disruptive zoning requirements and recyclers are denied access to waste.[202] [203] The bulk of these workers suffer from poor conditions and poor pay relative to effort. While the formal sector offers superior pay, for many workers this remains inadequate. More than half of strike actions in 2017 were principally motivated by disputes in earnings.[204] The majority of these 132 strikes were protected and had followed necessary regulatory procedures – protected strike action is permitted by the Labour Regulations Act for formally defined employees.[205][206] This right therefore does not extend to contract workers.

South African labour law prevents the exploitation of workers, is adaptive and continues to expand coverage to a variety of forms of labour. The labour regulatory framework is considered on par with many developed nations as it provides minimum condition of work, leave and compensation, it enforces contractual security for employees, and it enforces social security expectations[207]. South Africa's regulatory framework is not static with a host of developments illustrating its potential to adapt to emerging conditions and reflect the needs of a wide range of labour. Key to these are the intended implementation of R204[208] and the National Minimum Wage Act (NMWA). The R204 seeks to expand the provision of labour rights and protection to all workers in the informal economy and reflects government

[200] Fedusa, (2018) Informal Economy Panel
[201] Ethekwini Municipality (2018). Economic Development and Growth in Ethekwini- Issue 17
[202] Skinner & Rogan (2019). *The informal Economy: Is Policy Based on Correct Assumption?* – Econ3x3
[203] Skinner & Rogan (2019). *The informal Economy: Is Policy Based on Correct Assumption?* – Econ3x3
[204] Department of Labour (2017). Industrial Action Report
[205]Chayya (2018). Towards the creation a fair ride-hailing industry: Should South African labour law regulate the Uber relationship?
[206] Online Media (2018) - *SA sets a new record for Industrial Action* – Business Day
[207] Online Media (2015) - *How South Africa's Labour Law Compares Globally* - APSO
[208] International Labour Organisation (2019). Online

commitment to catering for the needs of labour not traditionally defined as employees. [209] The nature of expanding labour regulation coverage is reflected in the historical enforcement of the Labour Relations Amendment Act 6 of 2014 which provided enhanced protection for workers in temporary employment and protection against unfair dismissal[210]. The yet to be enforced NMWA applies to all workers and their employers. 'Worker' as a broader definition than 'employee' includes contract workers.[211] The NMWA legislates that workers shall receive a minimum of R20 per hour except for domestic, agricultural and government expanded works programs as they have their own minimum wage levels.[212][213]

Despite a progressive attitude to regulation, its benefits are detracted from by imperfect compliance due to a lack of capacity in monitoring and enforcement. Analysis conducted in 2007 suggested that 45% of workers were paid below sectoral minimum wages with an average wage gap of 16%.[214] Lack of resources for enforcement underpin low compliance. For example: as of 2016, South Africa had on average 10 labour inspectors per 100,000 employees; only 5% of 30,000 households targeted for inspection were inspected for compliance with domestic minimum wages in 2003.[215] This is compounded by a lack of worker awareness of labour regulation. Digital platforms' digital visibility and traceable flows of client, worker and payment information may offer some innovative avenues for monitoring.

South African labour legislation is yet to define its stance on gig-economy workers. Workers drawing income from platforms such as Uber are not considered employees of the platform. As such they fall into the regulatory space of self-employed and lack entitlement to the host of provisions for employees such as minimum conditions of work and social protection. The Labour Court's overturn of the CCMA ruling in favour of defining Uber drivers as employees of Uber that illustrates the complexities associated with testing employee-employer relationships. This is true across a host of markets however the payment of a wage is widely recognised as evidence of employment. [216] South African labour law has been argued to prioritise focus on traditionally employed labour to the detriment of gig-economy workers that nonetheless are dependent on the platform for access to work opportunities. [217] This state of worker dependency and platform control creates vulnerabilities for platform workers – anonymous reports from drivers transport platforms detail the threat of disabling driver access to the platform if involved in the formation of a union and the pressures placed on drivers against trip cancellation regardless of driver safety[218].

Local studies, schemes and academic literature illustrate the motivation to solve for uncertainties around regulation of gig-economy workers and platforms. The Fairwork scheme is housed at Oxford with its collaboration with UCT and UWC an indicator of progress

[209] Department of Labour (2018). Department of Labour in Partnership with NEDLAC and strategic partners to convene national dialogue on "Transition from the Informal to the Formal Economy"
[210] Chayya (2018). Towards the creation a fair ride-hailing industry: Should South African labour law regulate the Uber relationship?
[211] Online Media (2018) - *Q&A: Between the lines of a national minimum wage with Neil Coleman* – the Daily Maverick
[212] Online Media (2019) - *Everything you need to know about the minimum wage act* – The South African
[213] The Presidency (2018). National Minimum Wage Bill
[214] Murahwa (2016). Monitoring and enforcement: strategies to ensure an effective national minimum wage in South Africa
[215] Murahwa (2016). Monitoring and enforcement: strategies to ensure an effective national minimum wage in South Africa
[216] Oxford, UCT (2017). The employment status of uber drivers
[217]Chayya (2018). Towards the creation a fair ride-hailing industry: Should South African labour law regulate the Uber relationship?
[218] Online Media (2019). *Uber, Taxify score poorly in Oxford University study on South African digital platform working conditions* – The Daily Maverick

outside of the public sector. The scheme is using South Africa as a case-study to test how principles around gig-economy labour regulation can be integrated with labour law.[219] Fairwork recognise that platforms reliant on local market demand can be directed to comply with labour regulation. Platforms that contract labour through non-regionally bound digital channels are more challenging to regulate. In this regard the Fairwork scheme promotes the establishment of an international accreditation of platforms based on key principles.[220] This may be integrated with local regulation and motivate self-regulation among platforms. Application of a set of these principles in South Africa - fair pay, employment conditions, employment contracts, management, and labour representation – found poor performance across the majority of popular South African platforms.[221] However, there is evidence that platform management is forward-looking and may respond to these findings – Bottles, a liquor delivery service, has committed to allowing workers establish collective representation.

Labour market composition is available annually and is robust. Labour union effectiveness however requires deeper research to unpack its economic impact while enforcement data tends to be dated. Assessing labour regulation dynamism relies on interpretation of case law while pressure to cater for non-traditional forms of labour is proxied for by rising intensity in public debate and academic research.

Supplementary data and empirics:

- Annual publication of department of labour inspector staffing and inspection activity at a sub-national level. This may furthermore detail actions taken.

[219] UCT Online News (2018). Project to protect workers in digital gig economy
[220] UCT Online News (2018). Project to protect workers in digital gig economy
[221] Online Media (2019). *Uber, Taxify score poorly in Oxford University study on South African digital platform working conditions* – The Daily Maverick

Innovative Business

South Africa has a strong though under-utilised foundation for innovation and the ability to respond to changing conditions. The Global Innovation Index (GII) uses a variety of indicators to measure the presence of innovation inputs and outputs in a country. South Africa ranks 58th of 126 nations and first on the continent in its combined input and output score[222]. A strong innovation input ranking at 48 is driven by the sophistication and maturity of its business environment and markets and the presence of strong academic and financial institutions. These inputs are being transformed into innovation outputs. For example, product and process innovations exceed continental averages while patents per person are higher than regional competitors and markets of comparable income[223][224][225]. Although impressive, South Africa's strong foundation for innovation is not being leveraged to its full capacity – South Africa's GII output score ranks 17 places lower than its input score, South Africa's ratio of technology imports to exports is most severe in high technology areas, and total factor productivity (a measure of the effective use of technology in production) has been deteriorating[226][227]. This pillar investigates business innovation and flexibility to unpack the mechanisms that unlock business innovation.

This category looks at 2 conditions measuring the availability of innovation finance and 7 conditions that make innovation finance effective. These together come to create an environment where new products, processes and business models are conceptualised and have the opportunity to be tested and scaled. The first condition measures the availability of growth and start-up capital for emerging business. The second condition measures the availability of government and business investment in R&D. An Accenture report found that companies that are leaders in innovation enjoy an average of 42% return to innovation investment - 3 times higher than market averages[228]. The final 7 conditions measure aspects of innovative business that lead to effective innovation investments and avoids wastage. The human aspect is measured along 3 areas. Firstly, the scale and quality of entrepreneurship in South Africa, secondly the quality and orientation of corporate leadership in South Africa and finally business access to talent on demand. The final measurement takes into considering institutional norms as they relate to hiring and flexible work arrangements. Business and network processes are also measured along three areas. These are key inputs into market capability for innovation. Firstly, innovation processes and collaboration evaluate enterprises' commitment to structured innovation strategies and enterprises' appetite for relying on entities outside of the organisation for co-creation, inspiration and deployment support. The second condition measures business attitudes and access to technology while the third measure analyses entrepreneur access to non-financial capacity development support. The

[222] WIPO (2018) Global Innovation Index.
[223] WEF (2018) Global Information Technology Report.
[224] GEDI (2017). The Entrepreneurial Ecosystem of South Africa: A strategy for Global Leadership
[225] HSRC (2008). South Africa Innovation Survey Main Results
[226] Department Science & Technology, NACI (2017). South African Science, Technology and Innovation Indicators.
[227] World Bank (2017) South African Economic Update: Innovation for Productivity and Inclusiveness
[228] Accenture (2016). *SA Companies slow to innovate, Shows Accenture Innovation Index* – Online report

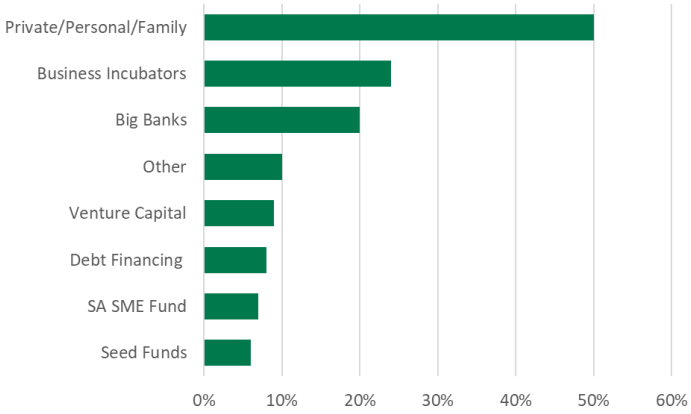
measure reviews the scale and maturity of South Africa's domestic consumer market identifying customer attitudes to digital goods and services to understand appetite and the trajectory of the addressable market of digital goods and services

Innovation Financing

Start-up and Early Stage Finance

There is a severe shortage of early-stage and growth funding for SMMEs in South Africa. South African SMMEs have access to a wide range of funding instruments however there remains a severe shortage. In 2010, a Finscope survey estimated that 13% of formal businesses had access to funding.[229] With IFC estimating the scale of the funding gap at 10% of GDP and Finfind estimating the value in the range of R86 to R346 billion, the vast majority of emerging business are without the means to sustain and scale their business[230231]. A survey of SMMEs found access to finance the most critical and common areas of support needed while nearly 25% of early stage business closures are due to a lack of access to finance - 50% above African averages[232233]. Approximately 6% of SMMEs accessed government finance while the bulk of SMMEs with access to finance rely on support from personal savings or networks[234]. Approximately 61% of funding projects in the South African ecosystem do not have a sector focus and are therefore broadly accessible[235]. Of those that do, the bulk are focused on manufacturing and ICT which are prime areas for exponential growth[236].

Sources of non-government funding for SMEs



Source: SME South Africa, 2018, An assessment of South Africa's SME Landscape

SMMEs suffer from high rejection rates in the range of 30% to 70% suggesting the need for support in finance applications and alternative credit-worthiness assessments[237238]. The

[229] Finfind (2017). Inaugural South African SMME Access to Finance Report.
[230] Finfind (2017). Inaugural South African SMME Access to Finance Report.
[231] IFC (2017) MSME Finance Gap Data
[232] GEM (2018). South Africa Report
[233] SME South Africa (2018). An assessment of South Africa's SME Landscape
[234] SME South Africa (2018). An assessment of South Africa's SME Landscape
[235] Finfind (2017). Inaugural South African SMME Access to Finance Report
[236] Finfind (2017). Inaugural South African SMME Access to Finance Report
[237] SME South Africa, 2018, An assessment of South Africa's SME Landscape
[238] SME South Africa, 2018, An assessment of South Africa's SME Landscape

bulk of SMME financiers do not require collateral[239][240]. Funding rejections are primarily due to insufficient operating history or poor completion of applications - nearly 13% of funding rejections are due to a poor business plan. Despite this, only 17% of private sector financiers assist in the completion of applications[241][242].

Private sector finance that carries emerging business from inception to proof-of-concept is in severe shortage. This working capital is a means to market research and product development that takes emerging goods and services to a stage of maturity that can be sold to the market or integrated with corporate operations. The banking sector is a key player in this area and requires a developed knowledge of what is viable in the exponential business world to ensure credit is extended where appropriate, needs to overcome a culture of conservatism and risk avoidance and, along with other sources of finance, improve turnaround times[243].

Expansion phase funding in the form of venture capital (VC) and private equity (PE) is growing however there are few funds that cater for the specific needs of ICT start-ups. SMEs with a proven concept can experience rapid growth if supported with expansion capital. South Africa's traditional VC and PE market is growing and supported by a small and concentrated Angel network. Access to VC funding is considered above global averages and in line with BRICS comparators with 42% of the R1,160 million invested in 2017 considered growth capital and 57% seed and start-up[244][245]. The PE market has grown at a 9.4% CAGR since 1994 to reach R158.6 million in funds under management in 2017[246]. Nearly 30% of PE investments were targeted at start-up and early-stage firms while 27.5% on expansion. However, there are only a handful of players dedicated to ICT and technology who have a grounded understanding of the specific needs of these kinds of businesses. RaizCorp incubate nearly 3,000 entrepreneurs a year and have seed funding available following POC while Cortex Logic is developing a network of service providers by taking partial ownership of and nurturing emerging technology business.[247]

Section 12J venture capital funds are funnelling investment towards employment creating SMMEs and growing rapidly in popularity. The 12J tax incentive allows individuals, corporates and funds investing in qualifying venture capital companies (VCCs) to offset their income tax burden by 45% of the investment. The incentive seeks to drive SMME growth in key sectors that offer high employment growth opportunity.[248]. In 2015 an estimated 30 funds were registered for the 12J incentive. This accelerated to over 100 in 2018 illustrating the attractiveness of the fund and its recent recognition among investors leading to an estimated

[239] Finfind (2017). Inaugural South African SMME Access to Finance Report
[240] SME South Africa (2018). An assessment of South Africa's SME Landscape
[241] Finfind (2017). Inaugural South African SMME Access to Finance Report
[242] SME South Africa (2018). An assessment of South Africa's SME Landscape
[243] SME South Africa (2018). An assessment of South Africa's SME Landscape
[244] SAVCA (2018) Venture Capital Industry Survey
[245] WEF (2017). Global Information Technology Report
[246] SAVCA (2018). Private Equity Industry Report
[247] World Bank (2017). South African Economic Update: Innovation for Productivity and Inclusiveness
[248] This excludes SMMEs operating in the following: trade of immovable property, financial services, advisory services, gambling and casinos, manufacturing of liquor, tobacco or firearms, and trade carried out outside of South Africa

R3.6 billion under management.[249][250] National Treasury's forthcoming review of the fund will determine whether the economic benefits outweigh foregone tax revenues and understand the degree to which funding is diversified.[251] This comes amidst concerns of excessive use ('abuse') of the fund by individual investors and the potential for distorting investment decisions to the detriment of investment quality.[252]

Alternative financing sources are gaining traction and offer an innovative solution to the finance shortfall. Crowdfunding platforms have emerged as possible sources of working and growth capital for SMEs regardless of the regulatory uncertainty around them. The People's Fund targets black owned business and has raised over R1.5 million for 12 campaigns. This includes MySurfer – a provider of low-cost internet access solutions – that required capital to install wireless access in 175 buildings and have since been successfully paying out investors. The People's Fund is furthermore raising a working capital base for SMEs servicing government that suffer from long payment leads. The nascent industry provides a much needed (albeit costly) source of finance for SMEs. Promotion of the industry would improve visibility for SMEs and expand coverage however this should be paired with mentorship around the opportunities and risks of taking on alternative financing sources.

Established Firm Finance

South Africa has a sophisticated and high quality banking sector which provides established business with access to finance. South Africa has a world-class financial system which ranks 18 of 140 markets in its efficiency, trustworthiness and confidence.[253] This quality is reflected in the depth of South African, with domestic credit provided to the private sector estimated at 144% of GDP - in line with OECD averages[254]. South Africa's banking sector is a key financer of this credit at 66% of GDP and nearly 20% above global averages[255]. The banking sector is robust given its strong regulatory and legal framework and is competitive with a host of well-established and emerging institutions. The sector's quality is reflected in global awards. For example, the Lafferty banking 500 benchmarks 500 global banks in terms of their quality. South Africa graded 6th of 38 markets, with Capitec being one of eight banks to receive the highest possible rating.

Capital markets are well developed and provide established firms with a valuable public source of finance. South Africa's capital markets are large relative to global benchmarks with listed domestic companies' market capitalisation estimated at 321% of GDP – secondly only

[249] Online Media: *Section 12J incentive good start but government can do more* – Venture Burn
[250] SAVCA (2018). Venture Capital Industry Survey
[251] Online Media (2019). - *Venture Capital Company tax regime under review. Again* - Moneyweb
[252] Ngwenya (2014). A study of the section 12J VCC regime as a capital procurement instrument for SMMEs
[253] WEF (2018) Global Competitiveness Index
[254] World Bank (2018)
[255] World Bank (2018)

to Hong Kong[256]. South Africa subsequently ranks 25th globally in ease of raising capital through the public sale of shares.[257] The Johannesburg Stock Exchange is recognised globally not only for its scale but also the quality of its reporting expectations of listed firms. Integrated reporting provides investors with clear and accurate details of business operations and financial health so as to judge their efficacy. The International Integrated Reporting Council ranked South Africa the top performing country in this regard. While the JSE is the cornerstone exchange, alternatives such as ZAR X and 4 Africa Exchange are slowing gaining traction.[258] These platforms broaden business access to finance by altering the stringency of listing requirements and providing secondary listing opportunities to the JSE[259]..

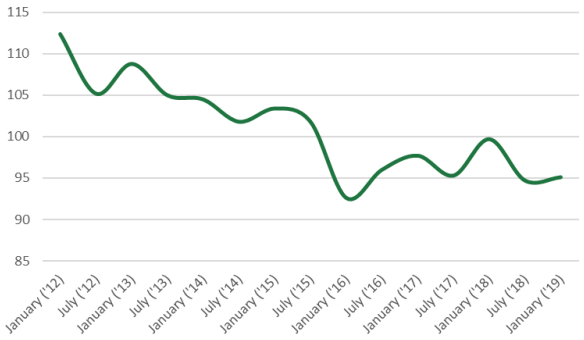
Business Investment

Business is a key financier of R&D however spend falls short of leading innovative nations. The business sector is a key source of investment contributing 38.9% to gross expenditure on R&D (GERD) in 2016 and prioritising areas such as engineering, ICT and medicine.[260] This places South Africa at 42 of 109 countries in business share of GERD and slightly below sample averages.[261] Business expenditure on R&D has grown in Rand terms since the impacts of the global financial crisis waned in 2010 however business' share of GERD has slid by 3% since 2012.[262] Business spend remains in shortage as access to finance has been noted as a common hindrance to innovation projects.[263] Innovation leading markets such as South Korea and China which have high GERD to GDP ratios are driven by spending by the business sector[264]. In these markets business contribution to GERD tends to account for over 70%[265]. South African business seems to be under-investing with an R&D to sales ratio far below OECD averages.[266]

[256] World Bank (2018)
[257] WEF (2018) Global Competitiveness Index
[258] COEFS (2017) The Impact of the 4th Industrial Revolution on the South African Financial Services Market
[259] COEFS (2017) The Impact of the 4th Industrial Revolution on the South African Financial Services Market
[260] HSRC (2016) South African National Survey of Research and Experimental Development
[261] UNESCO (2019). Research & Development Spending
[262] HSRC (2016) South African National Survey of Research and Experimental Development
[263] CLC Africa (2018). The State of Innovation Capabilities Report.
[264] UNESCO (2019). Research & Development Spending
[265] UNESCO (2019). Research & Development Spending
[266] World Bank (2018). Innovation activity in South Africa: Measuring the Returns to R&D

South African firms seem risk averse given attractive returns to R&D investment which may be attributable to low levels of business confidence. Local returns to R&D range between 118% and 294% exceeding those in France and the USA (28% to 78%), Taiwan (8% to 35%) and OECD averages. [267][268] As South African businesses contribute less to GERD than these markets, there is the possibility of risk adversity given challenging business conditions as illustrated by waning business confidence. Poor macro-economic and political conditions create uncertainty which depresses business confidence and motivation to invest. This lack of confidence has significant effects as a 1% increase in business confidence has been estimated to raise economic growth by 0.23% through its impact on investment.[269]

Business Confidence Index
(2012 – 2019)



Source: SACCI (2019) Business Confidence Index

Government R&D and Tax Incentives

Government has set ambitious targets for GERD which has been growing in real terms since 2010 though falls short of benchmark countries. As of 2017, GERD equated 0.77% of GDP – akin to global and Indian averages however far below top performing BRICS nations and the OECD average of 2.5%[270]. Government has set ambitious targets for GERD, seeking to double the 0.77% of GDP spent on R&D to 1.5% by 2020[271]. Government can pursue these targets through directing expenditure or through incentivising private sector investment though tax incentives.

The scale of government expenditure on R&D is competitive relative to comparators and has been growing in real terms. Government accounted for 44.6% of gross expenditure on R&D in 2015 – nearly 10% higher than a sample of 36 countries including OECD benchmarks. This figure has been growing since 2013, offsetting the slowing growth in spend from the business sector. Government prioritises spend on sectors that provide broad national benefits such as agriculture, education and medicine. Government expenditure on R&D has positive effects by contributing to GDP growth and sustaining ~40,000 jobs directly and indirectly in

[267] World Bank (2018). Innovation activity in South Africa: Measuring the Returns to R&D
[268] World Bank (2017). South African Economic Update: Innovation for Productivity and Inclusiveness
[269] Jongh & Mncayi (2018). An Econometric Analysis on the Impact of Business Confidence and Investment on Economic Growth in Post-Apartheid South Africa
[270] UNESCO (2018). Institute for Statistics
[271] Online Media (2017). – *Government Aims to Double R&D Spend by 2020* – University World News

2012[272]. This is far larger than the ~3,000 direct R&D personnel employed by government in 2012, illustrating the significant of its knock on effects[273].

South Africa's key innovation tax deductions are competitive relative to global leaders and BRICS nations. The Section 11D R&D tax incentive allows a maximum of 150% tax deduction on expenditure on research on an invention, or on new or improved product designs and functionalities and allows for accelerated depreciation of capital expenditure. This is a competitive policy when benchmarked to innovation leaders: Israel allows qualifying large enterprises a corporate tax rate of 5-8% and between 7.5% and 16% for SMEs; the US gives a non-refundable tax credit to reduce income tax up to 9.1%. Benchmarked to more comparable BRICS states finds tax policies are also relatively competitive - Brazil offers a 200% incentive, China offers a 75% maximum deduction, Russia, offers 150%, while India allows only 15%.[274]

The 11D tax incentive has had a limited though positive impact on investment in R&D. Between its introduction in 2006 and June 2017 292 companies have received approval for the tax deduction. The government is estimated to have spent R36.1 billion on R&D through the incentive. Data from 2012 shows that 75% of companies whose application was approved attributed the creation of new products to the tax incentive[275]. A further 42% of companies attributed an increased scale and pace of pre-planned R&D to the scheme. This resulted in a net 2.9% increase in R&D expenditure.[276]

Despite the value of the 11D tax incentive, it is inefficiently administered. The impact of the incentive is dependent on the DST's ability to efficiently process applications as qualification requires preapproval from the DST. The 2015 National Treasury budget review found severe backlogs in the process of approving applications attributed to capacity constrains in the DST.[277] This is reflected in decreasing applications being adjudicated –218 adjudications in 2012 steadily declined to 97 in 2014.[278] These imperfections have been identified as the cause of a 70% drop in forgone government revenue from approved tax deductions in 2013.[279] Progress in achieving efficiency seems to have been made[280] As of November 2018 potential structural reforms to improve administrative efficiency were being considered, but no reforms have been implemented.[281]

[272] Perrot *et. Al.* (2012) Government R&D Impacts on the South African macro-economy.
[273] HSRC (2016) South African National Survey of Research and Experimental Development
[274] Deloitte (2018). Survey of Global Investment and Innovation Incentives
[275] National Advisory Council on Innovation (2015) Review of The White Paper on Science and Technology
[276] National Advisory Council on Innovation (2015) Review of The White Paper on Science and Technology
[277] Deloitte (2018). Survey of Global Investment and Innovation Incentives
[278] Status update on processing of application for the R&D tax incentive – Presentation to the Standing Committee on Finance (SCOF).
[279] DST (2016). Science and Technology on Research and Development Tax Incentive report, Polity - *Issued by Department of Science and Technology*
[280] Parliamentary Monitoring Group (2017). Research and Development (R&D) Tax Incentives; Indigenous Knowledge Systems Bill: briefing
[281] Deloitte (2018). Survey of Global Investment and Innovation Incentives

Non-financial Investment Support

Start-up ecosystem

A rich start-up ecosystem provides the non-financial post-ideation support needed by the start-up community. There are over 90 providers which nurture start-ups through non-financial capacity development[282]. These provide support fort start-ups that have conceptualised a new product, service or process in the testing and eventual scaling of that good. The ecosystem network is key in the early stages of the start-up lifecycle.

In South Africa access to networks, mentoring, marketing, and business strategy/planning are the most common forms of capacity development provided to emerging business[283]. Investor matchmaking and showcasing – important means of accessing finance – are uncommon.[284] The category and number of players are illustrated on the right. This ecosystem is the deepest and most sophisticated on the continent although yet to achieve critical mass.

The diverse community of incubators, accelerators and shared working space collectively meet the key criteria for this system to be effective: ***There is access regardless of industry*** with 55% or program providers being sector agnostic in Gauteng – a strong indicator of national trends[285]. Focused programs are concentrated in ICT and agriculture; ***Support spans the start-up lifecycle*** and range of start-up requirements; ***There are efforts to broaden access*** such as The Innovation Hub[286] developing a township network and the Awethu Project focusing on historically under-resourced participants*;* ***the ecosystem provides high quality support*** **-** The 2017 UBI global rankings of university linked business incubators and accelerators identified the LaunchLab as the top challenger in Africa, a position historically occupied by programs in other African countries. Additionally, CITI is Africa's oldest and one of the continent's most prominent incubators.

The ecosystem's effectiveness can be improved through skills development and coordination. The range and complexity of this ecosystem creates challenges for entrepreneurs as there lacks a focal point and ecosystem champion. An ecosystem coordinator could break down silos and align activities while improving entrepreneur and provider visibility. Deepening start-up access to international networks and markets may lead

[282] ANDE (2018). South Africa's Entrepreneurial Ecosystem
[283] ANDE (2018). South Africa's Entrepreneurial Ecosystem
[284] ANDE (2018). Gauteng Entrepreneurial Ecosystem Snapshot.
[285] ANDE (2018). Gauteng Entrepreneurial Ecosystem Snapshot.
[286] During 2017, nearly two thirds of startups being supported had an ICT focus illustrating how technology innovations specifically and innovation generally can emerge in all circumstances.

to the emergence of global scale exponential businesses. This should be complemented by improving service provider capacity as there is a shortage of skill and experience at entrepreneur support organisations

Collaboration and Co-ordination

Appetite for collaboration between emerging and established businesses drive knowledge diffusion however challenges to engagement remain. At nearly 90%, South African corporates rank have a keen desire to collaborate with emerging business, are intent on learning from competing firms, service providers and academic institutions and rank 28 of 119 countries in collaboration between industry and academia[287][288][289] South Africa subsequently ranks 59 of 126 countries in innovation linkages.[290] Both emerging and established firms that are strong collaborators achieve higher levels of reported revenue growth – effective collaboration could raise SMME revenues by between 3% and 18% and established firm revenues by between 3% and 7%[291]. However two points of friction remain: entrepreneurs have the perception that corporates are limited in their culture of entrepreneurship; large companies consider themselves committed to collaboration with entrepreneurs however entrepreneurs do not consider these large companies truly committed.[292] In select circumstances cooperation has seen emerging firms embed themselves in larger corporations, the benefits of which are often diffused within the institution.

Innovation platforms that deepen links between emerging and corporate businesses are quickly being realised as key sources of co-creation and ideation. The majority of surveyed innovation leaders believe these platforms are core to business idea generation Dimension Data's collaboration with Silicon Cape seeks to improve entrepreneur knowledge of and comfort with collaboration and a platform for new thinking. This process is indicative of the rising value innovation leaders place in innovation networks and key to sensitising both players to the others' cultural norms and expectations.[293] Open innovation platforms such as Zindi, Openix and the NTT Data Open Innovation Contest are gaining traction. While innovation platforms are improving between business collaboration, South African enterprise scores far above global averages in knowledge sharing within business and between business functions.[294]

[287] *WEF, Global Executive Survey*
[288] Accenture. (2016). Harnessing the Power of Open Innovation through Digital Collaboration – a $12 billion Opportunity for South Africa.
[289] PWC (2017). Global Digital IQ Survey.
[290] WEF (2018). Global Innovation Index
[291] Accenture (2016). Harnessing the Power of Open Innovation through Digital Collaboration – a $12 billion Opportunity for South Africa.
[292] Accenture (2016). Harnessing the Power of Open Innovation through Digital Collaboration – a $12 billion Opportunity for South Africa.
[293] Accenture (2016). *SA Companies slow to innovate, Shows Accenture Innovation Index* – Online report
[294] Dell (2018). Digital Transformation Index.

Expert networks and external engagements are considered strong sources of new ideas and implementation support.[295] Established businesses have access to international service providers such as Accenture and a handful of local providers such as Cortex Logic. These entities walk businesses along their digital transformation journeys and assist in the development and operationalisation of new technologies. A range of dedicated IT service providers cater to the specific ICT needs of SMEs.

Innovation Culture

Entrepreneurship

South African entrepreneurs have positive attitudes, are innovative and capable of scaling given positive conditions however start-up skills require development. Approximately 75% of South African early-stage entrepreneurs are opportunity motivated as opposed to necessity driven. [296] The share of opportunity motivated firms has been growing rapidly since 2001 implying that South African entrepreneurs are increasingly interested in and willing to pursue and exploit gaps in the market in the creation of value and the pursuit of growth. South African entrepreneurs are willing to embrace risks and rank second on the continent and 55th of 137 counties in their attitudes, aspirations and abilities.[297] This is complemented by positive social and public perceptions of entrepreneurship.[298] South African entrepreneurs are furthermore innovative with 48% believing they produce products that are new to some or all customers and 43% believing their products differ from those offered by other businesses.[299] This is above continental averages with the GEDI assessment of the South African ecosystem suggesting there are no gaps in entrepreneurial capacity for product and process innovation. [300]

Emerging businesses are positioned well to compete in the digital economy with the majority considering themselves well prepared to leverage the digital age and keep up with disruption[301]. This has resulted in the emergence of an ICT start-up community which attracts foreign talent. There are over 1,500 ICT start-ups active in Johannesburg and Cape Town with both cities ranking well in the availability of experienced software engineers.[302] These hubs of entrepreneurship are attracting foreign talent and outstrip upper middle-income city averages in the number of active entrepreneurs. [303]

[295] CLC Africa (2018). The State of Innovation Capabilities Report.
[296] GEM (2017). South Africa Report
[297] GEDI (2017) The Entrepreneurial Ecosystem of South Africa: A Strategy for Global Leadership
[298] GEM (2017) South Africa Report
[299] GEM (2017) South Africa Report
[300] GEDI (2017) The Entrepreneurial Ecosystem of South Africa: A Strategy for Global Leadership
[301] SME South Africa (2018). An Assessment of South Africa's SME Landscape
[302] World Bank (2017) South African Economic Update: Innovation for Productivity and Inclusiveness
[303] World Bank (2017) South African Economic Update: Innovation for Productivity and Inclusiveness

Despite these innovative qualities and emerging digital orientation, the scale of South African entrepreneurial activity ranks poorly relative to competitors and gaps in start-up skills persist. Approximately 6.9% of adults are in the process of starting or who have just started a business. This is a downwards trend since 2014 and places South Africa at 52 of 65 surveyed countries.[304] Compounding potential challenges in scale are foundational entrepreneurial skills.

Corporate Innovation

South African enterprise is in the middle stages of its innovation process maturity cycle. A key characteristic of successful innovation programs is the development of realistic innovation objectives that align with business goals complemented by innovation processes that resource wastage. A pilot survey of South African enterprise places respondents in 1 to 5 stages of innovation maturity with 1 ranking the lowest.[305] This assesses awareness of both the need for and how to change innovation processes based on 6 clusters of innovation capabilities. The bulk of enterprise are in the early to middle stages of innovation maturity: 44% are at the second lowest, 'emerging' stage with some awareness, organised approach and occasional results. This is driven by strengths in innovation strategy. Approximately 33% and 7% are at the third and fourth stages respectively while none are at the highest stage. This distribution seems in line with international trends however raises slight concerns as 14% of business are at the first stage and have little to no formal appetite for and process around innovation.

South African enterprise are developing innovation strategies and are confident they can embrace the challenges of disruption. The middle to early stages of innovation reflect a growing entrenchment of and genuine institutional vision for innovation and an innovation strategy that increasingly aligns with and supports broader business strategy[306][307]. Nearly 80% of South African enterprise consider innovation a strategic priority with the majority having innovation objectives appearing in business plans[308]. The processes is strengthening - 85% of Accenture surveyed firms are deploying dedicated innovation teams while a manager survey found 97% consider innovation an opportunity[309]. Regardless of the presence of laggards in the cultural readiness for innovation, business is generally confident that it will be able to meet changing customer expectations and the demand for trustworthiness. [310,311,312]

[304] GEM (2017). South Africa Report
305 CLC Africa (2018). The State of Innovation Capabilities Report.
[306] CLC Africa (2018) The State of Innovation Capabilities Report.
[307] Accenture (2016). *SA Companies slow to innovate, Shows Accenture Innovation Index* – Online report
[308] Steyn & Bell - USB (2016). South African Management Index Report
[309] Steyn & Bell - USB (2016). South African Management Index Report
[310] PWC (2017). Global Digital IQ Survey.
[311] WEF (2018). Global Innovation Index
[312] Dell (2018). Digital Transformation Index.

Sophisticated and well-developed innovation processes are necessary to avoid investment wastage. Companies considered superior innovators with embedded strategies and committed programs realise nearly 3 times the returns on R&D as less effective innovators.[313] Differences in innovation maturity therefore create important differences in innovation success. This may contribute to the fact that the number of South African enterprises that have experienced genuine bottom line growth due to investment in innovation are in the minority[314] Maturing innovation processes and culture will see the emergence of lean innovation as a norm as opposed to an exception and the broader adoption of a fail-fast mindset[315].

South African firms having varying abilities to leverage technology in their innovation efforts with the bulk of local firms in middle stages of digital maturity. The Dell digital transformation index is a business level survey that evaluates a market's digital maturity by ranking the digital transformation performance of companies from 1 to 5 with 1 being the lowest. South African firms fare well by global standards - 39% are in the middle or 'evaluator' stage with a gradual embracement of digital transformation and investment. Approximately 8% of firms are considered digital leaders at the top end – above global averages – while the instances of digital laggards that have little to no commitment to digital transformation are below global averages. The South African appetite for digitisation has led to some cases of exponential business however these are far less common than in leading markets, with local firms frequently emulating digital strategies of businesses in developed nations as opposed to building pathways appropriate for their own organisation.[316] With 23% of business at the digital adopter stage – just before digital leader - there is a strong base of firms primed to build on learnings from digital leaders.

South African corporate leadership have an eye for innovation and digital strategy however more can be done to future-proof these talents Leaders in established businesses are enabling innovation and are a key strength in established business' innovation landscape[317][318] Clear leadership commitment to innovation is supporting business competitiveness, however surveyed business suggests the innovation competencies of leaders are sometimes inadequate and can create obstacles.[319] South African CIOs and CEOs are believed to score below continental and global averages in their perceived ability to assimilate new technologies into an organisation[320]. This translates into only 60% of managers believing top organisational leaders have the talent to address future challenges the business will come to face[321]. Uncertainty around 'what it takes' for digital innovations to be operationalised and 'what these can achieve' can create misalignment in expectations between decision makers and service providers/ staff expected to execute on digitisation plans.[322] This talent gap is

[313] Accenture (2016). *SA Companies slow to innovate, Shows Accenture Innovation Index* – Online report
[314] Accenture (2016). *SA Companies slow to innovate, Shows Accenture Innovation Index* – Online report
[315] Interviews with Stakeholders conducted by Genesis Analytics, June - July 2019
[316] Online Media. 2019. Accenture & GIBS report of digital competitiveness
[317] CLC Africa (2018). The State of Innovation Capabilities Report.
[318] PWC (2017). Global Digital IQ Survey.
[319] CLC Africa (2018). The State of Innovation Capabilities Report.
[320] PWC (2017). Global Digital IQ Survey
[321] Steyn & Bell - USB (2016). South African Management Index Report
[322] Interviews with Stakeholders conducted by Genesis Analytics, February-March 2019

compounded by the under-development of digital leadership programs in nearly 50% of business despite 67% of businesses considering digital leadership as at least important[323].

South African enterprise are strengthening the innovative capabilities of their staff through flexible work arrangements and on the job learning[324]. These functions improve staff ability to pivot to new tasks and embed a staff-wide innovation mindset. Business access to skills are considered a key impediment to innovation processes.[325][326][327][328]. Approximately 44% of South African enterprise believe their staff have the skills necessary to compete in the digital economy in contrast to 65% globally[329]. South African firms recognise the need to respond to this challenge with 76% believing a more fluid work force will improve innovation.[330] Employers are recognising the benefits of hiring freelancers at an on-demand basis to improve the rate at which skills can be sourced. Business is also increasingly investing in on the job leaning, as discussed in the human capital pillar.

Access to and adoption of digital technologies

South African firms have superior access to ICT services and the latest technologies. The Global Innovation Index suggests South African firms are above global medians in access to the latest technology, ranking 45 of 137 counties[331]. This access provides the means of developing and scaling digitally enabled products and services. South African firms are leveraging this access and rank 28 of 139 countries in the adoption of new technologies[332]. The nature, rate and challenges to adoption differ for emerging and established firms.

Emerging business has an appetite for technology and disruption however there is division between the haves and the have nots. The majority of South African SMMEs have at least basic access to technology with 97% using a smart-phone and 94% using LTE networks.[333] Firms without access are disadvantaged in their ability to compete in the digital and cannot access digitally enabled supply chains and leverage new customer channels and means of productivity. Although technology usage is expanding, 45% of emerging businesses have little to no new technology orientation and 50% consider technology access a challenge to growth and have insufficient skills for use[334][335]. On the other hand, technologically oriented SMMEs

[323] BCG (2017) Human Capital Trends Report for South Africa
[324] Accenture (2016). *SA Companies slow to innovate, Shows Accenture Innovation Index* – Online report
[325] CLC Africa (2018). The State of Innovation Capabilities Report.
[326] Dell (2018) Digital Transformation Index
[327] PWC (2017). Global Digital IQ Survey.
[328] Interviews with Stakeholders conducted by Genesis Analytics, February-March 2019
[329] PWC (2017). Global Digital IQ Survey.
[330] Accenture (2016). *SA Companies slow to innovate, Shows Accenture Innovation Index* – Online report
[331] WEF (2018). Global Competitiveness Index
[332] WEF (2018). Global Competitiveness Index
[333] SME South Africa (2018). An Assessment of South Africa's SME Landscape
[334] GEM. 2017. A South African Perspective on Entrepreneurship.
[335] SME South Africa. An Assessment of South Africa's SME Landscape

are well positioned to compete and recognise the need to remain technologically relevant with almost 25% making use of the latest technology (on par with continental averages) and 30% using technology that is 1 to 5 years old (above continental averages)[336]. This has led to success stories in digital leaders such as Yoco and the eHealth Group. Emerging South African enterprises use innovation and technology more frequently than African and BRICS comparators and generally have a greater appetite for using new technology than established business[337].

Established firms are believed to adopt new technologies more extensively than continental competitors and global averages however many businesses approach new technology cautiously and adopt a 'wait-and-see' attitude.[338][339][340] This risk adversity creates barriers in the testing and development of new products, services and business processes. Usage of frontier and ICT technologies is set to grow following successful proofs-of-concept as illustrated by the findings of a survey of 400 large South African enterprises[341].

- Internet-of-Things (IOT) is the most commonly adopted frontier tech. IOT has the largest appetite for non-user adoption while 100% of current users plan to increase use;
- Big data and Machine Learning has been explored by a small share of business. Over 70% of current users aim to expand usage while 60% of non-users intend on adopting;
- Virtual reality has been tested by a handful of businesses however the desire for further adoption seems limited relative to other technologies;
- Robotics is in its nascency with a moderate intent for further expansion;
- Blockchain technology is little used and shows low levels of interest relative to other frontier technologies however adopters embrace the opportunity for further expansion.
- While frontier technologies gain traction, the pervasive use of cloud computing continues to expand in emerging and established businesses. The technology is being used to enhance productivity as it is considered by business as a means of international expansion and improving time to market and speed of development.[342]

Across all frontier technologies (with the exception of robotics) finance was not the most common impediment to adoption. This implies that deeper factors such as attitudes to innovation, institutional culture and skills are key in unlocking the effective use of technology. These capabilities would support institutions' abilities to identify processes that can benefit from the application of technology.

[336] GEM. 2017. A South African Perspective on Entrepreneurship.
[337] Department Science & Technology, NACI. 2017. South African Science, Technology and Innovation Indicators.
[338] WEF (2018). Global Information Technology Report.
[339] Online Media. (2018). Citrix Survey - *'Digital Adoption Key for SA Business'*
[340] Online Media. (2018). Citrix Survey - *'Digital Adoption Key for SA Business'*
[341] Online Media. (2018). World Wide Worx Survey – *'The Mobile Corporation in South Africa'*
[342] Online Media. (2019). World Wide Worx Survey – *'Cloud Africa 2018'*.

Constructing Ecosystems

In addition to the individual systems required to support economic opportunities, a critical readiness factor is the ability for these systems to interact with one another and be co-ordinated around specific opportunities. Large systems such as digital infrastructure, human capital, and the public and private sectors often operate in silos and are not automatically co-ordinated – either within their respective systems or between systems. This limits the potential for economic opportunities to be realised and scaled because important inputs are not being aligned.

There are a number of organisations and processes which serve to play a facilitating and co-ordinating role for these opportunities to be realised and scaled. These range from formal institutions that have been set up by the state to less formal relationships and partnerships that aim to strategically co-ordinate disparate stakeholders to achieve common goals. This section investigates how this is playing out in South Africa in the four areas: business-to-business co-ordination, public private solutioning, ecosystem stewards, and access to global markets.

Business-to-business co-ordination

South Africa has relatively well-developed organised business with a large presence of industry and apex business associations. There are over 18 business councils and business support organisations in South Africa. Further, there are various export councils and trade associations for the respective industries**.** Some examples include the South African Chamber of Commerce (SACCI) which is the largest business association in South Africa; National Small Business Chamber (NSBC) which is a membership based organisation that protects and promotes small businesses, and Business Unity South Africa (BUSA) which represents South African businesses on national and international levels, as well as a number of industry bodies.[343]

In South Africa, there is more emphasis on the role of business councils as advocates for the private sector for concerted political action. These councils have been pivotal in promoting good governance and sound policy making to improve the ease of doing business in South Africa and to increase the role of business in economic growth and development.[344] However, it is not clear whether these associations have taken the responsibility to coordinate

[343] Genesis Analytics Team Analysis 2019
[344] Genesis Analytics Team Analysis 2019

businesses to develop industry-specific value propositions and market to global players.[345] Some industry-specific associations have taken on this role, for example in the GBS sector Business Process Enabling South Africa (BPESA) has re-emerged as a key stakeholder that aims to coordinate the GBS sector in sourcing market intelligence and crafting a value proposition that can be marketed to the global players.[346]

This lack of industry co-ordination is evidenced by the fact that most market intelligence practices are conducted at a firm level. Nearly 60% of businesses in SA say that they have a formal market intelligence function in their organisation with 65% of businesses having this function in operation for more than 5 years.[347] However, most of the collaboration that takes place between businesses appears to be face to face and ad hoc on an informal basis. Only a few companies have a central coordinating point for gathering market intelligence. This lack of coordination makes it difficult for industries to present a unified and succinct South African marketing package to the world.[348]

It is unclear which bodies should be responsible for co-ordinating businesses across a sector to gather market intelligence and craft sector-specific value propositions. Industry associations, individual businesses or the DTI could individually or collectively take up this responsibility. Marketing processes are still very much at an individual business level, which is in the early phases of development and is gaining prominence.[349]

The measure relies on a base of anecdotal evidence and academic publication validated against stakeholder insights. The assessment acknowledges that BPESA may not be the sole entity playing a coordinating and intelligence sourcing role. However, in the absence of visible alternatives, it is feasible to conclude that entities playing similar roles are scarce.

Supplementary data and empirics:

- Cross-industry stakeholder interviews accompanied by a narrow survey can be used to measure the extent of business cooperation, effectiveness of organised business and identify emerging champion coordinators. This information should be publicised to provide business with visibility.

Public private solutioning

In addition to business-to-business co-ordination, channels for co-operation between private and public sector stakeholders are critical for solutioning in specific areas of opportunity. While organized business is an important contributor to private sector advocacy, it is often constrained by the need to achieve consensus among a diverse set of private sector interests rather than advocating for the changes required to support specific

[345] Genesis Analytics Team Analysis 2019
[346] Based on Stakeholder interviews conducted by Genesis Analytics, February-March 2019
[347] Du Toit & Sewdass (2015) Competitive intelligence in emerging economies: A comparative study between Brazil and South Africa
[348] Du Toit & Sewdass (2015) Competitive intelligence in emerging economies: A comparative study between Brazil and South Africa
[349] Du Toit & Sewdass (2015) Competitive intelligence in emerging economies: A comparative study between Brazil and South Africa

opportunities.[350] As such, there is a need for organisations and structures which allow public and private sector stakeholders involved in a specific sector/opportunity area to co-develop solutions to specific problems that are constraining inclusive growth.

South Africa has a number of institutions and ad-hoc structures designed to facilitate public private engagement. Broad stakeholder consultation for economic policymaking is legislated through the National Economic Development and Labour Council (NEDLAC) Act of 1994. NEDLAC is a vehicle through which government, labour, business and community organisations can co-operate on economic, labour and development issues in the country.[351] In addition to this permanent structure, there are also ad-hoc structures which provide a similar role for specific national development objectives. For example, the Presidential Jobs Summit held in 2018 under the auspices of NEDLAC brought together representatives of government, private sector, unions, and community organisations to deliberate on solutions for South Africa's employment crisis. The outcome of the Summit was a Framework Agreement consisting of high-impact actions to drive job creation, job retention, and economic growth.[352]

However, these institutions and structures are often not effective at arriving at solutions for specific areas of opportunity. The nature of nationally-representative consultation and bargaining is such that actions required around specific opportunities are often lost. A recent development in South Africa is aiming to address this issue directly. The Public Private Growth Initiative (PPGI) brings together business and government leaders in specific sectors to design 5 year growth strategies in each sector by identifying specific projects and the public sector enablers required for them to scale. More detail on the initiative is provided in the box below.

The recent Public Private Growth Initiative is a good example of a structure set up to create public private solutioning around specific opportunities

The PPGI has been convened by the Minister in the Presidency to bring together business and government leaders to identify and plan for specific growth projects within each sector.[353] There are 24 sectors that are represented by the initiative which was inspired by the sector-based reconstruction and development model adopted by Japan after the Second World War.[354] Business leaders and the Director Generals of relevant government departments have been meeting to discuss projects with the potential to unlock growth in each sector, and identify the enablers that government must have in place for these project to succeed.

The outcome of the initiative will be a consolidated plan detailing identified projects in each sector and the required actions for these projects to scale. This will be incorporated into the country's economic planning process after the May 2019 elections. The PPGI represents a fundamentally different approach to public private co-ordination where the focus is on deriving sector-specific strategies rather than national consensus-building and negotiating between various stakeholders.

[350] Nelson (2014). Innovative Platforms for Public-Private Dialogue, *2014 Brookings Blum Roundtable*, The Brooking Institute
[351] NEDLAC (2017). Growth Equity and Participation
[352] NEDLAC (2018). The Presidential Jobs Summit Framework Agreement, 4 October 2018
[353] The Presidency (2019). Public-Private Growth Initiative believe high-growth South Africa within reach, *Presidency on the Public-Private Growth Initiative meeting*, 29 January 2019
[354] Online Media (2019). - *Public-Private Growth Initiative identifies 18 priority projects to unlock growth* - Engineering News

The measure captures the complexities of decision making within multi-agent systems through readings of regulation and observation of developments in the market. The nature of the measurement means data related evidence would need a highly accurate focus to be meaningful.

Supplementary data and empirics:

- Given the impending mobilisation of the PPGI, assessment frameworks to track represented industries need to be developed and used to assess PPGI effectiveness.

Ecosystem stewardship

Organisations that can catalyze cross-sectoral partnerships and develop common agendas for change play an important role in realizing economic opportunities. These organisations are sometimes referred to as collaborative intermediary organisations (CIOs) because they provide the "glue" that brings different parties together to collectively solve problems or realise opportunities[355]. These organisations, which are referred to as ecosystem stewards in this study, can be public, private, or social enterprises – or some combination thereof – whose purpose is to play one or more of the following roles:

- Unlock funding and other resources for a specific problem or opportunity among a set of stakeholders that typically do not co-ordinate support
- Convening disparate stakeholders that do not ordinarily engage with one another around specific problems or opportunities, and setting a common agenda or goal among them
- Acting as a relationship and trust broker among these stakeholders, particularly where there are opposing interests that give rise to conflict
- Coordinating actions required by the set of different stakeholders in order for solutions to be developed and opportunities to be unlocked
- Providing information and analysis which supports the formulation of common agendas and required actions, and monitors the effectiveness of these actions

South Africa has a number of organisations playing this ecosystem stewardship role across a number of areas and with a mix of models. A 2016 study by the Labour Market Intelligence Partnership identified a number of intermediary organisations successfully playing some of the roles describes above across the sugar, automotive, and astronomy sectors in South Africa.[356] Another study from 2014 identified a number of collaborative intermediary organisations operating in the urban regeneration space in Cape Town and Johannesburg.[357] However, these organisations are not widespread and could be replicated across a number of

[355] Hamann & April (2013). On the role and capabilities of collaborative intermediary organisations in urban sustainability transitions
[356] Peterson, Kruss, McGrath, & Gastrow (2016). Bridging skills demand and supply in South Africa: The role of public and private intermediaries
[357] Sonday (2014). Towards value generating capabilities for collaborative intermediary organisations

sectors, particularly if there is additional research on understanding where these models work best.[358]

Ecosystem stewards with strong private sector involvement may provide an added advantage. The Labour Market Intelligence Partnership study argues that private sector intermediaries should be more widely recognized because they bring the necessary expertise and social capital to provide sector-specific strategies and can enlist support from public intermediaries as needed. One of the most notable ecosystem stewards in South Africa, the Harambee Youth Employment Accelerator, is a social enterprise that was incubated by a large investment holding company in South Africa. One of the drivers of Harambee's success is the involvement of the holding company's subsidiaries in its partnerships.[359] More detail on the Harambee model and its outcomes are provided in the box below.

Harambee – pulling together to solve youth unemployment in South Africa

The Harambee Youth Employment Accelerator is a social enterprise that was incubated by Yellowwoods, an investment holding company with businesses across a number of sectors in South Africa and elsewhere. Harambee matches the skill demands of employers in South Africa with the enormous potential of unemployed young South Africans. It does this through a model which sources, screens and upskills young South Africans to take up jobs among Harambee's partner companies. In executing on this core model, Harambee has played a critical ecosystem steward role by convening, mediating, and motivating to action key stakeholders around specific blockages to youth employment in South Africa.

Harambee's core model involves a six step process, as depicted in the diagram and elaborated on below[360]:

Harambee engages in extensive **job profiling** among its more than 200 partner firms to understand what jobs are required and the skills and behavioural attributes of successful employees for these jobs. Harambee also **sources and screens** a large database of potential candidates who are locked out of formal employment and who have less than 1 year of work experience. The candidates are assessed using Harambee's own assessment instruments and **matched** to appropriate job opportunities given the candidates capabilities, preferences, and geographical location. Candidates are provided with **work seeker support** in the form of interview skills, opening email accounts, writing CVs, etc. Candidates are provided with **step-up and bridging** training to improve behavioural and basic competence for the work place. Candidates are then **placed into jobs** within Harambee's network of partner firms based on their capabilities and aspirations. Lastly, **retention** is supported through mentoring and coaching candidates and employers to support the candidate's integration and retention within the job.

Harambee's success is partly attributable to its innovative data-driven approach to executing this model. The organisation uses a cloud-based IT infrastructure to incorporate cost-effective data analytics and machine learning algorithms as the basis of its job matching service.[361] Its candidate sourcing and screening has created the largest and richest database on unemployed young people in South Africa, allowing for matching to be conducted on the basis of capabilities as well as geographic attributes that take informal and multi-transport

[358] Sonday (2014). Towards value generating capabilities for collaborative intermediary organisations
[359] Based on Stakeholder interviews conducted by Genesis Analytics, February-March 2019
[360] Altbeker (NY), *Harambee Employment Accelerator (Case Study from South Africa*
[361] Google Cloud (NY) *Harambee Youth Employment Accelerator: Solving the youth unemployment challenge*

routes into account. It includes predictions of behavioural metrics, such as which candidates are most likely to leave a job within the first year of employment.[362]

Another central driver of Harambee's success has been its ability to construct partnerships. The Harambee model depends specifically on partnership with the employing companies in its network. Having been incubated by a large investment holding company that directs a number of companies in South Africa, Harambee was able to show how its model unlocked value for these companies in order to get other companies to join the partnership. In addition, Harambee has built strong partnerships with the Department of Higher Education, Department of Monitoring and Evaluation, the National Youth Development Agency, and a number of provincial and local stakeholders to unlock resources and tackle specific issues acting as blockages to youth employment creation in specific sectors.[363]

Ecosystem stewards are an emerging organisational form. Measuring the impact of these organisations is simpler when their effects are direct (as with Harambee) though more complex if effects are indirect and less visible (as with the successful coordination of entities) The condition therefore considers the prevalence, importance and trajectory of stewards in key systems.

Supplementary data and empirics:

- A broad enterprise level survey assessing business awareness of relevant stewards that come into contact with their operation. This should be coupled with assessment of where stewards have been effective. Results should be publicised.

Access to global markets

South Africa have incentives, marketing and support structures that are crucial for export promotion. These channels allow South African capabilities to be signalled and marketed to the global market. While there is evidence of success, a gap remains in access for small scale enterprise and coordination amongst export promoting entities.

South Africa has an export promotion capability through its dedicated export promotion vehicles such as BrandSA and InvestSA. InvestSA is a division of the DTI and South Africa's national investment promotion agency which provides interested investors with information and support in accessing the South African market. The entity was recently recognised for its performance winning the global Investment Promotion Award at the 2019 Annual Investment Meeting and received an UNCTAD award of excellence in 2016[364]. InvestSA houses 'a one-stop shop' where information about sector-specific skill value propositions can be accessed and used for marketing SA capabilities to the global market. BrandSA is the official marketing agency tasked with developing and implementing a proactive marketing and communication strategy for South Africa. Its role is to create a positive, unified image of South Africa, promote

[362] Google Cloud (NY) *Harambee Youth Employment Accelerator: Solving the youth unemployment challenge*
[363] Wilson-Prangley and Ngosi (NY) *Urban Youth Unemployment – The case of Harambee, a Youth Employment Accelerator*
[364] South African Government (2019). – *Trade and Industry on Investment Promotion Award* – Online Media - South African Government

investment and tourism, and help new enterprises access foreign opportunities. However, BrandSA does not have a specific targeted marketing strategy for new and emerging industry capabilities, and there are very few official publications on South Africa's sector and skill value propositions that can be easily accessed.[365]This suggests there is room for improvement in coordination.

The DTI has been taking on a few of these roles and assisting businesses through the Export Marketing & Investment Assistance Scheme (EMIA). This scheme provides export marketing and investment assistance to businesses that develop export markets for South African products and services and recruit offshore opportunities to South Africa. It assists with the identification of new export markets through market research and helps companies strengthen their competitive advantage by supporting patent registrations, quality marks and product marks.[366]

Accessing the global market for businesses is supported by the DTI through international investment missions and facilitation by DTI representatives stationed world-wide. The DTI together with industry and businesses, facilitates joint marketing trips to investor countries. The goal of these marketing trips is to allow South African companies to meet analysts, consultants, advisors and business executives from destination countries and outsourcing vendors. During these visits businesses get to exhibit their offerings at tech expos and conference events and promote South Africa as a competitive offshoring destination.[367] Another marketing channel available to businesses are the relationship brokers who facilitate connections between South African businesses and potential customers in specific markets, such as the business process outsourcing industry.

Access to these marketing channels is limited for smaller players who lack awareness of these services or the capital to pay for such connections. However, the DTI compensates businesses for costs incurred recruiting in new FDI into South Africa.[368] This contributes to broadening access and may facilitate the growth of emerging firms. In order to scale these initiatives the DTI would have to increase its capacity to support emerging industries as well those that might emerge in the future.

There are some pockets of coordination and marketing excellence outside of InvestSA. Cape Town is the largest outsourcing destination in South Africa and is currently ranked 21st in the world by the Financial Times for its investment promotion brand strategy.[369] This achievement has been largely attributed to the Invest in Cape Town Strategy that identifies opportunities for businesses and provides information on eight high-growth sectors of the

[365] Genesis Analytics Team Analysis 2019
[366] DTI (2019) Trade, Exports & Investment
[367] DTI (2019) Trade, Exports & Investment
[368] DTI (2019) Export Marketing and Investment Assistance
[369] CFO South Africa (2017)

economy for investment.[370] This makes business decision making easier and has seen a number of companies setting up their headquarters in Cape Town.[371]

Access to global markets is evaluated in terms of the presence and perceived effectiveness of coordinating and dedicated entities. The direct economic impact of export and investment promotion is difficult to estimate and divorce from trends.

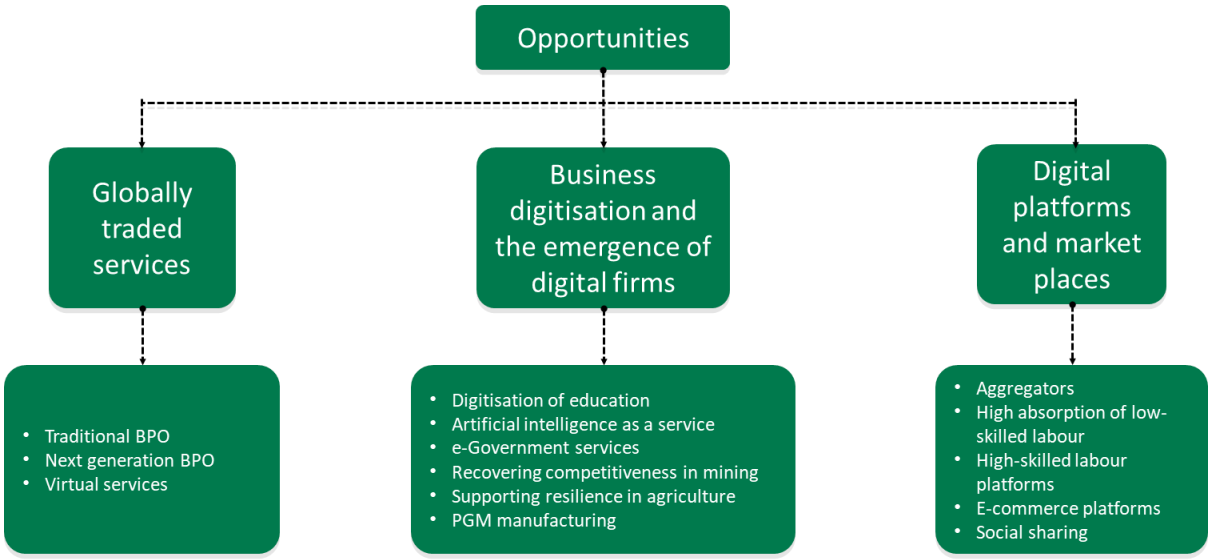
Supplementary data and empirics:

- A targeted survey of firms to which South Africa exports and firms recently invested in SA to determine the role export and investment promoting agencies played in the decision.

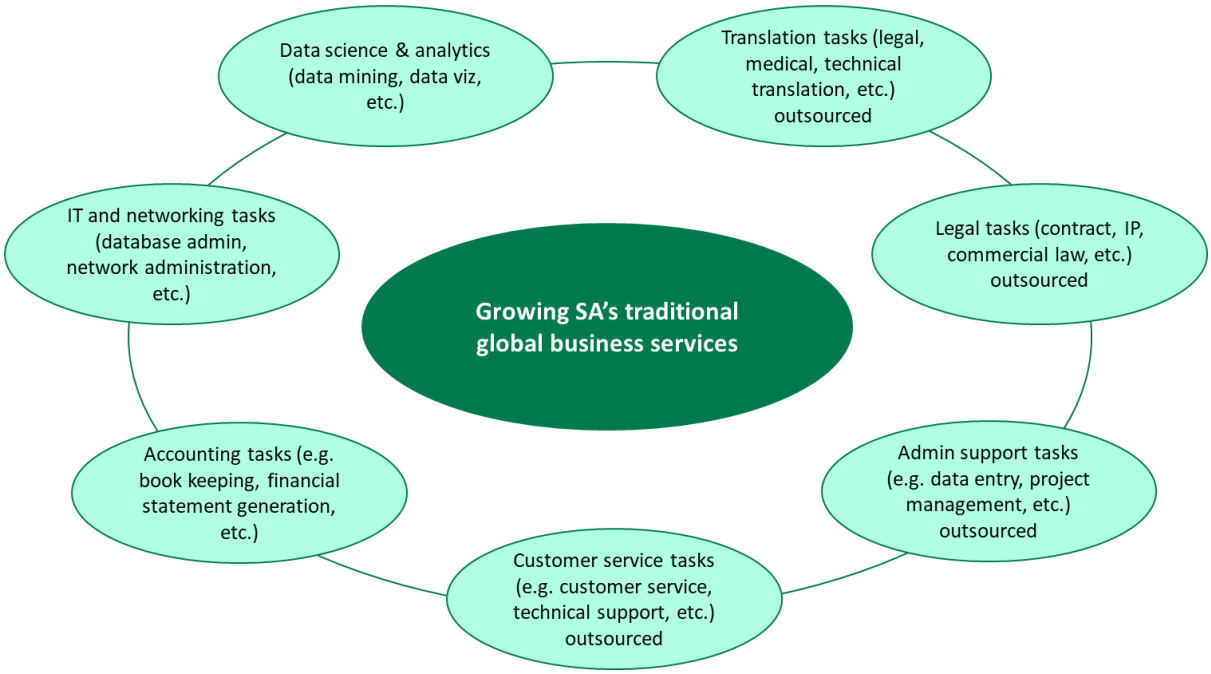
[370] City of Cape Town (2018)-Invest in Cape Town
[371] City of Cape Town (2018)-Invest in Cape Town

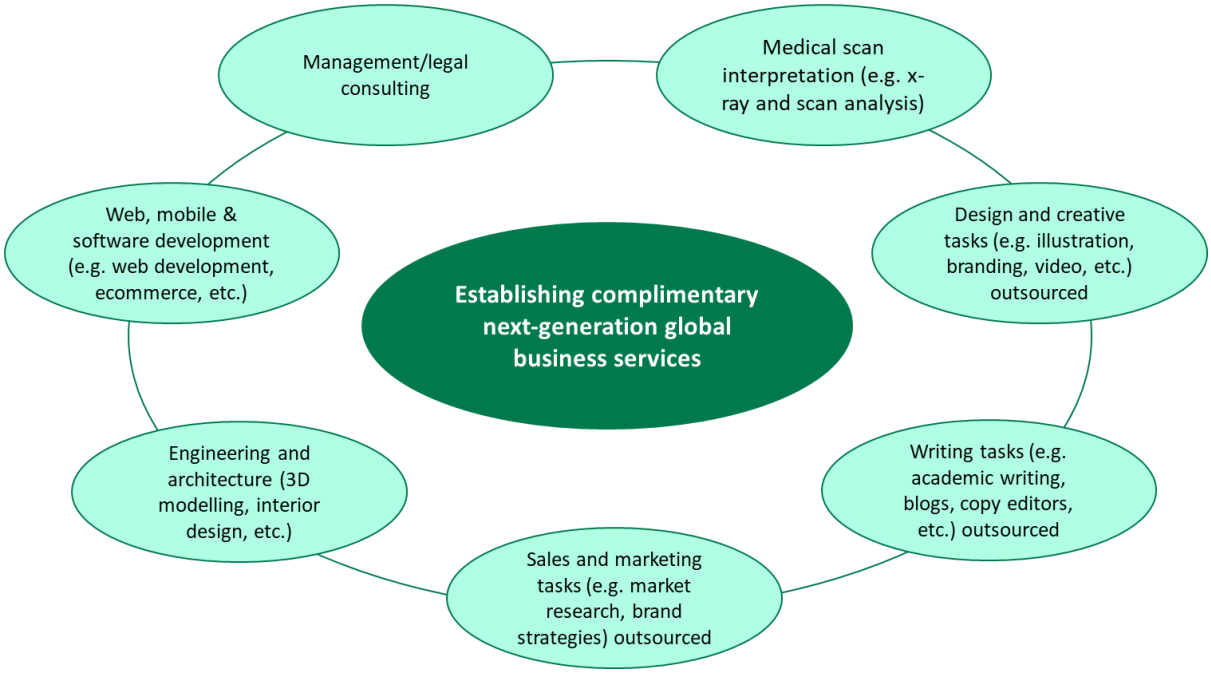
Alternative Opportunities

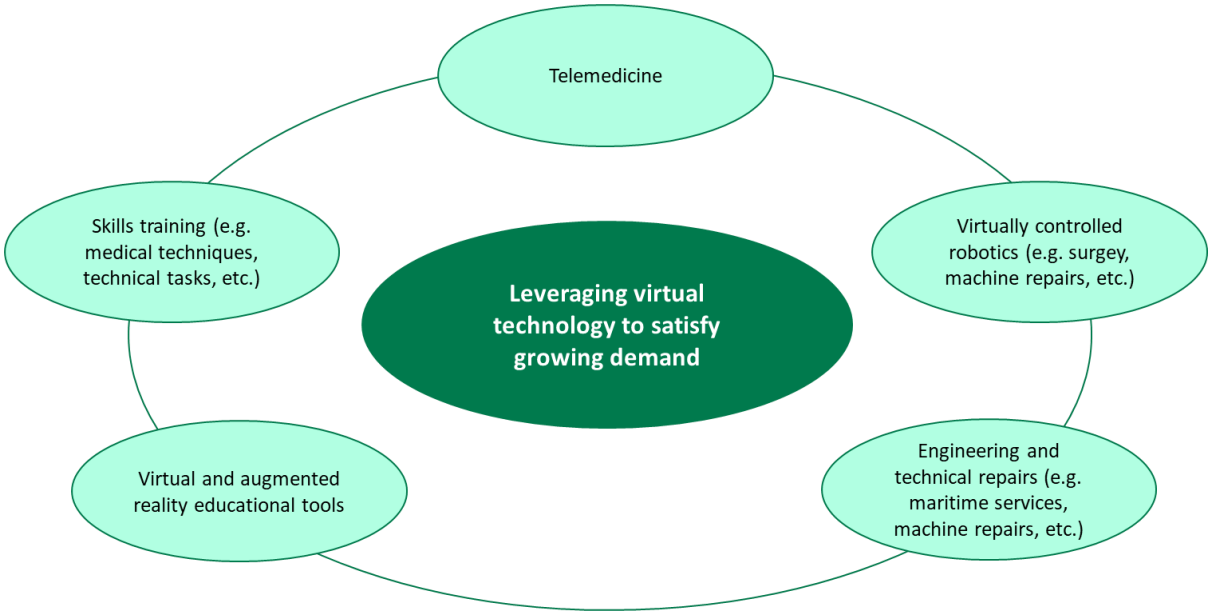
A host of alternative opportunities not contained in the opportunity zones were identified. These were not included as they either did not meet the employment creating criteria of an opportunity, shared characteristics and dynamics with other opportunities, or are embedded in the current opportunity zones. The full set of opportunities and the motivation behind not including some of them are summarised below:



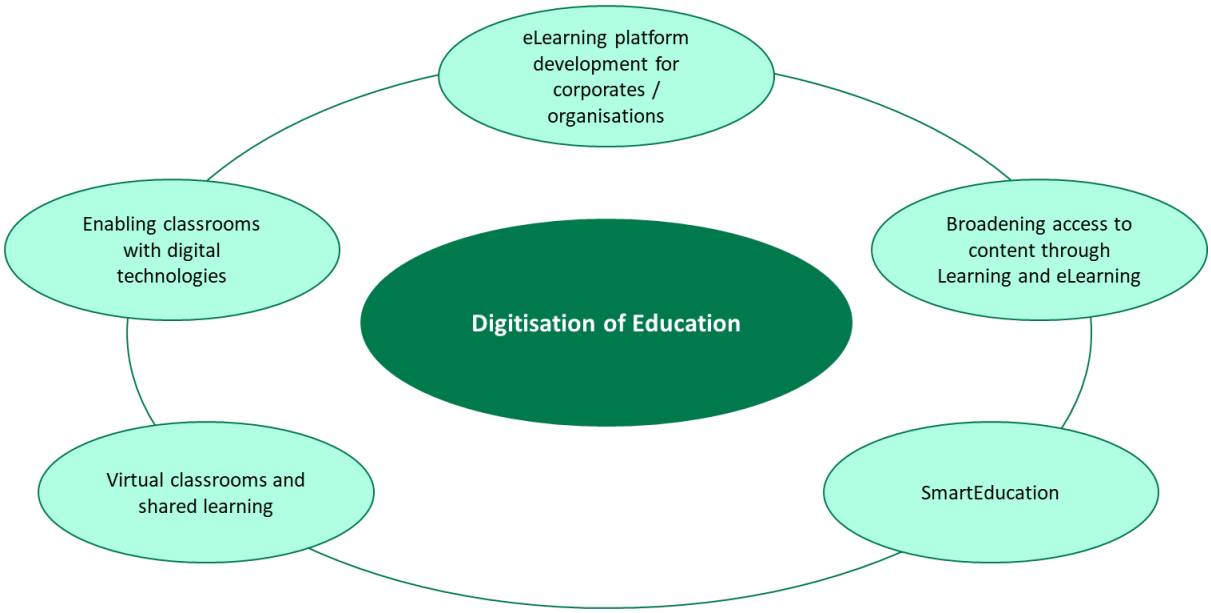
Globally traded services

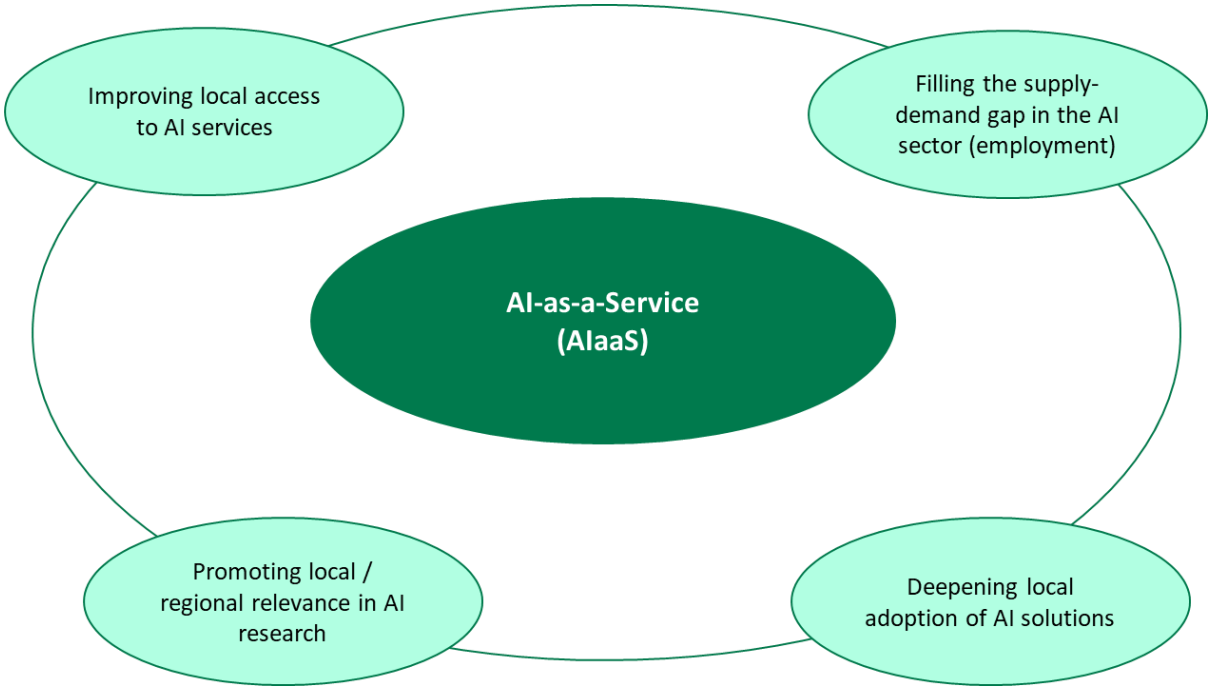


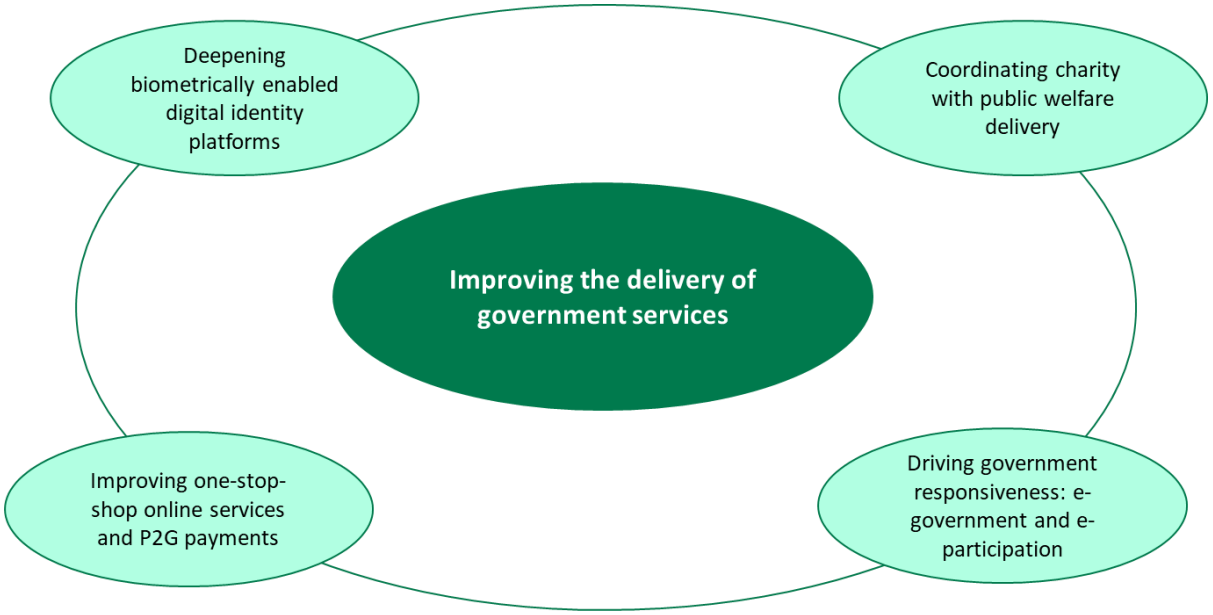

Management/legal consulting
Medical scan interpretation (e.g. x-ray and scan analysis)
Web, mobile & software development (e.g. web development, ecommerce, etc.)
Design and creative tasks (e.g. illustration, branding, video, etc.) outsourced
Establishing complimentary next-generation global business services
Engineering and architecture (3D modelling, interior design, etc.)
Writing tasks (e.g. academic writing, blogs, copy editors, etc.) outsourced
Sales and marketing tasks (e.g. market research, brand strategies) outsourced

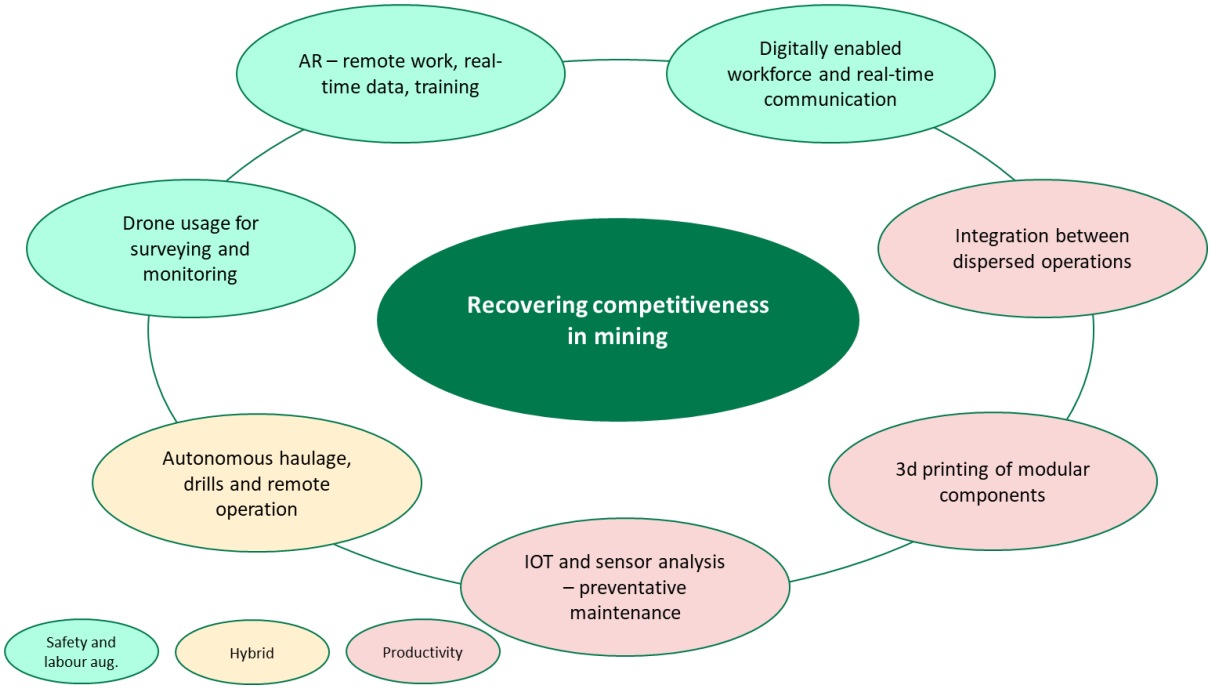

Telemedicine
Skills training (e.g. medical techniques, technical tasks, etc.)
Virtually controlled robotics (e.g. surgey, machine repairs, etc.)
Leveraging virtual technology to satisfy growing demand
Virtual and augmented reality educational tools
Engineering and technical repairs (e.g. maritime services, machine repairs, etc.)

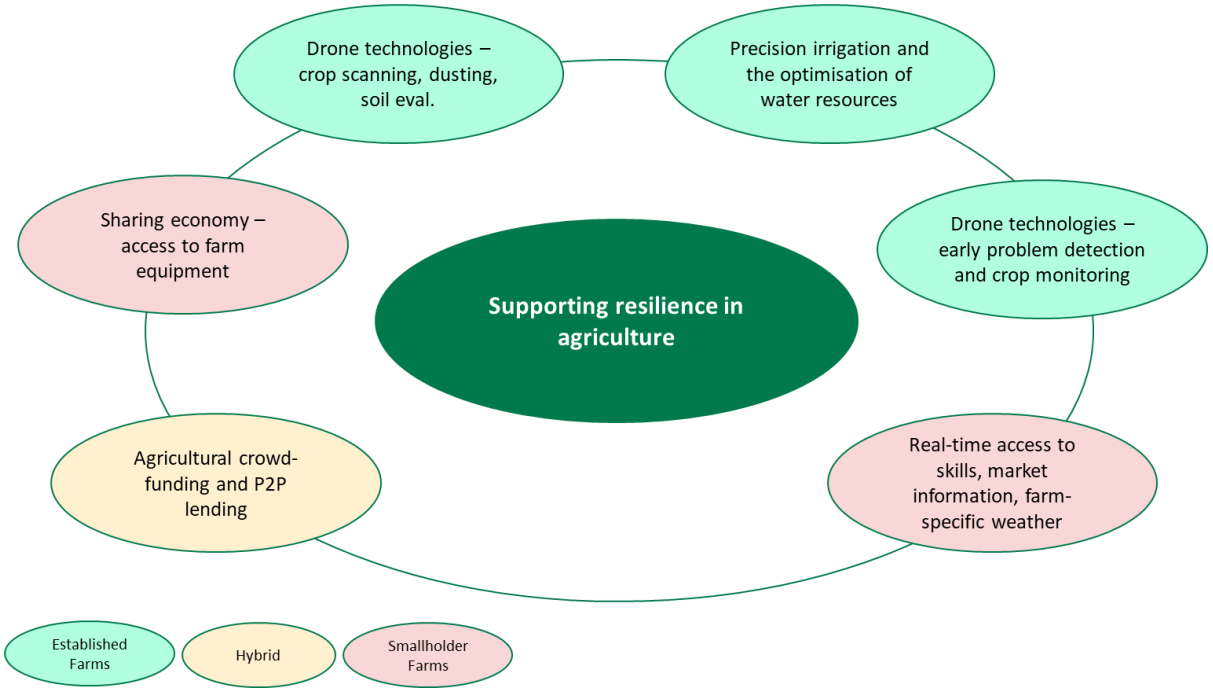
Business digitisation

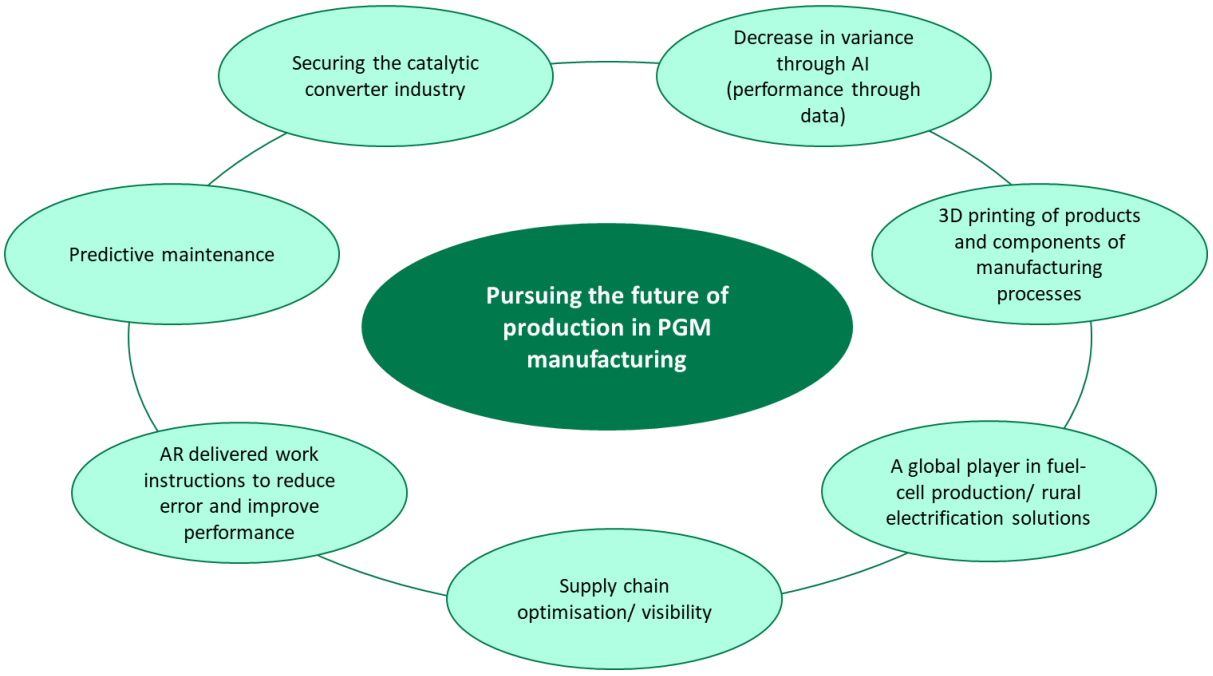




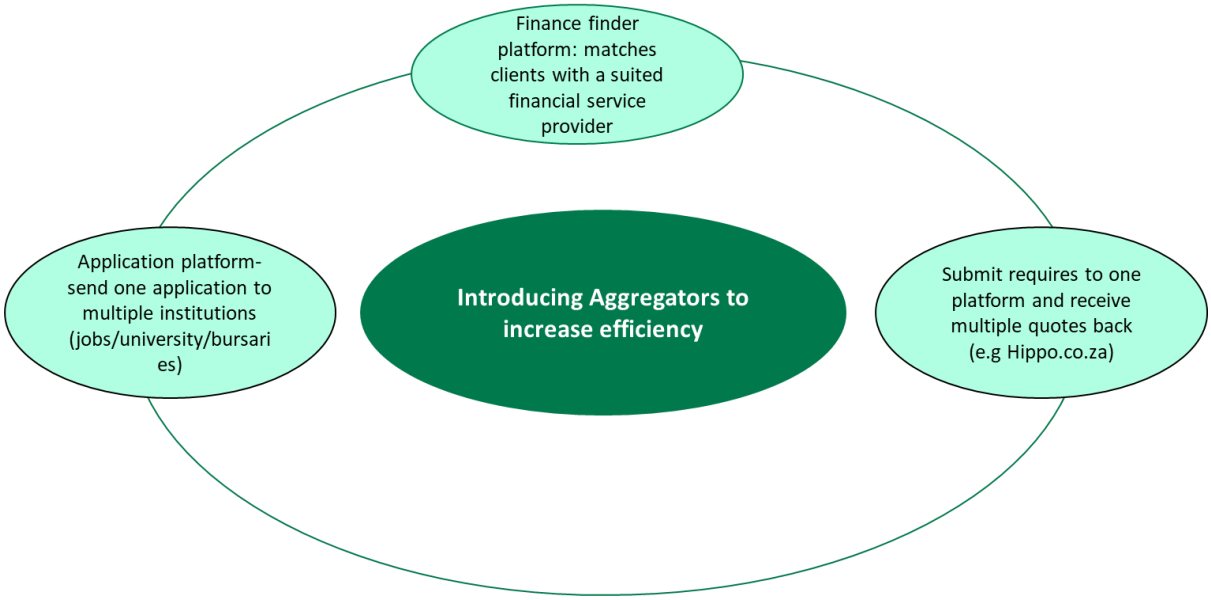

Deepening biometrically enabled digital identity platforms
Coordinating charity with public welfare delivery
Improving the delivery of government services
Improving one-stop-shop online services and P2G payments
Driving government responsiveness: e-government and e-participation

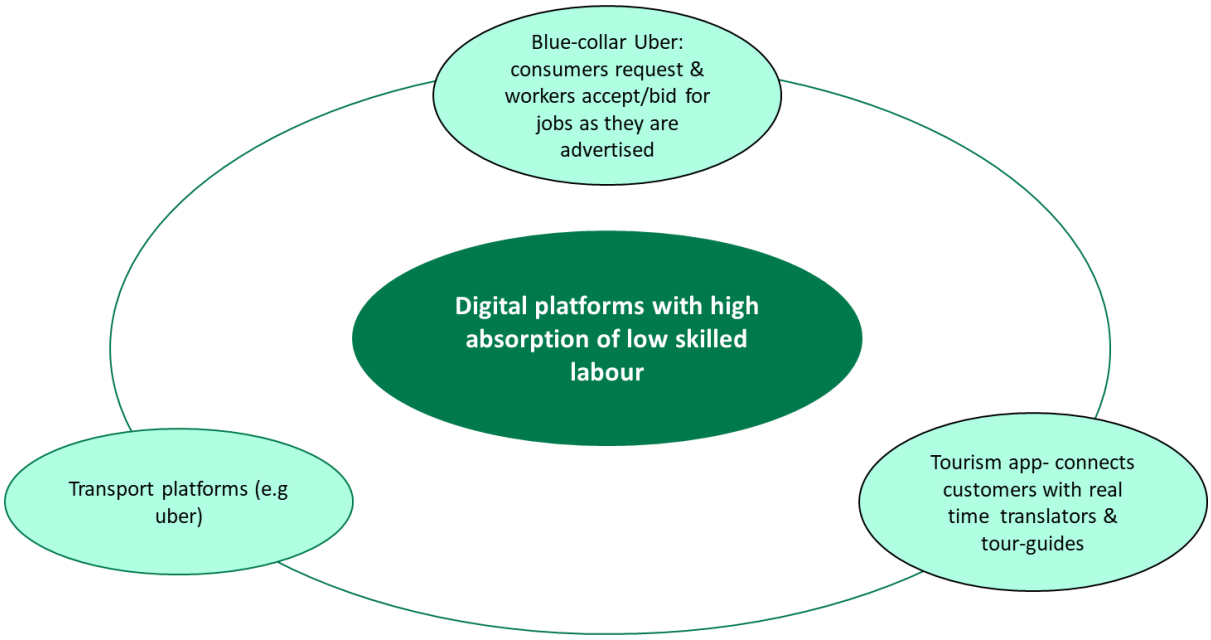

AR – remote work, real-time data, training
Digitally enabled workforce and real-time communication
Drone usage for surveying and monitoring
Integration between dispersed operations
Recovering competitiveness in mining
Autonomous haulage, drills and remote operation
3d printing of modular components
IOT and sensor analysis – preventative maintenance
Safety and labour aug.
Hybrid
Productivity

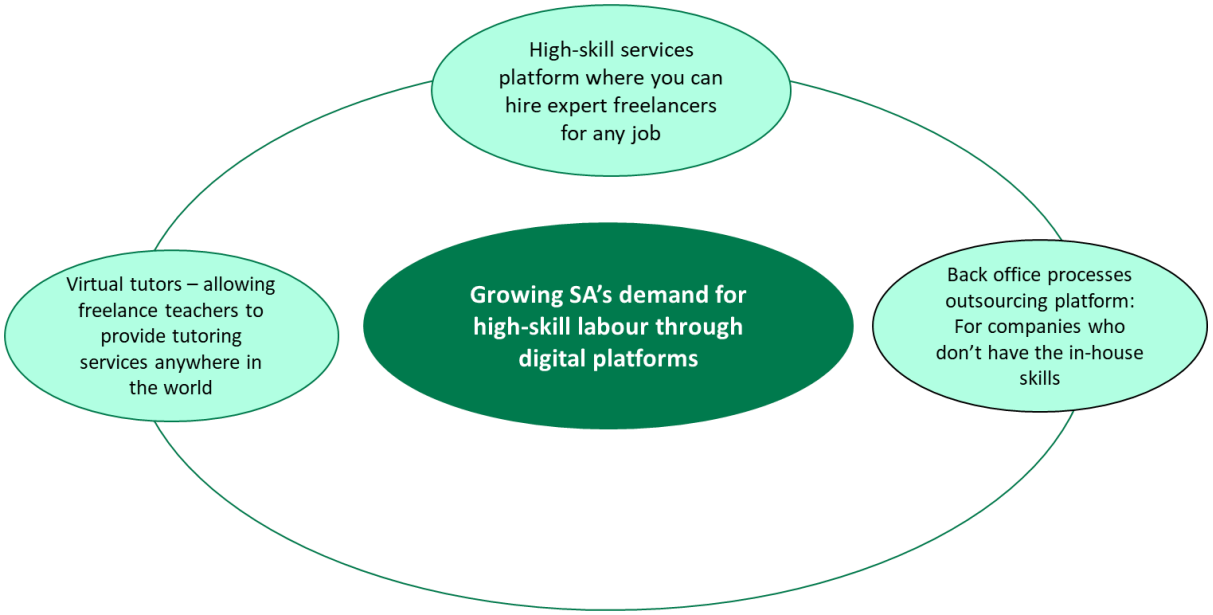

Drone technologies – crop scanning, dusting, soil eval.
Precision irrigation and the optimisation of water resources
Sharing economy – access to farm equipment
Supporting resilience in agriculture
Drone technologies – early problem detection and crop monitoring
Agricultural crowd-funding and P2P lending
Real-time access to skills, market information, farm-specific weather
Established Farms
Hybrid
Smallholder Farms

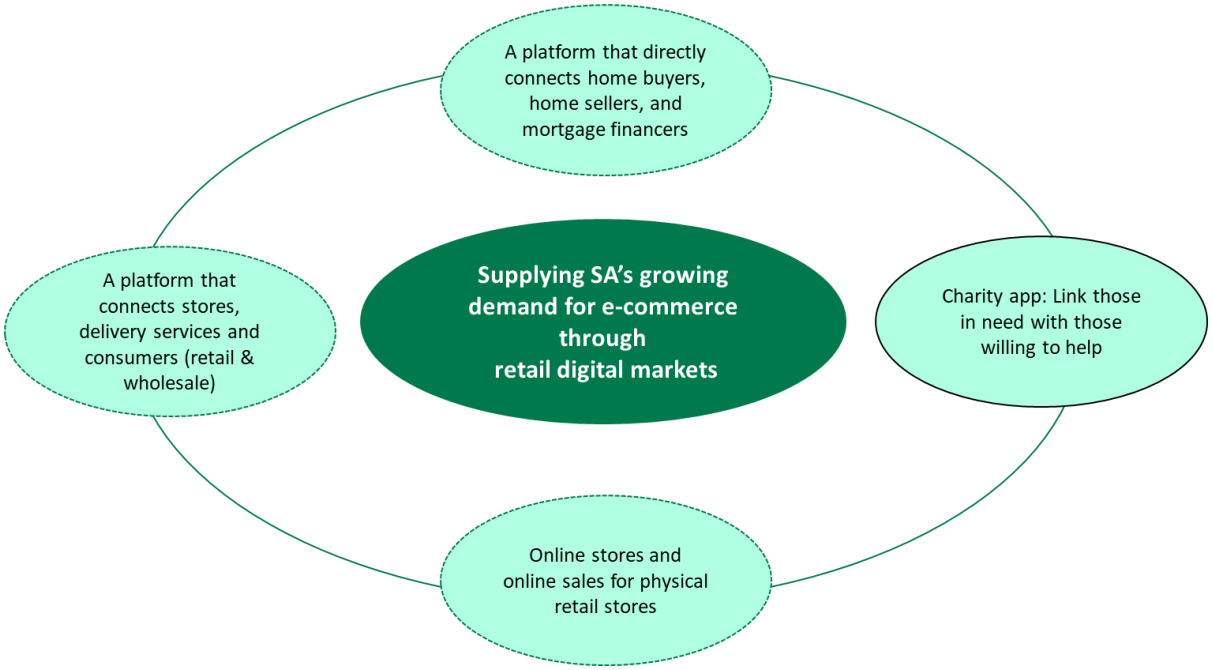

Securing the catalytic converter industry
Decrease in variance through AI (performance through data)
Predictive maintenance
Pursuing the future of production in PGM manufacturing
3D printing of products and components of manufacturing processes
AR delivered work instructions to reduce error and improve performance
A global player in fuel-cell production/ rural electrification solutions
Supply chain optimisation/ visibility

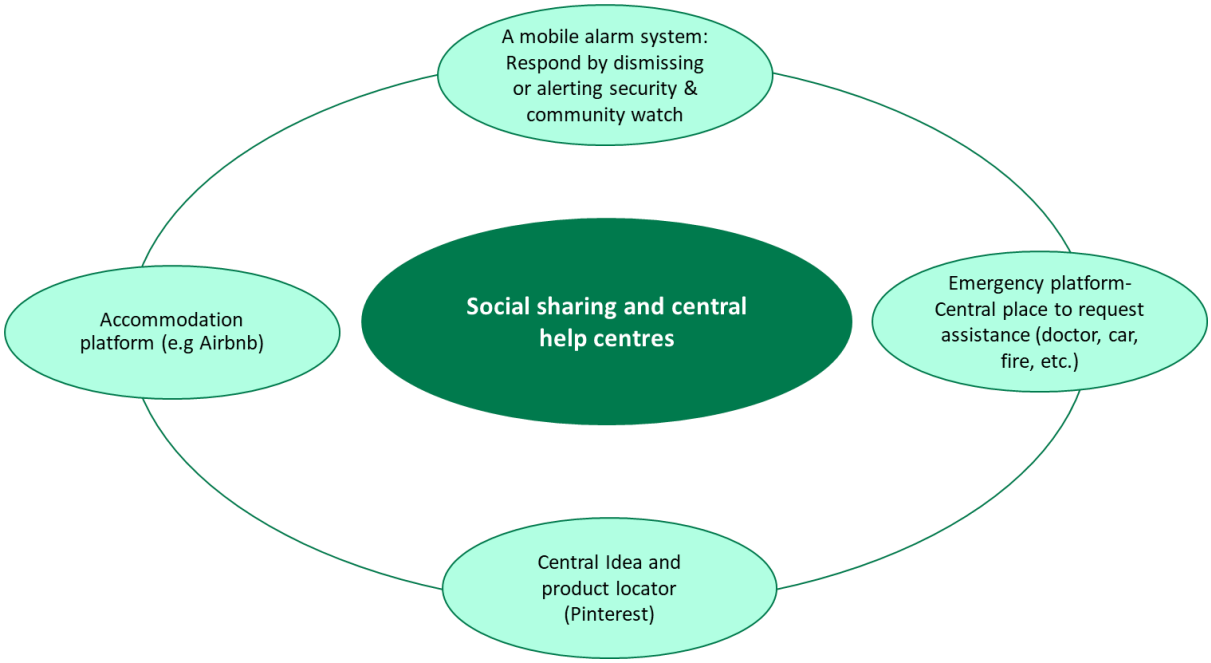
Digital platforms






High-skill services platform where you can hire expert freelancers for any job
Virtual tutors – allowing freelance teachers to provide tutoring services anywhere in the world
Growing SA's demand for high-skill labour through digital platforms
Back office processes outsourcing platform: For companies who don't have the in-house skills


A platform that directly connects home buyers, home sellers, and mortgage financers
A platform that connects stores, delivery services and consumers (retail & wholesale)
Supplying SA's growing demand for e-commerce through retail digital markets
Charity app: Link those in need with those willing to help
Online stores and online sales for physical retail stores



- ***Improving educational outcomes through digital content delivery*** – employment effects are limited while education is better characterised as a core system upon which other opportunities rest. Digitisation of entities is captured within the frontier tech opportunity zone.
- ***Improving the delivery of government services*** – the primary gains are efficiency and service delivery. The levers of change are limited while the means of change captured in the frontier tech opportunity zone.
- ***Supporting resilience in agriculture and growth of smallholder farmers***– the primary sources of employment growth in the agricultural sector are through providing small-holder farmers with access to supply chains and improving the productivity of small-holder farmers. The prior is reflected in the digital platforms opportunity and the latter largely matter of access to information that can improve productivity, again captured in the digital platforms opportunity. The use of frontier technologies to improve resilience to changing weather conditions is reflected in the frontier tech opportunity zone.
- ***Pursuing the future of production in PGM manufacturing*** – the sector is capital intensive and therefore offers limited employment opportunity. The dynamics of achieving this are captured in the frontier technology hub opportunity zone.
- ***Social sharing and central help facilities*** – these are similar in nature to digital platforms that deliver knowledge-based services.
- ***Solving the shortage of healthcare practitioners through remote diagnostics*** – the use of technology for remote diagnostics can broaden public access outside of cities, improve the quality of services offered and reduce congestion at top tier facilities. However, this comes with limited direct employment gains with the mechanisms largely captured in the current opportunity zones.

- ***Improving the distribution of medication along the medical supply chain*** – effective supply chain management with predictive capabilities at the distribution-point level can improve consumer access to medication and avoid shortages. However, employment creation is limited, the mechanisms are largely captured in the current opportunity zones and there is ongoing efforts to improve operation of these supply chains through technology.