**DIGITAL
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DIAGNOSTIC
BOTSWANA

#DE4A
**Digital Economy
for Africa Initiative**

DIGITAL ECONOMY DIAGNOSTIC

BOTSWANA

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About The DE4A Diagnostic Process In BOTSWANA

Rapid digital transformation is re-shaping our global economy, permeating virtually every sector and aspect of daily life, changing the way we learn, work, trade, socialize, and access public and private services and information. The Digital Economy for Africa (DE4A) initiative forms part of the World Bank Group's support for the African Union's Digital Moonshot for Africa, which aspires to see every African individual, business and government digitally enabled by 2030.

The DE4A initiative is underpinned by five principles:

1. **Comprehensive** ecosystem approach that defies siloes and looks at supply and demand

2. **Transformative** ambition recognizing the need to move beyond incremental progress

3. **Inclusive** approach ensuring the digital economy is for everyone

4. **Home-grown** and anchored in the local context, supporting African digital content and solutions

5. **Collaborative** encouraging partnerships among countries and sectors, including public and private

Five foundational pillars form the digital economy:

DIGITAL ECONOMY FOUNDATION / PILLARS

APPLICATIONS LIKELY TO DEVELOP ONCE THE FOUNDATIONAL ELEMENTS ARE IN PLACE
- Govtech applications
- eCommerce
- Open Banking: non-banks offer tailored services
- DATA LOCKERS to access selected services

USAGE

DIGITAL PLATFORMS

DIGITAL SKILLS & LITERACY

DIGITAL BUSINESSES

DIGITAL FINANCIAL SERVICES

DIGITAL INFRASTRUCTURE

CROSS-CUTTING AREAS
- Strong regulatory frameworks to foster competition and MDF agenda
- Manage risks: data privacy, cyber security
- Opportunitiey to empower women to FCV

Digital infrastructure provides the means for people, businesses, and governments to get online, and link with local and global digital services. High-quality and affordable internet is a critical foundational component of the digital economy.

Digital platforms offer products and services, accessible through digital channels, such as mobile devices and computers. Governments operate platforms to offer public services and share information.

Digital financial services (DFS) enable individuals and businesses to conduct transactions electronically, for example digital payments, including credit, savings, and insurance.

Digital businesses help bring the digital economy to life by spurring growth-oriented ventures, products, and services that leverage technology. Digital entrepreneurship contributes to net employment growth and helps to enhance competitiveness and productivity.

Digital Skills ensure countries have a digitally savvy workforce to build robust digital economies and competitive markets, and to enable individuals to access digital services and information efficiently and safely.

In addition, several cross-cutting themes are foundational for the institutional and policy environment. For example, strong leadership, legal and regulatory challenges, such as consumer and data protection, taxation, and competition.

As part of the DE4A initiative, targets have been established for the foundational pillars, as a way to define and measure success against the goal of ensuring that every individual, business, and government is digitally enabled by 2030.

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4IR	Fourth Industrial Revolution	**GDS**	Government Digital Services, United Kingdom
A4AI	Alliance for Affordable Internet	**GoB**	Government of Botswana
ADSL	Asymmetric Digital Subscriber Line	**GSMA**	Global System for Mobile Association
API	Application Programming Interface	**ID**	Identification
ASER	Annual Status of Education Report	**ISP**	Internet Service Provider
AU	African Union	**ITU**	International Telecommunication Union
BAB	Bankers Association of Botswana	**IXP**	Internet Exchange Point
BACH	Botswana Automated Clearing House	**KYC**	Know-Your-Customer
BIF	Botswana Innovation Fund	**LEA**	Local Enterprise Authority
BIH	Botswana Innovation Hub	**Mbps**	Megabit Per Second
BINX	Botswana Internet Exchange	**MDAs**	Ministries, Departments, and Agencies
BISS	Botswana Interbank Settlement System	**MITI**	Ministry of Investment, Trade and Industry
BITC	Botswana Investment & Trade Centre	**MoBE**	Ministry of Basic Education
BoB	Bank of Botswana	**MTC**	Ministry of Transport and Communications
BOCRA	Botswana Communications Regulatory Authority	**NBS**	National Broadband Strategy
BoFiNet	Botswana Fiber Networks	**NFP**	Network Facilities Providers
BTC	Botswana Telecommunications	**PCI**	Payment Card Industry
BURS	Botswana Unified Revenue Services	**PPADB**	Public Procurement and Asset Disposal Board
CIRT	Computer Incidence Response Team	**SEZA**	Special Economic Zones Authority
DE4A	Digital Economy for Africa	**SOE**	State Owned Enterprises
DFS	Digital Financial Services	**SSA**	Sub-Saharan Africa
DPSM	Directorate of Public Sector Management	**TVET**	Technical and Vocational Education and Training
DSS	Decision Support System	**UASF**	Universal Access and Service Fund
EASSy	Eastern Africa Submarine System	**UN**	United Nations
EFT	Electronic Funds Transfer	**UNCTAD**	United Nations Conference on Trade and Development
ERTP	Economic Recovery and Transformation Plan	**WACS**	West African Cable System
GB	Gigabytes	**WBG**	World Bank Group
Gbps	Gigabit per second		
GDP	Gross Domestic Product		

Acknowledgements

Executive Summary

Digital technologies are paving the way for economic growth and new service delivery models across Africa. This holds true for Botswana as well, where digitalization has been placed at the forefront of national development, not least in the wake of the COVID-19 pandemic. Digital transformation is seen as critical in preparing Botswana for the Fourth Industrial Revolution (4IR) and accelerating its journey towards achieving high-income country status. In the shorter-term, digital is viewed as an enabler to diversify a mineral dependent economy, as well as supporting post-pandemic economic recovery.

Such aspirations place Botswana among the African countries raising the bar for digital transformation and driving progress towards the African Union's (AU) goal of seeing every African individual, business and government digitally enabled by 2030. The AU's goal reflects a growing recognition of the role digital technologies play in economic growth and inclusion and is aligned with the World Bank's twin goals of ending extreme poverty and promoting shared prosperity.

On key digital indicators, Botswana fares similarly or better than regional neighbors, but is lagging behind global peers with the same income levels, illustrating the potential to enhance performance. Botswana's landlocked geography and small, dispersed population creates high structural barriers, which must be overcome to actualize opportunities in the digital economy. These constraints are not unsurmountable but require creative responses and engagement from all public and private sector stakeholders. To support this process the DE4A diagnostic provides a snapshot of the state of the digital economy in Botswana and actionable recommendations.

The digital economy in Botswana rests on several relatively strong individual strategies, policies and regulations. However, when combined, these form a somewhat fragmented framework – further challenged by oftentimes slow implementation. SmartBots, a digital strategy from 2020 is designed to alleviate these bottlenecks through a whole-of-government approach, and an ambitious action plan aimed to prepare Botswana for the Fourth Industrial Revolution (4IR). If implemented successfully Botswana could become a digital leader. However, previous attempts to boost digital transformation highlight the challenges at hand.

This DE4A report considers the digital economy's five foundational pillars, as well as cross-cutting issues. The following summarizes pillar status and recommendations for addressing challenges.

Infrastructure: While two thirds of Botswana's population are within reach of a mobile broadband network, mobile broadband adoption remains relatively low (43 percent). Furthermore, the quality of connectivity offered is often only suitable for basic applications. Several factors are driving this usage gap: the affordability of services and devices, the relevance of digital content and the skills required to use services; these are further compounded by structural constraints to the broadband value chain. A national backbone network connects cities, major towns and villages. However, network gaps connecting rural villages and localities continue to exist across Botswana's large landmass. In addition, Botswana's landlocked status means that it depends on neighbors for access to undersea cable capacity. The related transit costs are passed on to consumers who end up paying relatively high broadband prices. Although Botswana has developed a well-articulated National Broadband Strategy to address constraints to the growth of its digital infrastructure, it has so far lacked adequate coordination and implementation mechanisms.

Digital Platforms: Despite several well-articulated e-government strategies, the general level of implementation of public digital platforms has been relatively low. Botswana has started digitizing internal public processes and external services, although many platforms are used for back-office purposes and emulate the manual processes they are replacing, and in some instances still include paper-based steps. As a result, there is a widening gap between the expectations and realities of citizens and businesses for modernized and accessible digital government services. However, a new public site has recently been launched organizing and expanding public e-services. Access is both available via a mobile app and in public facilities to accommodate unconnected citizens. Key challenges across public platforms include lack of an overarching enterprise architecture guiding services, limited interoperability across platforms and applications, lack of a digital ID system, and weak implementation of data protection standards.

Digital Financial Services (DFS): Botswana has made significant strides laying the foundational financial infrastructure to support the evolution of DFS. Approximately 42 percent of adults reported having made or received a digital payment in the previous 12 months (2017), which is ahead of the regional average (34 percent) and comparator countries like Lesotho (38 percent) and Malawi (28 percent). Digital payments are driving the growth of DFS through digital banking solutions, card-based transactions and mobile wallet transfers. To meet the growing demand, banks and other DFS providers are ramping up investments in digital channels, and novel solutions are emerging. However, the regulatory environment still favors commercial banks over other financial service providers, and the lack of interoperability between payment instruments hampers both DFS development and the general efficiency and convenience of financial services. Know-Your-Customer (KYC) requirements also pose a challenge, with limited ability for providers to control and validate customer data during enrollment.

Digital Business: Alongside established digital businesses, Botswana is home to a growing number of digital startups and boasts an active entrepreneurship ecosystem compared to African peers. In contrast, few multinational technology companies have a presence in Botswana. These types of companies have served as anchors in digital business ecosystems in other African countries. However, companies such as Orange, Nashua, and Stanbic Bank have signaled interest in deepening support to emerging digital startups, and are hence supporting the ecosystem. At the political level digital business is a government priority, which is reflected in the National Entrepreneurship Policy, and an e-commerce strategy which emphasizes digitization of small and medium enterprises. Despite a small market size, the ecosystem is characterized by various entrepreneurship support programs making it vibrant but also fragmented. Critical initiatives are underway to address ecosystem gaps, including the formation of angel networks, and the Botswana Innovation Hub (BIH) and its associated fund. Use of private platforms, in such areas as ridesharing, tourism, and e-commerce, is becoming increasingly prevalent in Botswana partly driven by COVID-19 lockdown measures.

Digital skills: While Botswana has various education and training policies designed to support digital skills development and ICT in education, they are not anchored in an integrated and comprehensive policy framework. This has resulted in education and training institutions working in oftentimes siloed approaches to prepare and deliver digital skills in education programs. Especially at the primary level, many programs teach a narrow range of digital skills, and face delivery challenges due to missing or intermittent connectivity in schools. As a result, a significant proportion of Botswana's children and youth lack the range of digital skills required to flourish in an increasingly digitized society. Several initiatives are underway to enhance school connectivity and improve digital skill programs across the country. For more advanced skills there is a range of university programs and rapid ICT skilling programs in Botswana, including a growing number of private providers and corporate partnerships.

Suggested priority areas for action: Based on the findings of the DE4A report, five cross-cutting areas are especially important to drive digital transformation in Botswana. Addressing these would strengthen Botswana's ability to navigate and address the aforementioned digital economy challenges.

Priority 1:

Close access gaps: The SmartBots strategy calls for leapfrogging towards 4IR while at the same time leaving no-one behind. This dual strategy requires a delicate balance prioritizing, and importantly – funding, the core enabling parts of the digital economy, while at the same time launching advanced projects and technologies. Access to high-speed broadband connectivity is limited and remains the most important foundational element in achieving a dynamic digital economy. Increasing broadband penetration should be of the highest priority and will likely require rethinking previous approaches, including finding novel ways to tackle the urban-rural divide and the digital gender gap.

Priority 2:

Make digitization worthwhile: Adoption of broadband internet is not only linked to access drivers but equally to the perceived value of digital use cases. The report shows that adequate supply of local and relevant content to drive adoption and useful digital consumption is a key bottleneck in Botswana. Changing this requires concerted efforts to support quality content development and delivery across sectors, including public e-services, e-commerce, digital financial services, and digital health and education. It also requires sufficient local digital infrastructure, for example data centers and Internet Exchange Points (IXPs).

Priority 3:

Improve the enabling environment: Despite the headway already made in Botswana's digital ecosystem, diverging institutional interests, and limited resources and specialized skills have hindered efficient implementation of previous strategies. GoB is encouraged to address regulatory siloes and incentivize diverse public and private institutions in service delivery. As part of this work different digital enablers need to be implemented. Botswana has acknowledged the critical role of digital ID, data protection and cybersecurity through various assessments and policies, including a data protection act and cybersecurity strategy. However, implementation of these plans has been slow: there is a need to impel these enablers to drive wider and safer adoption of digital technologies.

Priority 4:

Leverage private sector resources: Botswana started its digital journey with successful liberalization. In recent years the role of the private sector has, however, not always been leveraged to its full potential. With the high digital ambitions, as well as severe structural barriers in mind, the resources and capacity of all stakeholders need to be deployed. The report points to a number of practical ways to engage the private sector and support their enabling environment, including last-mile incentives to enable affordable coverage, more efficient infrastructure sharing schemes, and creating a clear and predictable division of labour between, for example, state owned enterprises and private telecom companies - leveraging their comparative strengths.

Priority 5:

Look abroad to overcome geographic barriers: Botswana's geographic reality and small domestic market highlights the need for regional and international integration. Economies of scale and network effects offered by a larger regional market would both develop the local market and equip Botswana to compete in the broader regional and global digital economies. Integration could take several forms, be it through enhanced sea cable agreements, supporting regional digital development through SACU or SADC,[1] exposing entrepreneurs to regional markets and investment opportunities, or by establishing and linking a National Research and Education Network (NREN) with regional RENs.

The report includes more detailed recommendations across the five pillars of the digital economy. Table 1 summarizes these recommendations. Full recommendations are included in each chapter.

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[1] Southern African Customs Union and Southern Africa Development Community

TABLE 1 Phased recommendations in summary form

	POLICY AND INSTITUTIONS
Short-term	**R1:** Strengthen monitoring mechanisms and results-based incentives to expedite regulatory enforcement. **R2:** Strengthen public digital trust by implementing the Data Protection Act and Cybersecurity Strategy.
Medium-term	**R3:** Institutionalize SmartBots in a way that strengthens capacity and cross-government support. **R4:** Adopt an agile regulatory approach to counter-balance rapid technological development.
	DIGITAL INFRASTRUCTURE
Short-term	**R1:** Reform UASF for efficient and effective program delivery and consider supplementary mechanisms. **R2:** Incentivize private sector deployment of networks, particularly in rural areas by creating bulk purchase agreements.
Medium-term	**R3:** Strengthen price and quality of whole-sale services through increased private sector participation. **R4:** Reduce the price of international traffic by route-diversity and expediting international connectivity partnerships. **R5:** Enhance supporting infrastructure through enabling policies to strengthen broadband value chain. **R6:** Develop secondary spectrum trading markets to optimize spectrum usage.
	DIGITAL PUBLIC PLATFORMS
Short-term	**R1:** Design and adopt enterprise architecture principles to guide cross-government digital projects. **R2:** Develop a centre of excellence to support MDAs and enable skill development. **R3:** Prioritize sequence of digitization without skipping steps. **R4:** Strengthen cross-cutting enablers to improve interoperability, prioritizing digital ID.
Medium-term	**R5:** Modernize the existing public platforms to become service delivery oriented and user centric. **R6:** Integrate citizen and business engagement mechanisms in public platforms to improve service delivery and feedback.
	DIGITAL FINANCIAL SERVICES
Short-term	**R1**: Develop national identity that is accessible to financial services and mobile operators through digital means (APIs). **R2**: Establish an MoU between Botswana Communications Regulatory Authority (BOCRA) and Bank of Botswana (BoB) to address and formalize inter-institutional cooperation.
Medium-term	**R3**: Promote the expansion of the number of public services that could be paid for online through a payment gateway, including tax collection.
Longer-term	**R4**: Improve DFS interoperability by ensuring an open and transparent consultative process. **R5**: Review and amend the National Payment System (NPS) Act to widen access to the payment system and ensure consistency in regulating payment service providers and strengthening regulatory capacity of BOB in DFS. **R6:** Create a regulatory sandbox for fintech to stimulate innovation and promote use of DFS products.
	DIGITAL BUSINESS
Short-term	**R1:** Harmonize government initiatives to strengthen the enabling environment for digital businesses. **R2:** Strengthen the GoB's investment into the BIH and BIF to ensure that it is in line with SmartBots' objectives. **R3:** Support the development of the Botswana Startup Network to reduce ecosystem fragmentation and tap into financial and non-financial ecosystem resources in the national and regional ecosystem.
Medium-term	**R4:** Increase the quality of support provided to entrepreneurs through capacity building. **R5:** Improve market access for Digital Businesses by promoting public procurement opportunities for digital businesses through targeted support, access to data and reducing barriers to public tenders.
Longer-term	**R6:** Launch a study on early-stage finance in Botswana to inform public incentives that attract venture capital, private equity, and angel investments into growth and expansion stage digital businesses.
	DIGITAL SKILLS
Short-term	**R1:** Establish a Policy framework for digital skills development and ICT in education. **R2:** Enhance understanding of the nature of demand for digital skills.
Medium-term	**R3:** Prepare a comprehensive digital skills curriculum and teachers training programs for primary, secondary education and TVET institutions. **R4:** Ensure all learning institutions at the secondary (junior and senior) and tertiary education levels, including those in the rural areas, are connected and equipped and ready to deliver digital skill curriculum.
Longer-term	**R5:** Ensure all primary schools, including those in the rural areas, are connected and equipped and ready to deliver digital skill curriculum. **R6:** Improve inclusiveness in digital skills development by improving female participation in advanced and highly technical digital skills programs at tertiary education.
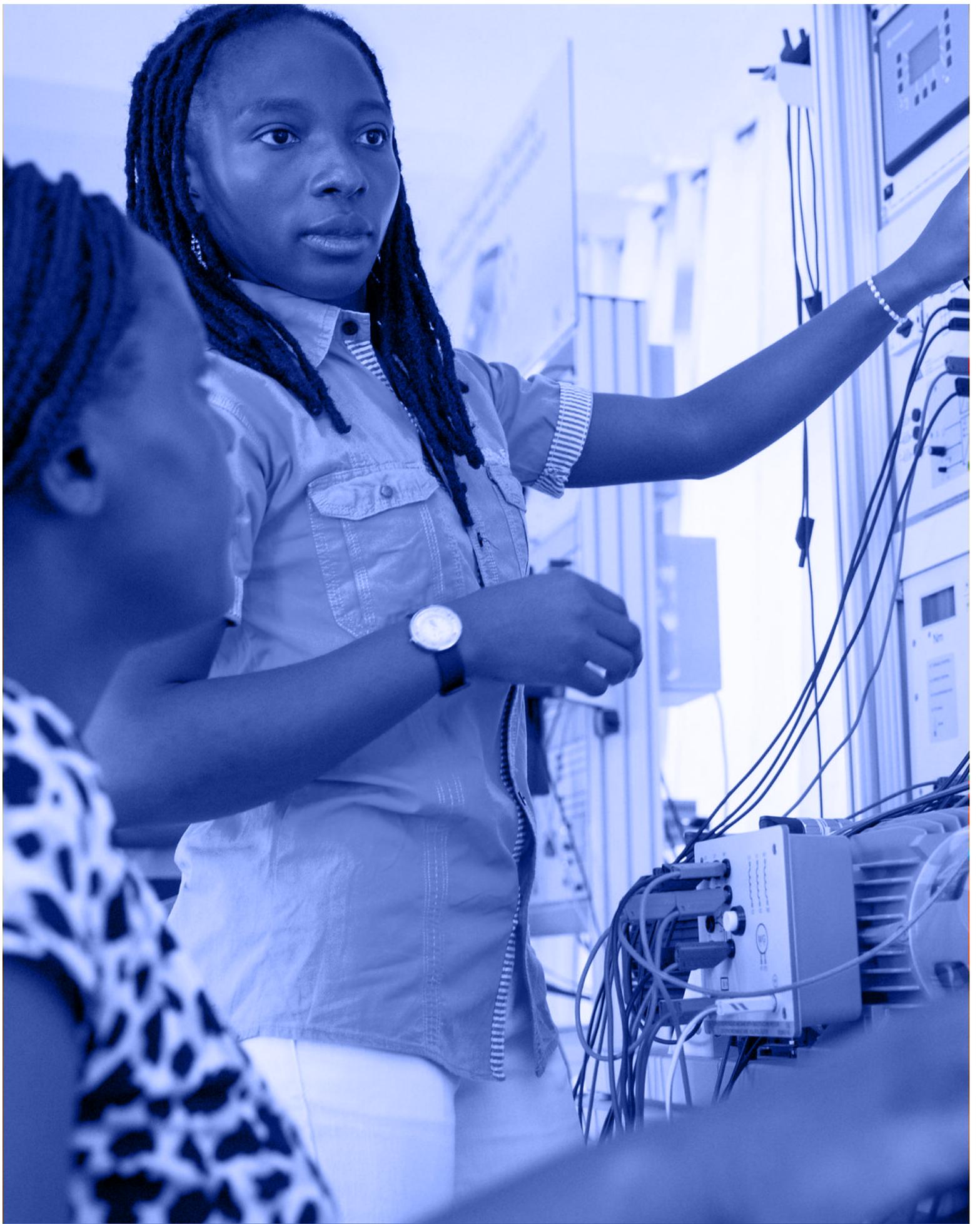
Country at a glance: Botswana

Population **2.3 M**

GDP per capita (2020), current USD	**6,405**
Rural population (2019)	**30%**
Poverty headcount ratio at national poverty line (% of population) (2015-16)	**16 %**
Literacy rate (2013)	**87%**
Electrification rate (2018)	**65%**
Labor force participation rate (2019)	**60 %**
Labor force participation rate, female (2019)	**56. %**
Agriculture jobs (% of population) (2019)	**7%**
Digital Adoption Index, score 1-100 (2016)	**0.47**

TABLE 2 Botswana at a Glance[2]

MAP 1 Botswana

Botswana is a landlocked country in the heart of Southern Africa with 2.3 million inhabitants. Since independence from British rule in 1966, Botswana has rapidly transitioned from one of the world's poorest countries into a middle-income country with aspirations of becoming a high-income country by 2036.[3] Natural resources, notably diamonds, a stable multi-party environment, and prudent economic management have been important drivers of this development. With the Botswana Democratic Party (BDP) in power since 1966, successive governments have invested Botswana's considerable mineral wealth in infrastructure and public services and maintained a strong track-record of macro-economic performance.

Besides diamonds, the service sector, with a GDP contribution of 65 percent in 2020, dominates the economy, including trade, hospitality, financial services, and government services.[4] While agriculture represents a marginal contribution to GDP it provides a quarter of employment.[5] More recently, diamond market volatility has weakened the economy and heightened the need for economic diversification. Combined with the continued economic repercussions from the COVID-19 pandemic and the financial aftermath of a severe drought, Botswana's economy is facing unprecedented pressure with reduced fiscal buffers. To tackle this, a 2020-2023 Economic Recovery and Transformation Plan (ERTP) has been put forth. The government's ability to advance these reforms will play a key role reshaping Botswana to meet current challenges.

2 Data from Statistics Botswana, Botswana Multi-Topic Household Survey 2015/15 Poverty Stats brief, 2018,
3 Vision 2036, Achieving Prosperity for All, Presidential Task Team, 2016
4 World Bank Development Indicators
5   Statistics Botswana, Quarterly Multi Topic Survey: Labor Force Module Report Quarter 3:2019

The economic growth has lifted most citizens out of poverty, but inequality remains high, and COVID-19 has exacerbated existing economic and social challenges. In the latest Household Survey (2015/16) the poverty headcount had come down to approximately 16 percent, but 30 percent of the population were just above the poverty line and at risk of falling back into poverty[6] Pushed by the ongoing pandemic the poverty rate was projected to increase fourfold to 60 percent in 2020 (using the upper-middle-income country poverty line).[7] Inequality in Botswana pre-COVID-19 was also among the highest in the world with a Gini-Coefficient of 0.53.[8] In addition, the devastating impact of Botswana's high prevalence of HIV/AIDS in combination with the high rates of inequality has contributed to human capital outcomes that are among the lowest in the world for a country at Botswana's level of economic development.

Background on Digital Economy

Botswana has already made much progress – and has charted a path to become a high-income country by 2036. Vision 2036 outlines the road towards high-income status, and the need to become a knowledge-based economy that leaves no-one behind. Pillar 1 of this strategy details the key components necessary for this evolution: "sustainable economic development through the use of science, technology and innovation to propel the economy to high levels of efficiency to support socio-economic development." The digital economy is ascribed a critical role in enabling this vision.[9]

The complementary National Transformation Strategy (NTS) defines the high-level path towards Vision 2036, calling for "bold decisions that reflect long-term national needs rather than short-term interests." NTS highlights several structural changes required, notably moving away from dependence upon diamonds by accelerating economic diversification, opening Botswana to investors and visitors, integrating

Botswana in the global economy, and finally, enabling citizens to be independent, self-reliant and entrepreneurial in spirit, rather than dependent upon the state. This self-diagnosis reflects the political concern around dwindling diamond supply and the heavy role of - and reliance on - the public sector in the economy, both of which have been reoccurring political themes.

Botswana also relies on a series of National Development Plans (NDP) to guide implementation of the long-term development visions. ICT has been assigned a prominent role in the last series of NDPs, including the current plan, NDP 11 (2017-2023).[10] As part of these digital ambitions, NDP 11 aims to achieve universal access to reliable high-speed networks within its 6-year period. NDP 11 also recognizes the importance of local content and applications as a driver of digital adoption and sets out to develop the local content industry, boosting local e-government, e-health, e-education and e-commerce resources. Finally, NDP 11 defines smart cities as a focus area, aspiring to connect "villages and cities to the latest technologies."

The envisioned digital transformation requires an enabling environment, and in this regard, Botswana is not short on strategies, supporting legislation and policies. Key plans include the National ICT Policy (named Maitlamo), National Broadband Strategy, National eGovernment Strategy, National Cybersecurity Strategy, Presidential Directive CAB 14 (A)/2018 (Infrastructure Sharing), Electronic Communications and Transactions Act, Electronic Records and Evidence Act, Cybercrime and Computer Related Crimes Act, Data Protection Act and Consumer Protection Act, National E-Commerce Strategy, and most recently the SmartBots Strategy. Such policies and laws are generally modelled after good international practices, and in some cases have been drafted based on extensive consultative processes. Notwithstanding, there are ongoing challenges around implementation. In addition, as in many countries, the regulatory landscape is struggling to keep pace with technological advances.

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6   Botswana Multi-Topic Household Survey 2015/15 Poverty Stats brief
7   WBG estimates. US$5.5/person/day in 2011 Purchasing Power Parity
8   The World Bank IBRD-IDA, 2020
9   Vision 2036, Achieving Prosperity for All, Presidential Task Team, 2016
10   National Development Plan 11, volume 1, April 2017-March 2023.

The COVID-19 pandemic sent Botswana into lockdown, shaking the economy and accelerating the need for and use of digital solutions. This crisis created an impetus to revisit the NDPs and expedite structural reforms. This approach was laid out in the 2020 Economic Recovery and Transformation Plan (ERTP).11 Accelerating digital transition was singled out as one of six critical drivers for recovery, with the plan calling to close gaps in IT provision by "taking advantage of opportunities but also addressing past (and recent) failures." Specifically, the plan aims to accelerate provision of digital infrastructure and expedite roll-out of e-government services, alongside cashless payment infrastructure.

Rationale for Digital Economy Development

Thanks to the relatively solid regulatory starting point, the GoB, SmartBots and other key public institutions can focus digital transformation efforts on aligning, updating, and more importantly implementing and enforcing strategies and policies, as well as laying the foundation for 4IR. However, with its small population and landlocked geography, Botswana needs to overcome high-structural barriers to actualize the digital economy strategies. Compared to neighboring South Africa, Botswana has neither the economies of scale nor natural access to sub-marine cables and international digital infrastructure that is critical to drive this development. These constraints can be overcome but require creative responses and cross-sector collaboration, as well as leveraging and servicing the much larger regional markets.

To support Botswana's digital aspirations this Digital Economy Diagnostic of Botswana (DE4A) provides an overview of the current state of the digital economy, including strengths, weaknesses, and actionable recommendations.

Diagnostic Methodology

The report is based on the DE4A diagnostic framework (page 4) that maps the five foundational pillars of the digital economy. To inform the report pillar teams have completed desk-research and conducted a virtual mission in 2020 that included consultations with a broad range of stakeholders from government, parastatal organizations, educational institutions, private sector, and representatives from the entrepreneurship ecosystem, among others. See full list in acknowledgements. The analysis presented within this report also draws on regional and global benchmarking using standardized indicators from the DE4A methodology.

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11   Ministry of Finance and Economic Development, 2020
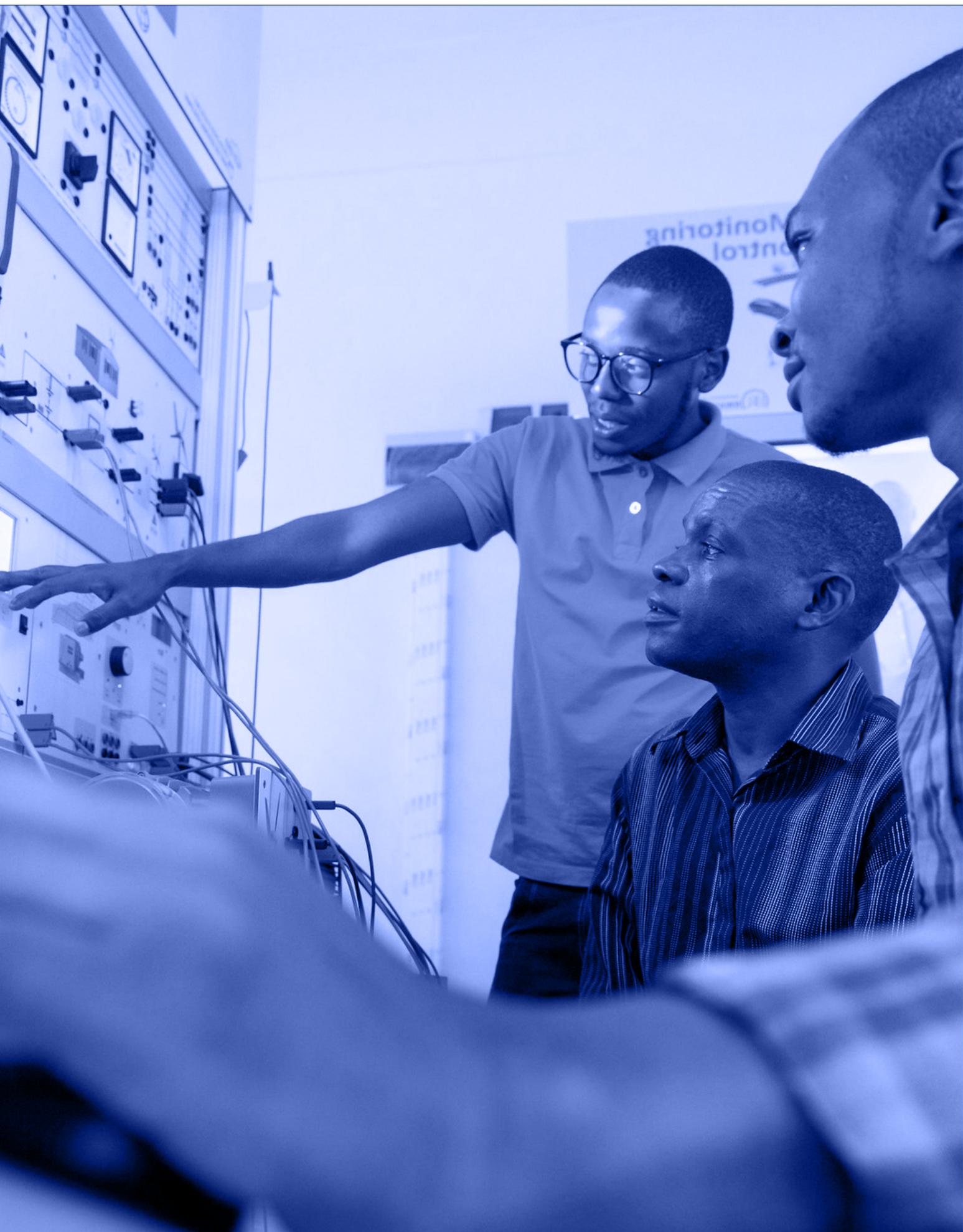
Policy and Institutional Context

Driven by an increasing need for economic diversification and the sudden push from the COVID-19 pandemic, the digital economy has gained importance in Botswana. However, the role of ICT was recognized and institutionalized early on with the creation of the Botswana Telecommunication Authority (BTA) through the Telecommunications Act of 1996. This paved the way for market liberalization and competition, which has shaped the sector ever since despite some setbacks.

In 2007 the National ICT policy (Maitlamo), was launched to guide sector development.[12] Maitlamo was developed with assistance from *"approximately one thousand people from all segments of society and all parts of the country"* and included extensive reviews of e-readiness, legislative gaps, and skills assessments. The policy provides a roadmap to *"drive social, economic, cultural, and political transformation through the effective use of ICTs."* Detailed recommendations span e-commerce regulation, consumer rights, data protection, cybersecurity, digital ID, e-education, expanding broadband access and a vision to make Botswana a regional ICT hub. Some progress has been made on these priorities, but many remain equally urgent today.

By 2012 the industry had grown, and with the passing of the Communications Regulatory Authority Act, BTA was transformed into a converged regulator, Botswana Communications Regulatory Authority (BOCRA). This expanded regulator covers telecommunications, broadcasting, and postal and internet services. The market was further restructured through partial privatization: by publicly listing the incumbent Botswana Telecommunications Corporation (BTC) into Botswana Telecommunications Corporation Limited (BTCL). The Government retained 51 percent and 49 percent was transferred to the public. Additionally, Botswana Fibre Networks (BoFiNet) was spun off from BTC to create a wholesale business, providing products and services to other licensed operators. The process of privatizing BTC while retaining BoFiNet as a parastatal was lengthy and chilled the growing ICT market somewhat.[13] The argument and mandate for creating BoFiNet was to improve broadband penetration, especially by providing efficient whole-sale infrastructure solutions. Currently, the role of BoFiNet extends to many areas; from securing international connectivity to linking homes and businesses with fiber infrastructure through ISP resale. As a result, the choices and performance of BoFiNet have deep market implications across the broadband value chain.

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12   Maitlamo approved by National Assembly in 2007
13   World Bank, A review of the ICT Regulatory Framework in Botswana, 2014,

In 2014 Botswana passed both the Electronic Records (Evidence) Act and the Electronic Communication and Transactions Act. 2014 also saw the creation of the Universal Access and Service Fund (UASF), to support the provision of access to communication services in unserved or underserved areas. This is achieved through financial incentives, such as subsidies or grants to service providers to reduce the cost of delivering services in financially unattractive areas. The fund collects a levy of 1 percent annual gross turnover from selected licensed services providers within the communications sector. BOCRA also contributes its surplus annual revenues to the fund, in addition to making its premises and employees available for the day-to-day running of the fund.[14]

Attempts have been made to challenge the position of BoFiNet. In 2016, Liquid Telecom and Botswana Power Corporation (BPC) announced that they had entered a joint venture for the establishment of a wholesale telecommunications service provider. However, the partnership was stopped by the Ministry of Transport and Communication (MTC) in 2018, a few months before the completion of the National Broadband Strategy (NBS),[15] which recommends that all government ICT assets be rationalized under BoFiNet. The Presidential Directive on Infrastructure Sharing[16] recommends that Government-owned ICT infrastructure be shared with the private sector to support economic development. Efforts to consolidate assets are still ongoing. The objective of this exercise is to facilitate the sharing of backbone, ducting, rights of way and other passive infrastructure to improve infrastructure in underserved areas. Assets include broadcasting infrastructure for the Department of Broadcasting, and fiber infrastructure for the Water Utilities Corporation (WUC) and Botswana Power Corporation (BPC).

The NBS was developed in 2014 and revised in 2018 in recognition of the relatively slow broadband roll-out and uptake in Botswana. Diverse stakeholders were engaged to pinpoint bottlenecks and devise a comprehensive plan for driving broadband penetration. As a result of this process, NBS maps detailed steps towards connecting every citizen, business, and community to quality high-speed broadband infrastructure at affordable prices.[17] However, momentum around implementation has been wanting, and most targets remain to be met. Stakeholders in Botswana, especially from the private sector, are the first to lament this fact and are expressing varying levels of strategy fatigue.

While Botswana has made digital strides in some areas, many key objectives set by strategies and policies have in the last decades lagged in implementation. This signals a lack of effective institutional coordination and inadequate resources to support implementation. Stakeholders point to different reasons, including (over)ambitious strategies with limited follow up, and a complex governance structure with unclear decision centers.

Botswana's digital ambitions have, however, not been relinquished. With barely two-years remaining to reach NDP 11's goals and propelled by the new *digital normal* created by the COVID-19 pandemic, Botswana has ramped up digital transformation efforts through the SmartBots initiative launched in 2020 and the creation of a dedicated Ministry of Communications, Knowledge, and Technology (2022).

14   UASF Strategic Plan: 2019 -2024
15   BOCRA, National Broadband Strategy, 2018
16   CAB 14 (A)/2018
17   Ministry of Transport and Communications, National Broadband Strategy, 2018

The SmartBots strategy and action plan

To expedite digital transformation Botswana has developed the SmartBots Strategy that adopts a whole-of-government approach (2020), which is coordinated by the Office of the President (OP). SmartBots' tagline is *"Digital Society Reinvented"*, and the declared goal is for Botswana to take advantage of the opportunities presented by the Fourth Industrial Revolution (4IR). To this end SmartBots has charted a strategy that dually addresses the lack of core digital infrastructure and kickstarts ambitious implementation of advanced technological solutions.

The process leading to the strategy skipped extensive national stakeholder engagements but consulted similar small countries like Estonia and Singapore that have come far on digital development. Rather than presenting a strategy document to the public, SmartBots is presented on a simple website[18] as an action plan to *"deliver a smart sustainable society for Botswana."* In addition, frequent social media posts are revealing different elements of the plan and in some cases engaging the public in execution. A 2021 mobile app hackathon, for example, marked the first attempt to engage entrepreneurs in improving public service delivery.

SmartBots's key focus areas include expanding broadband access and promoting digital inclusion to increase citizen participation in the digital economy, digital public transformation through citizen centric services, and executing ambitious research, innovation, and education initiatives, which include a digital and innovation hub and a large-scale science park. These activities seek to not only solve local problems, but also position Botswana as a regional hub with solutions that can compete in global markets. Most of the strategy's themes follow on logically from the ICT Policy Maitlamo and the National Broadband Strategy, while others set a somewhat new course. While private sector engagement is emphasized as a key implementation driver, the strategy is more closely linked with the public sector.

Looking back at the ambitious but slow-moving plans of previous decades there is clearly a desire to do things differently. Coordination of the action-plan is led by a cross-government secretariat working in sprints emulating the methods of digital entrepreneurs. Implementation is focused on building momentum, showcasing tangible short-term results, and laying the foundation for the more complex goals. Sustaining this momentum, while ensuring buy-in from cross-government institutions and gaining the trust of external stakeholders is the challenging next step.

Cybersecurity and Data Protection

As detailed above, SmartBots builds on several decades of ICT policy, including efforts to mitigate risk. Key public and private stakeholders in Botswana recognize that digital development is a double-edged sword: opening opportunities at the same time as introducing cyber-crimes and data privacy related risks. As a result, Botswana has developed several policies and legislative instruments which provide direction and guidelines on cybersecurity and data privacy.[19] Important and recent additions are the 2018 Data Protection Act and the National Cybersecurity Strategy (NCS), which has been underway for several years and formally approved in early 2021. In the long run-up to the approval of this strategy, Botswana partnered with several international institutions, and now has a solid track record of international collaboration on cybersecurity. While there has been no lack of detailed assessments, there are indications the ensuing recommendations have been more challenging to absorb and implement.

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18   smartbots.gov.bw
19   Cybercrime and Computer Related Crimes Act, 2018, Communications Regulatory Authority Act, 2012, Electronic Communications and Transactions Act, 2018, Electronic Records Act, 2014, National ICT Policy 2004.

The NCS covers a broad range of national cybersecurity issues, such as the regulatory framework, national coordination structures, updated arrangements for managing national cyber incidents, awareness-raising activities, and international cooperation mechanisms to combat cybercrime. The NCS also defines the critical information infrastructure (ICC) for Botswana,[20] and assigns the Ministry of Transport and Communication (MTC) and the Ministry of Defense, Justice and Security as responsible for carrying out audits and contingency plans to protect this infrastructure.

Despite previous laws and regulations related to cybersecurity, the roles and responsibilities regarding enforcement have not always been clear. The NCA helps clarify this division of labor: although the practical implementation is still in process. Key players include MTC, which is responsible for the regulatory framework, while BOCRA is assigned the role of regulator and implementor of several cybersecurity related functions. For example, BwCIRT, a Computer Incident Response Team (CIRT), was established in 2019 by BOCRA. On its website, BwCIRT is noted as responsible for managing security incidents for government departments and Internet Service Providers, as well as assisting stakeholders to understand and manage cyber threats and sharing security related information with other CIRTs. [21] The Department of Information Technology (DIT) at MTC also hosts a Network Operations Center (NOC) and a Security Operations Center (SOC). The scope for these efforts seems to be limited to the DIT networks and hence not the full footprint of the public enterprise ICT critical infrastructure, systems, databases and networks. Common for these entities seem to be limited resources compared to the growing cybersecurity challenges they are set out to tackle.

Response capacity has been pressured by the COVID-19 pandemic. The increased use of digital platforms and solutions, including being able to work from home, has sustained many critical public operations but has likewise accelerated unsecure network connections, leaving home-bound IT security specialists with less ability to monitor and respond to threats. As a result of increased online activity, Botswana, as most countries globally, has seen an escalation in cybersecurity related incidences in 2020 for citizens, public institutions, and businesses, spanning phishing, malware and other forms of attacks.[22]

A key bottleneck managing the increasing number of incidents and threats is access to staff with appropriate skills: according to a 2018 survey, Botswana had an estimated 200 certified cybersecurity specialists and adds around 30 new specialists to the pool per year.[23] This number does not meet market requirements, and competition to attract specialists is tough across organizations. Stakeholders call for less talent poaching and more investment in in-house staff to expand the pool. This is also pertinent for the public sector which cannot compete with private sector wages but urgently needs specialists. As of now, there is no public certification for cybersecurity due to lack of institutional standardization to accredit, train, certify and provide the governing standards.

Cybersecurity specialists are needed across many public sector functions including the police and courts to adequately address cybercrimes. A 2018 cybersecurity survey of more than 150 professionals found that around half of survey participants had experienced cybercrimes in the previous five years. Of these, approximately one third did not report the crime to the police, while another third did report, but found that no action was taken. Just five percent of the cases reported to the police resulted in successful prosecution. [24] While this low level of prosecution likely reflects the legal nature of the cases, stakeholders note that capacity and resources to pursue these cases are strained.

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20   finance, communications, energy, water, emergency services, food, public safety, health, public services and e-government
21   www.cirt.org.bw
22   Numbers and cases supporting this trend were shared during the Botswana International University of Science and Technology (BIUST) Virtual Cybersecurity Symposium 2021. Access to recording through BIUST Facebook page.
23   Africa Cybersecurity Report – Botswana, Serianu and United States International University – Africa.
24   Africa Cybersecurity Report – Botswana, Serianu and United States International University – Africa.

Organisations in Botswana regularly collect sensitive personal data; however, few have or enforce data protection standards. Botswana has a Data Protection Act (2018), which includes good practice but has seen slow implementation. BOCRA, the institution mainly responsible for implementing the Act, has not yet developed the regulations, structures or enforcement arrangements required to implement the law. Based on discussions with stakeholders, data sovereignty requirements have also not been agreed.

This is of concern since there have been incidents of sensitive data being acquired, used and stored by private and public entities both domestically and internationally without adequate consideration of the privacy and security of the data's provenance. This delay in implementing the Data Protection Act means there is currently little control and possibility of recourse for data subjects. This represents a growing challenge in light of the digital ambitions in Botswana and associated exponential data collection growth expected.

Recommendations

Short-term

R1: Strengthen monitoring mechanisms and results-based incentives to expedite regulatory enforcement: Botswana has many solid laws and admirable strategies which, if fully adopted, could have positive ripple effects across the digital economy. What remains however is expedited roll-out and enforcement. A strong political and institutional focus on overcoming this is needed. Strengthening institutional capacity, establishing monitoring schemes and results-based incentives is encouraged, as well as developing internal and external forums to pragmatically address implementation bottlenecks.

R2: Strengthen public digital trust by implementing the Data Protection Act and Cybersecurity Strategy: Lack of supporting regulation, implementation structures, and enforcement arrangements is stalling the Data Protection Act. Equally, the Cybersecurity Strategy will require a concerted effort to build adequate institutional structures and capacity. Urgent implementation of these measures is pertinent to build the foundations of digital trust required for broader adoption of digital platforms.

Medium-term

R3: Support impact of SmartBots by institutionalizing approach: SmartBots represents a new type of coordination mechanism for boosting digital transformation in Botswana. Building the foundation and mindset for this transition is however not a quick fix but will require a sustained effort. To avoid losing momentum it is important that SmartBots over time spreads strategic ownership and leadership from individuals to many stakeholders. This does not imply giving up the agile and results-oriented approach but diffusing this mindset across the critical implementing organizations and working towards shared goals.

R4: Adopt agile regulation mechanisms to counter-balance rapid technological development: Matching regulatory evolution with the exponential speed of technological development is challenging, especially when proactively adopting nascent technologies as planned in Botswana. Experience from other countries shows the importance of avoiding both under or over-regulating evolving technologies but allowing them to mature while managing risks. To strike this balance, Botswana will need to implement an agile regulatory scheme which, among other things, includes no-regrets measures, staying abreast with technological developments and risks, regulatory review cycles and close cross-sector collaboration.

Digital Infrastructure

Importance of Digital Infrastructure

Connectivity can play an instrumental role shaping Botswana's development. In connecting citizens to markets and services, improving productivity, reducing transaction costs, and bridging information gaps, these channels unlock the digital economy. To achieve these benefits, internet access, regardless of type, is an important first step. However, high-speed broadband services are paramount in enabling the full potential of the digital economy. A study by the International Telecommunication Union (ITU) estimates that a 10 percent increase in mobile broadband penetration on average across Africa will yield a GDP growth of 2.46 percent.[25]

To reach end-users, high-speed connectivity travels through four segments of the broadband value chain: the *first mile* where connectivity enters a country, the *middle mile* where backbone infrastructure leads connectivity across the country, the *last mile* where connectivity reaches end-users, and finally the *invisible mile,* constituting the enabling infrastructure and environment for broadband (Figure 1). All segments of the value chain need to be built incrementally and require important supporting infrastructure such as data centers, internet exchange points, reliable electricity, as well as an enabling policy and regulatory environment.

FIGURE 1 The Broadband Value Chain

INVISIBLE MILE
HIDDEN ELEMENTS THAT ARE VITAL TO ENSURING THE INTEGRITY OF THE VALUE CHAIN

Nonvisible network components include the spectrum, network databases, cybersecurity, etc., but can also include potential bottlenecks, like international frontiers.

FIRST MILE
WHERE THE INTERNET ENTERS A COUNTRY

International internet access, including submarine cables, landing stations, satellite dishes, cross-border microwave, etc.

MIDDLE MILE
WHERE THE INTERNET PASSES THROUGH THAT COUNTRY

National backbone and intercity network, including fiber backbone, microwave, internet exchange points (IXPs), local hosting of content, etc.

LAST MILE
WHERE THE INTERNET REACHES THE END USER

Local access network, including local loop, central office exchanges, wireless masts

Source: World Bank

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25 ITU_Global_Econometric_Modeling_GSR-DiscussionPaper , 2020

To support the envisioned digital transformation, broadband infrastructure is recognized by the GoB as a critical enabler in empowering citizens, easing business processes, and driving technological and service innovation. However, as described, the comprehensive National Broadband Strategy (NBS) has seen relatively weak implementation. The SmartBots strategy is, among other priorities, trying to revitalize these broadband aspirations with targeted interventions across the broadband value chain, ranging from improving international cable access to providing last-mile connections, with a predominant focus on the role of the public sector.

Diagnostic Findings: State of High-Speed Internet Development

Although up to 90 percent of Botswana's population lives within the footprint of a mobile broadband network, [26] only 49 percent are active mobile broadband users.[27] A key market consequence of this is a low adoption/ low investment equilibrium that is at odds with Botswana's digital transformation aspirations. Furthermore, the quality of service for these active users is generally suitable for simple applications as opposed to the more complex and data-consuming services necessary for the digital transformation of the economy. This section will review Botswana's broadband adoption level, and its key drivers.

Adoption of Broadband Services

Botswana has one of the highest internet penetration rates in the region. According to a national household survey, an estimated 64 percent of households in Botswana have access to the internet,[28] which is well above the African average of 19 percent (2018).[29] Mobile channels are the most ubiquitous entry point with 91 percent of households accessing the internet in this manner.

As in most African countries a significant urban/ rural divide persists. Urban villages[30] constitute 50 percent of households with internet access, followed by cities and towns (28 percent) and rural villages (22 percent). Based on this survey there does not seem to be a gender gap at household level. Of the total households with internet access, 54 percent are male-headed while 45 percent are female-headed – similar to the general gender split for household heads.[31]

Despite having a higher-than-average household internet penetration rate, the rate of broadband adoption remains relatively low. 45 percent of the market have a unique and active subscription to a mobile broadband service (2021).[32] Furthermore, fixed broadband uptake is much lower with a household penetration rate [DSL + Fixed Wireless] of 8.5 percent.[33] This low level is concerning because adoption of broadband is intrinsically linked with unlocking many productive uses of the internet.

FIGURE 2 Broadband Internet Uptake

	Mar -17	Mar -18	Mar -19	Mar -20	Mar -21
ADSL Subscription	59,590	40,164	29532	33618	35197
Fixed Wireless Subscription	8,997	10,350	10943	23352	48713
Total Broadband Subscription	68,587	50,514	40,475	56970	83910
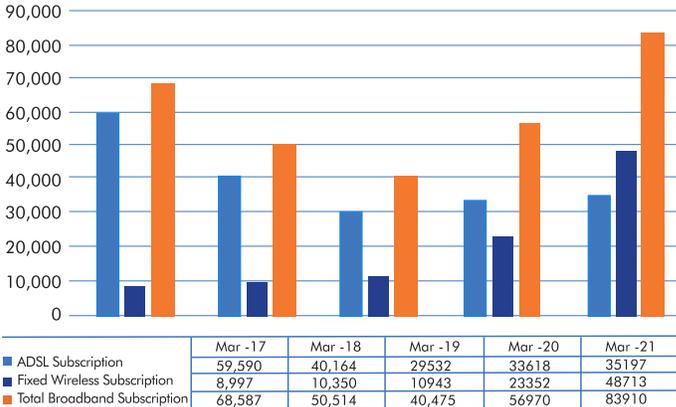
Source: BOCRA 2021 Annual Report

Various factors affect the ability of the population to adopt broadband technologies, including network availability and performance, service affordability and relevance of digital content. The following section reviews the current state of these drivers in Botswana.

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26   GSMA Intelligence
27   World Bank 2022 based on Mobile broadband capable connections (GSMA, 2022), SIMs per unique subscriber (GSMA, 2022) and Total population (UN Population Prospect, 2019).
28   Botswana HH Access to ICT Survey – 2019
29   ITU Measuring the Information Society Report 2018 – Volume 2
30   Formerly referred to as major villages and agro-towns.
31   Botswana HH Access to ICT Survey – 2019
32   World Bank calculation based on GSMA Mobile Broadband Capable Connections / GSMA SIMs Per Unique Subscriber (Jan 2022) / United Nations Population (2020)
33   TeleGeography

Availability of High-Speed Broadband Networks

Mobile networks are the most widely available broadband access channels in Botswana. 90 percent of Botswana is served by 3G coverage, and 80 percent by 4G coverage.[34] There are no 5G networks at present, but plans are under way for future deployment.[35] While most of the country is covered by 3G, only two-thirds of household leverage this for internet, indicating the gap is not primarily related to availability. One challenge is that consumers generally lack a choice of service providers outside densely populated areas and need to purchase SIM cards from numerous service providers to ensure coverage across the country.[36] This lack of competition hampers competitive pricing and renders services unaffordable for many (see Affordability).

As of March 2020, penetration of high-speed internet services stood at approximately 10 percent of total households, higher than the African average rate of 8.5 percent, but lower than peers with similar GDP.[37] Fortunately there has been progress: mobile broadband subscriptions grew by 16 percent between 2019 and 2020 and are anticipated to further grow in line with a five-year historical trend.[38] Compared to mobile broadband coverage, fixed broadband networks have limited coverage across the country, reflecting current consumer preferences for mobile broadband services due to lower cost, flexibility, and convenience. The level of fixed broadband is however also growing slowly but steadily, driven by increased availability of Fixed Wireless technologies (See Figure 2).[39] A key driver of this growth, as observed by a 2019 BOCRA study, may be that a significant number of service providers, particularly Internet Service Providers, use the unlicensed ISM spectrum radio band at 5.8 Ghz, and Mobile Network Operators (MNOs) use WiMax at 2.5Ghz.[40]

Quality of Broadband Networks

Botswana's average broadband download speed allows consumers to comfortably enjoy the use of basic broadband services, but it does not provide the bandwidth required to support more advanced services (see requirements in Annex 3, Table 9). The current national mean download speed of 2.78 Mbps[41] falls far below the NBS urban and rural targets for 2021.[42] The existing speed only meets the 2021 target for agricultural areas, 1-5 Mbps.[43] While in many parts of the world fixed broadband speeds vastly outpace mobile broadband speeds, this is not the case in Botswana and other countries with limited fixed broadband infrastructure. A speed test from Q2 2020 showed that the mean download speed for fixed broadband was 8.24 Mbps compared to 15.28 Mbps for mobile broadband. Both levels were below regional peers (South Africa, Eswatini, Lesotho) indicating significant challenges providing sufficient quality internet in Botswana.[44]

Botswana's current broadband latency rates (48ms for fixed and 33ms for mobile broadband) fall within the national target.[45] From a global perspective fixed broadband is well above the global average of 20ms, while the average latency rate for mobile broadband falls below the global average of 37ms, indicating significant fixed broadband latency challenges. Neighboring South Africa performs comparatively better with a 29ms latency rate for mobile broadband and a 22ms latency rate for fixed broadband.[46] It is unlikely that Botswana will see significant improvements in the latency rates, given that most of the content it consumes is foreign based and thus uses international networks to be accessed locally. To change this, Botswana may have to consider ways to stimulate local content and improve capacity to cache international traffic locally. Additionally, the reliability of broadband network services has been affected by disruptions to power supply, requiring the use of back-up generators.

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34   GSMA intelligence
35   ibid
36   Even when several service providers are present in an area consumers often use multiple SIM cards due to the unavailability of mobile number portability in Botswana. However, mobile termination rates have been reduced by approximately 35 percent following a BOCRA mandated glide path to reduce termination rates between June 2017 and June 2018. Source: BOCRA, Annual Report, 2019
37   TeleGeography
38   BOCRA Annual Report 2020
39   BOCRA Broadband Facts and Figures 2020
40   BOCRA Annual Report 2019
41   Worldwide Broadband Speed League, 2020
42   Urban: 30 – 100 Mbps, rural: 10 – 30 Mbps, National Broadband Strategy, 2018
43   BOCRA, National Broadband Strategy, 2018
44   https://www.speedtest.net/insights/blog/mobile-speeds-lead-southern-africa-q2-2020/
45   Less than or equal to 85ms around 95 percent of the time. National Broadband Strategy, 2018
46   Speedtest Global Index

Vandalism and theft of network service equipment such as solar panels and mast batteries have also affected the reliability of service delivery.[47] Consequently, power supply and network security will need to be improved to ensure high reliability broadband networks.

Affordability of Broadband Services

Entry-level data packages are generally affordable in Botswana, but higher capacity data packages remain expensive. Small data packages play an important role introducing new adopters to the benefits of mobile internet; however, it is higher order data packages that unlock the full potential of the internet. In 2020, the average price of 1GB of mobile data was US$ 15, one of the highest rates in the region.[48] This translates into on average 1.4 percent of a person's monthly income, which meets the UN Broadband Commission's two percent affordability threshold.[49] Yet, prices for larger data packages fall above this target. According to the ITU's ICT price basket, citizens will have to part with four percent of their monthly income for 5GB of fixed broadband, rendering it unaffordable for many.[50] Efforts are being made by SmartBots to provide free wifi in public institutions, and a growing number of institutions are covered.

FIGURE 3. Average Price of 1GB Mobile Data in Selected SADC Countries (in US$, 2020)

Average Price Of 1gb Mobile Data In Selected Sadc Countries In Us$ (Source: Cable.co.uk)
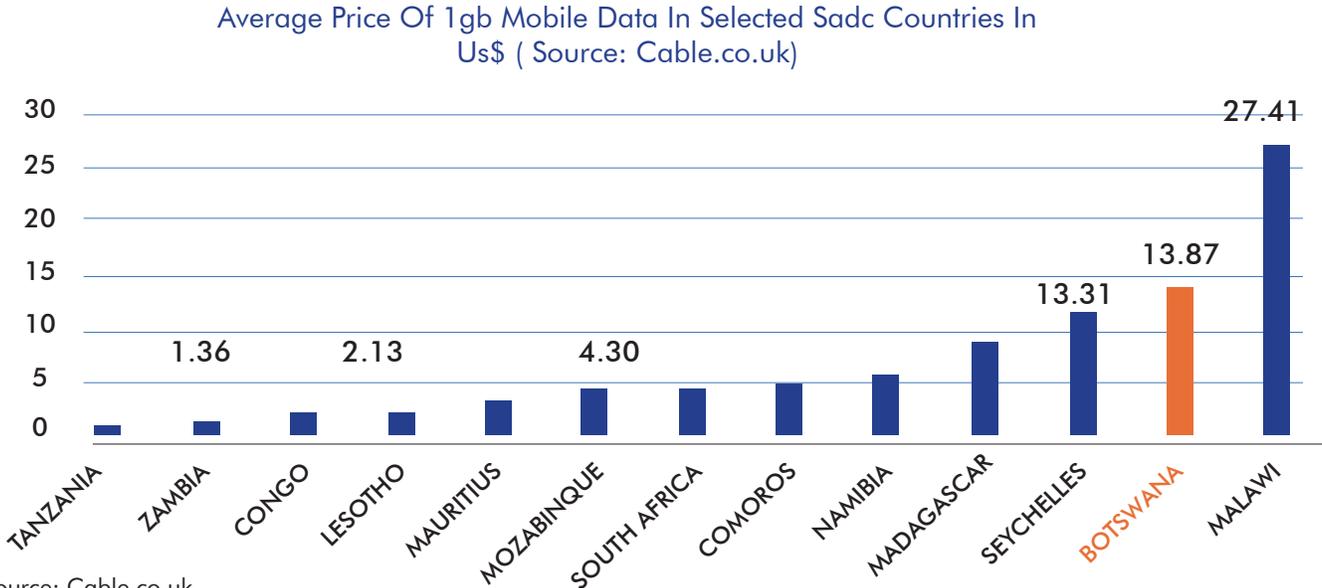
Source: Cable.co.uk

The price of devices also impacts broadband adoption rates. While entry-level smartphone devices are relatively low-cost, advanced devices are too expensive for many. According to a survey conducted by the Alliance for Affordable Internet (A4AI), a low-cost smartphone is priced at four percent of the average monthly income of citizens, which notably is the same price level as 5GB of fixed broadband. This makes Botswana among the most affordable countries for entry-level smart phones, compared to neighboring countries such as South Africa (18 percent), Namibia (8 percent) and an African average of 68 percent.[51] However, a 2019 survey revealed that high equipment costs (including desktops and laptops) were the most common reason given for not having access to the internet. The device affordability constraint is especially skewed towards rural areas where only 11 percent report having access to a desktop computer (versus 41 percent in cities), and among women, who are less likely than men to have access to desktop computers (50 percent versus 67 percent).[52]

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47   Information from stakeholder interviews
48   Cable.co.uk - World Data Pricing
49   A4AI Mobile Broadband Pricing 2020:
50   ITU ICT Price Baskets
51   From Luxury to Lifeline: Reducing the Cost of Mobile Devices to Reach Universal Internet Access, A4AI, 2020
52   Botswana HH Access to ICT Survey – 2019

Relevance of Digital Content

According to local stakeholders, a key reason for low internet adoption rates is lack of locally developed and relevant digital content providing incentives to get online. In the most recent Network Readiness Index, Botswana had an overall content development ranking of 87th out of 134 countries. Included in this ranking is a mobile app development placing of 100 of 134, implying a scope to improve local content, app development and hosting options.[53] Relevant content spans widely from public e-services and e-commerce, to social networks and content that preserves and helps share local traditions. It is important to note that even where content is not generated locally, it should ideally be local in language and subject.[54] As the next chapters will discuss, availability of public e-services, e-commerce, digital financial services, and online education opportunities have been low, but there has been a noteworthy acceleration of development with the COVID-19 pandemic.

Market Structure and Competition

Given its small population, Botswana is a small telecoms market by Sub-Saharan African standards. However, as noted earlier, its comparably progressive policy and regulatory regime has allowed a variety of players to enter the market. In a bid to promote competition and innovation in the market, Botswana's regulator, BOCRA, recently implemented a Unified Licensing Framework (ULF) which provides service-and-technology-neutral licensing across all communications markets. New concessions include Network Facilities Providers (NFP) licenses for entities that own, operate or provide any form of physical infrastructure used primarily for carrying services, applications and content; and Services and Applications Providers (SAP) licenses for non-infrastructure-based service providers offering services and applications to end users using the infrastructure of an NFP. As of June 2020 there were 73 SAP licensees (up from 64 a year earlier) and 41 NFP licensees (up from 34).[55] Even so, the GoB is an active participant in the domestic market through its direct and joint ownership in Botswana's dominant telecom operators; BoFiNet for wholesale backbone networks, and BTCL for retail wireline and

DSL networks, including a mobile network operating arm. These companies account for a large part of the nation's international, backbone and wireline last mile broadband capacity.

Broadband Wholesale Market

As discussed, the wholesale market is dominated by state-owned BoFiNet, which provides wholesale services to Internet Service Providers (ISPs). BoFiNet owns and operates Botswana's nationwide backbone network, as well as its interests in international cable systems such as the Eastern Africa Submarine System (EASSy) and West African Cable System (WACS).[56] BoFiNet has a national fiber coverage in excess of 10.000 km countrywide, and covers 206 of 399 gazetted localities in Botswana with a plan to reach the remaining localities by 2025.[57] The Government has hence placed strategic importance on BoFiNet and sees it as a key facilitator of broadband throughout the country providing connectivity at international, national, intercity and intracity levels.

FIGURE 4 3G and 4G Subscribers by Market Share by Network (June 2020)
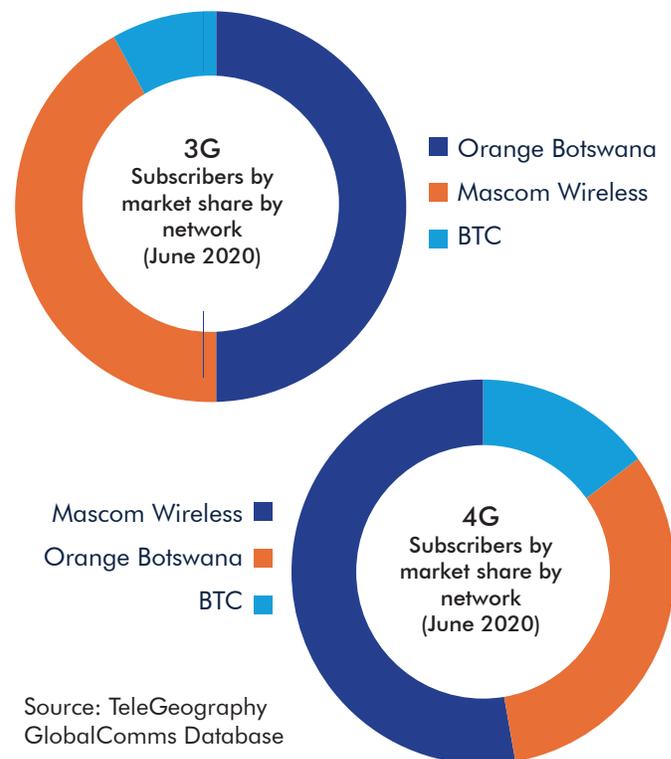
Source: TeleGeography GlobalComms Database

53   Network Readiness Index 2020
54   Internet Society Policy Brief, 2015 Available at: https://www.internetsociety.org/policybriefs/localcontent/
55   Telegeography, Botswana country profile
56   Telegeography, Botswana country profile
57   BoFiNet, Annual Report 2020

Mobile Broadband Retail Market

Key players in the mobile broadband market include Mascom Wireless, a subsidiary of the SA-based MTN group and Zimbabwe's Econet Wireless, with a 47 percent market share; Orange Group's Orange Botswana, with a 35 percent market share; as well as Botswana Telecommunications Corporation with an 18 percent market share.[58] All three operators offer 3G and 4G services, with Mascom playing a central role in both 3G and 4G networks (Figure 3). The fully liberalized mobile network market is showing signs of saturation, given the mobile penetration rate of 162 percent, 97 percent of which are prepaid subscriptions. Furthermore, the market is highly concentrated, leaving little room for the organic growth of the three dominant mobile operators.[59] The data market holds the greatest opportunity for growth, assuming operators engage in increased price competition and stimulate stronger demand. As a consequence, operators are beginning to pursue strategies to migrate customers to higher-value services in order to sustain revenue growth.[60] There are currently no active Mobile Virtual Network Operators (MVNOs)[61] in Botswana, despite the licensing of resellers now possible under the unified concessions BOCRA introduced in September 2015.[62]

Fixed Broadband Retail Market

Much like the broadband wholesale market, Botswana's fixed broadband market is dominated by BTC, which is the incumbent wireline operator. BTC also owns and operates the nation's copper network with a 55 percent market share. As the only licensee that has a copper deployment, BTC provides ADSL and VDSL technology services on both a wholesale and retail basis. This means that ISPs both purchase wholesale services from BTC and compete with its retail arm at the same time. In a bid to level the competitive playing field, BOCRA's 2017 regulatory directive stipulates that BTCL shall, among other things provide wholesale ADSL to its retail business and other licensed operators using the same prices, processes and terms. As of June 2019, 95 percent of active retail ADSL subscriptions in the market were supplied by BTC retail. DSL connections make up the majority of fixed broadband connections in Botswana with 48 percent of the market using this technology while the remaining 52 percent connect using fixed wireless technology. Most of the country's active ISPs operate data networks, and entry to the ISP/ data market is unrestricted.[63]

Serving a small, dispersed population across a large land mass places upward pressure on service pricing and affects the economic viability of infrastructure investments, reflected in the high market concentration which in turn can dampen interest among new entrants. Companies interviewed were largely of the position that existing infrastructure deployments are aligned with the demand patterns across the country. ISPs stated they would be willing to make the necessary investments to upgrade or build higher capacity networks as and when consumers are willing and able to pay for higher bandwidth; in some cases they already have surplus capacity, but currently only offer what customers demand.

The Broadband Value-Chain

With no direct sea access Botswana depends on its coastal neighbors for access to undersea cable capacity, driving high transit prices and corresponding wholesale costs for international traffic. Botswana has a redundant backbone network that connects major cities, currently being expanded to include rural areas. The key broadband service delivery challenge is the limited investment in the access networks; given Botswana's population disbursement this is particularly felt in rural areas.

First Mile: International Connectivity

Botswana's landlocked reality hampers access to undersea cable systems and international connectivity. Consequently, it is necessary to transit the bulk of international traffic through Namibia and South Africa. Botswana ensures redundancy in international connectivity by accessing both the Eastern Africa Submarine Cable System (EASSy), and the West Africa

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58   BOCRA Annual Report, 2020
59   Consequently, the market has a Herfindahl-Hirschman Index (HHI) greater than 2500 (3,677). The HHI is a common measure of market concentration and is used to determine market competitiveness. A market with an HHI of less than 1,500 is considered to be competitive, an HHI of 1,500-2,500 to be moderately concentrated, and an HHI of 2,500 or greater to be highly concentrated.
60   Fitch Solutions: Botswana Telecoms Market Overview, 2020
61   Mobile virtual network operator (MVNO) is a wireless service provider that does not own the network infrastructure it uses for services.
62   Telegeography, Bostwana Country Profile 2020
63   Telegeography, Bostwana Country Profile 2020

Cable System (WACS) (Annex 2, Map 2). Through Botswana's wholesale broadband operator BoFiNet, Botswana has made strategic investments in EASSy, and in WACS. The international incoming internet bandwidth is 43Gbps, with the bulk of it controlled by BoFiNet.[64] An increase in the international bandwidth will be required especially given BoFiNet's 2020-23 growth strategy.

Transit backhaul costs for connecting Botswana to the EASSy and WACs cable systems remain a significant impediment to making broadband services affordable and accessible for all. A review of the total cost of international bandwidth through the two undersea cables shows that transit charges through Namibia and South Africa constitute between 43 and 68 percent of the total cost for bandwidth from the Botswana border to London.[65] To address this, Botswana may need to explore the use of alternative transit routes or negotiate better terms with transit suppliers, including increasing investments in local IXPs and caches to reduce the volume and consequent expenditure on transit traffic.

Middle Mile: Backbone Networks

Botswana has a national fiber backbone network ring in excess of 9000km countrywide, covering cities, major towns and villages with redundant national links.[66] The main backbone is owned by BoFiNet while private operators also have deployed some national backbone infrastructure to service their needs (Annex 2, Map 3). For example, Mascom Limited has an optical cable running along the Gaborone – Francistown main route.[67] Overall, 164 towns, villages and strategic repeater sites for mobile coverage have been connected to the National Open-Access backbone fiber network and broadband wireless infrastructure since 2014/15.[68] Recent IPT (Internet Protocol Telephony) traffic has averaged 35 Gb/s, although this capacity can be increased depending on customer requirements. Extreme COVID-19 social distancing between February and April 2020 saw internet traffic increase by around 6 percent.[47]

Botswana has an Internet Exchange Point (IXP) but has had limited success promoting local exchange of internet traffic. The Botswana Internet Exchange (BINX) was founded by the Botswana ISP Association (BISPA) in 2005 to encourage local peering and reduce international transit costs. According to the BINX website, the IXP has 14 active members.[69] Involved stakeholders estimate that approximately three percent of traffic flows through the IXP: considerably less than the target originally envisioned. This failure has been driven by operational disagreements amongst members, exacerbated by the fact that participation is voluntary. A regulatory mandate to peer[70] may be required to engage a wider range of actors, especially larger ISPs. Because of the negligible traffic flows in the current IXP, BoFiNet is launching a national IXP as part of its planned carrier-neutral data center project.[71]

Last Mile: End-User Access

To keep up with growing demand for voice and data services and manage network performance, mobile operators have continued to roll out infrastructure. Between April 2019 and March 2020, 888 new mobile network sites were deployed, the majority 3G sites (43 percent) and the remainder 2G (29 percent) and 4G (27 percent). While the use of fixed-broadband is not as pervasive as mobile broadband access, it is expected to increase, especially within the Fixed Wireless segment. The growth prospects of Fixed Broadband are tied to its complementary value alongside mobile wireless internet, and as a solution for bandwidth-hungry applications and services. ADSL fixed broadband, is offered mainly by BTC at wholesale and retail level with a market share of 95 percent. ISPs offer ADSL as resellers of the BTC service and control the remainder of the market.[72]

BoFiNet started rollout of Fiber-To-The Building (FTTb) in 2016. In a stated quest to diversify the portfolio and re-position the company's competitiveness, BoFiNet also embarked in rolling out Fiber-To-The-Home (FTTh) in 2019 in Gaborone (resold by ISPs). This roll-

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64   BOCRA, Broadband Facts and Figures, March 2020
65   National Broadband Strategy, 2018
66   BOCRA, Broadband Facts and Figures, March 2020
67   National Broadband Strategy, 2018
68   BoFiNet 2019 Annual Report:
69   Botswana Internet Exchange
70   ISP peering is the business relationship ISPs engage in to reciprocally provide access to each others' customers using their networks.
71   Discussed in stakeholder interviews. Information from Uptime Institute https://uptimeinstitute.com/clients/bofinet
72   Telegeography, Botswana Country profile, 2020

out is being extended to various parts of the country and is increasing fixed broadband penetration.[73] BoFiNet has a five-year plan to roll out fiber to over 38 towns and villages that each have a population of over 5,000 inhabitants, considered the threshold for a viable investment.[74] With this diversification BoFiNet is expanding its territory and increasingly stretching the boundaries of its mandate to the frustration of some market players.

While BoFiNet's plans will expand coverage, there is still a long road towards comprehensive high-speed broadband coverage. Botswana's large land mass and sparse population distribution makes it expensive for service providers to increase the density of broadband networks, particularly in non-urbanized areas of the country. For example, there are many remote settlements with less than 5,000 residents. It is assessed that remote areas could require up to and over 35 percent more capital expenditure reducing private sector incentives.[75] The SmartBots strategy includes plans to investigate satellite-based connectivity, TV-white space and other emerging last-mile solutions to accommodate these challenges. Engaging the private sector to use Botswana as a testing ground for these technologies is promising, and in line with the SmartBots ambitions of positioning the country as a digital hub.

UASF is Botswana's development agency mandated to ensure availability of communications services across the country, primarily focusing on unserved and underserved areas. A key challenge for the fund has been to deliver on their access targets. According to stakeholders, this challenge emanates from a limitation of funding to address the volume of access challenges that the Fund has identified. An additional challenge highlighted is the high cost and lack of availability of equipment required for the deployment of broadband access services, given that most is imported and must be procured using foreign currency. Nevertheless, the Fund intends to continue operationalizing its 2019-2024 Strategic Plan. Areas the Fund intends to focus on include: increasing the number of government schools connected to broadband internet; providing institutions with ICT devices; increasing the number of villages connected with broadband networks; providing disadvantaged groups with broadband internet; ensuring key economic areas are connected; providing institutions with ICT training; and deploying IT graduates to unserved/underserved areas.[76]

Invisible Mile
The invisible mile constitutes the enabling environment and different types of supporting digital infrastructure necessary for broadband deployment.

Regulatory landscape: Relative to other African countries, Botswana has a progressive ICT regulatory framework. According to the ITU's regulatory tracker, Botswana is rated as a third generation (G3) regulatory regime, implying a framework which enables investment, innovation, and access. Around 13 percent of Sub-Saharan African countries have a G3 rating, while only 14 percent have the highest G4 rating. Areas of strength include: the presence of a *Separate Regulator and the Regulatory Mandate*. Areas for improvement include the *Competition Framework*, addressing the relatively low level of competition in the main market segments (17.5 points out of 28), and the *Regulatory Regime* (16 points out of 30), which indicates that key regulation is still missing.[77]

Spectrum: Spectrum management is a key policy instrument influencing broadband provision. In Botswana, mobile network operators have demonstrated efficient management of spectrum, despite the rise in demand for spectrum fueled by the rising demand for wireless broadband services. According to BOCRA, 3G spectrum was used efficiently and within the targets set for the year 2019/20. 4G spectrum has also operated within the efficiency targets set by a small margin.[78] BOCRA anticipates an increased utilization of spectrum as operators move to areas that are deemed economically unviable with the assistance of UASF subsidies. BOCRA's current spectrum management strategy is to carry out a simple demand assessment procedure: if demand exceeds supply a competitive process will be used to assign spectrum (comparative selection or auction).

73   BOCRA, Annual Report, 2021
74   BOCRA, Broadband Facts and Figures, March 2020
75   Closing the Coverage Gap, 2019
76   UASF 2019-2024 UASF strategy
77   ITU ICT Regulatory Tracker 2019
78   BOCRA, Annual Report 2020

If demand does not exceed supply, a *first come first served principle* is applied. The demand assessment process was applied to fixed wireless access spectrum in 2017, resulting in the use of a so-called *beauty contest*[79];.[80]

Following sector consultations on the spectrum management, and in support of the goals outlined in the National Broadband Strategy, BOCRA has developed a revised Spectrum Management Strategy which will, among other things, see an update of the National Frequency Register Plan; an update of the Spectrum Management Strategy for various radio services; the formulation of a Television White Spaces (TVWS) licensing framework; an update of the Spectrum Licensing Policy for various frequency bands, and an update of the Spectrum Pricing Policy. The strategy will be implemented over a five-year glide path and will be guided by principles derived from recommendations from the spectrum management consultations. This includes, *inter alia,* an improvement to the demand assessment mechanism; encouraging infrastructure and spectrum sharing principles; the review of market mechanisms such as the transfer of spectrum; and considering the implementation of reverse auctions for underserved and unserved areas.[81]

Infrastructure sharing: To optimize digital infrastructure, *Guidelines for Sharing of Passive Communications Infrastructure*[82] came into force in 2012 and highlighted the need for the joint use of infrastructure, such as towers, cable ducts, communications equipment, and other facilities.

The primary objective of the guidelines is to establish a framework within which telecoms operators can negotiate and conclude sharing arrangements for passive infrastructure sharing. Infrastructure sharing could be extended to include active components such as Radio Access Network (RAN) equipment, although there is an acknowledgement that this is a complex practice to implement. During consultations, stakeholders expressed concern regarding the use of guidelines as opposed to regulations to ensure desired outcomes.

Consequently, with the guidelines in place, it is not clear what monitoring and enforcement mechanisms will drive compliance. Furthermore, some stakeholders maintain that the lack of a strong enforcement mechanism has led to uneven applications of the guidelines across the industry with cases of unfair pricing options among competitors, indicating scope for improvement. Efficiently enforcing and encouraging infrastructure sharing is an important policy lever to enhance service provision. A few local and international TowerCos[83] are present in Botswana (Atlas Towers, Pula Towers), enabling commercial infrastructure sharing, including potentially improving operational costs for individual operators in areas with lower population density.

Data centers: Despite aspirations to encourage the growth of a local content and cloud services ecosystem, Botswana has only one certified data center facility in the country, with Tier II certification awarded to the BTCL for their data center in Gaborone. The remaining certifications are not for operational data centers, but for projects currently being planned or in the pipeline. These include a Tier III Certification of Design Documents awarded to Orange Botswana for a BIH data center project in Gaborone, and a Tier IV Certification of Design Documents awarded to the BIH for their Government Integrated Data Center project.[84]

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79   Named due to a comparative assessment process that selects the successful applicants based on those that best meet the criteria set out
80   BOCRA Spectrum Management Consultation, 2018
81   Ibid
82   Guidelines for sharing of passive communications infrastructure, 2012
83   Towercos own, build and manages cellular towers for colocation.
84   Uptime Institute Awards in Botswana

Recommendations

R1: Reduce the price of international traffic by increasing competition and route diversity, and expediting international connectivity partnerships: BoFiNet is engaged in several important projects to enhance IP transit backhaul fiber links, which will provide increased control over the transit backhaul network and if successful improve network redundancy and capacity. In addition to these efforts further route diversification and potentially technology diversification is important.

R2: Strengthen price and quality of whole-sale services through increased private sector participation. The price and quality of wholesale broadband services is a key bottleneck for Botswana's digital transformation. Plans are underway to rationalize and consolidate public ICT infrastructure assets under the ownership of BoFiNet (including from utilities). GoB is encouraged to evaluate other ways to enhance sector performance. Options could include: 1) Considering the sale of a stake in BoFiNet to a private strategic partner to secure capital and innovation capacity; 2) Utilize the opportunity of consolidating and outsourcing government assets to create a viable private sector competitor to BoFiNet; 3) Allow ISPs to make independent arrangements for wholesale IP traffic to ensure BoFiNet is obliged to compete on price for traffic.

Equally, enabling increased foreign investment in wireline incumbent BTC could secure financial backing and expertise of a regional telecoms player to strengthen sector performance.

R3: Incentivize private sector deployment of networks, particularly in rural areas, through creating Broadband Offtake/ Bulk Purchase agreements from private operators. This incentivization arrangement would help de-risk private sector operator infrastructure investments in commercially unviable areas by guaranteeing demand for broadband services for a specified period. This could be done through a Research and Education Network (see Digital Skills) or pooling connectivity needs of other service providers, for example health institutions, hence also improving public access to connectivity.

R4: Enhance policies enabling supporting infrastructure. Overcoming the geographic barriers in Botswana requires new approaches. Developing enabling policies for TowerCos to bring down rural deployment costs for operators is one option, while incentivizing Energy Service Company models that tackle the dual problem of limited power access and connectivity in rural areas. Enabl testing and deployment of emerging technologies, such as low-cost satellite deployment, is showing promising results in other countries. Additional examples and learnings can be found in the report *Innovative Business models for expanding Fiber-Optic Networks and closing the Access Gaps.*[85]

R5: Reform UASF for efficient and effective program delivery and consider supplementary mechanisms. Given its ambitious strategy, high equipment input costs, and cost overruns with imported equipment, the fund may have to develop a comprehensive revenue generation plan to address funding. This could also guarantee the sustainability of funded projects beyond the subsidy timeframe. It is also recommended to consider alternative mechanisms, for example a "pay or play" option whereby operators expand coverage commitments in lieu of making contributions to the fund.

R6: Develop secondary spectrum trading markets in the country. The mobile market is highly subscribed and operator requirements for high-demand spectrum are set to increase as service competition moves more towards high-value data services as a source of revenue growth. Secondary markets will provide ongoing incentives for the efficient allocation and use of spectrum and can complement the existing spectrum assignment and pricing regimes. Furthermore, they provide a faster route for the recycling of spectrum within the market.

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85   https://openknowledge.worldbank.org/bitstream/handle/10986/31072/132845-7-12-2018-17-20-11-InnovativeBusinessModels.pdf?sequence=1&isAllowed=y

Digital Public Platforms

Importance of Digital Public Platforms

The GoB acknowledges that digital public platforms have the potential to transform the way people, governments, businesses, and civil society interact with each other. By facilitating digital transactions, platforms can virtually connect people and things, promoting the exchange of information, goods and services. This is especially relevant across Botswana's vast landmass where access to public services in remote areas can be challenging. Platforms can also play an integral role minimising the impact of COVID-19 on citizens, businesses, and the economy by providing uninterrupted services, for example social benefit payments to citizens effected by the pandemic. Besides improving public service delivery, digital platforms can be used to engage citizens and improve public participation, transparency, and accountability, as well as foster improved government responsiveness and stronger public trust.

Public sector transformation is an intrinsic goal in the SmartBots strategy and adoption of digital platforms is seen as key to improve efficiency and effectiveness of service delivery to citizens and businesses. This is not a new goal. The SmartBots strategy supersedes the Botswana National e-Government strategy, named *Smart1Gov*.[86] *Smart1Gov,* coordinated by the Ministry of Transport and Communications (MTC), followed the National ICT Policy of 2007 (Maitlamo). The objective of *Smart1Gov* was to *provide universal access to services using appropriate strategies and technologies for efficient and effective service delivery*. The comprehensive strategy included implementation of high-impact e-services as well as a cross-government portal, and it defined a governance structure, legal frameworks and implementation masterplan.

While progress has been made, the overall level of implementation of the strategy has been relatively low. The SmartBots action plan sets out to change this and includes efforts to prioritize and develop key public platforms and e-services, related to digital identity, procurement, tax and payments etc. Until recently digitization and e-services were coordinated by the MTC's Government Online Office. With the introduction of SmartBots, efforts have been made to link the role and team within the wider framework of SmartBots. In addition, SmartBots will establish a *Digital Innovation Hub for Public Sector Transformation* with an ambition to co-create services together with start-ups and local innovators for public and commercial use within and beyond Botswana. As a part of this process several hackathons for development of public mobile applications have already been completed and more are planned.

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86   Two phases of strategies have been launched to date: 2011 -2016 and 2015 -2021.

Diagnostic Findings: Current State of Digital Public Platforms

Digital Public Platforms Status

Botswana has made progress digitizing the public sector in recent years, reflected in its UN e-Government index ranking, which improved from 127 in 2018 to 115 in 2020 (of 193 countries). Despite this positive trend, Botswana's performance still remains below the average for the Southern Africa region and is particularly weak in online service delivery.

FIGURE 5 Botswana: e-Government Development Index (EGDI)
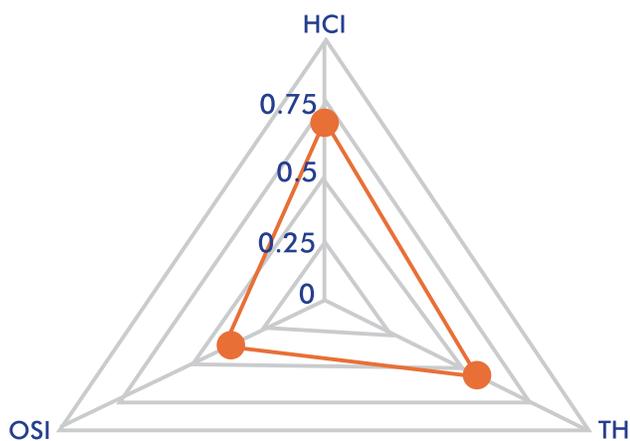
E- Government (2020 EGDI: 0.5383)

2020 Rank	115
Group	HEGDI
Rating Class	HI
2018 Rank	127
Change	-12

E-Participation (2020 EPART:0.3690)

2020 Rank	137
2018 Rank	168
Change	-31

Source: United Nations

Under Smart1Gov, several public platforms were developed mainly for internal Government use. These platforms are operated by different Ministries, Departments and Agencies (MDAs), oftentimes with limited linkages. The following section summarizes the status of different types of platforms while Annex 3, Table 9 sets out a comprehensive list of the platforms.

Core Government Systems – Government to Government (G2G)

The GoB uses several core back-office systems. Key systems include:

- The Government Accounting and Budget System (GABS) which includes modules on public sector budgeting and planning.

- The Integrated Financial Management Systems is used for accounting purposes in all MDAs, the Government payroll system; Human Resources Management System (HMIS); public supply chain, inventory and warehouse management systems.

- Cash management and banking modules for the payment of suppliers and all other accounts through BoB and other commercial banking services.

These systems, implemented on Oracle ERP, are mainly used at MFED and the Directorate of Public Sector Management (DPSM) and do not provide direct interface with suppliers, for example. Stakeholders indicated that GABS' infrastructure and hosting network frequently experiences disruptions, significantly effecting functionality.

Digital Service Delivery

While several MDAs operate service delivery platforms, few offer online self-service functionality for citizens and businesses. Examples of such beneficial interactive services include:

- An online business registration system operated by the Ministry of Investments, Trade and Industry, which has digitized some company requirements and services.

- The integrated tax management system set up by the Botswana Unified Revenue Service (BURS), which is used for tax and revenue collection from citizens and businesses. Unfortunately, the system is not yet integrated with Banks and ID systems, limiting its effectiveness.

- The Integrated Procurement Management System (IPMS), an e-procurement platform, administered by the Public Procurement and Asset Disposal Board (PPADB), is used for registering all contractors/suppliers and the management of tender publishing, submissions, evaluations, contracting and adjudication. The government is continuing to roll out the system and plans to interface the system with the BURS tax system, incorporate a Unique Identification Number for bidders/contractors in the system, and conduct more training for bidders on the use of the system.

- Additionally, MDAs host and utilize various internal digital systems that assist government to deliver external public services; including systems for import permits, driver's licenses and vehicle registration.

The systems are characterized by a one-way information flow and use paper-based manual processes: citizens and businesses must download forms and then submit the information at the Ministry. To address these challenges, SmartBots suggests supporting the development of user centric and high impact e-services (core public services that benefit many citizens). Prioritized services include electronic identity for citizens and passports, payments, land registration, licensing and vehicle registration, and full roll out of e-procurement and tax revenue collection. The first batch of services were launched in March 2021 and can be accessed online, via a mobile application, or in self-service facilities. In addition, SmartBots has set ambitious goals to digitize all services within a few years.

New e-services (2021)
- Application for common law land rights
- Application for customary land rights
- Application for internship
- Application for a Botswana driving license/permit
- Application for registration of vehicle
- Application for BAITS (Botswana Animal identification and Traceback System) user access
- Application for plant import permit
- Permissions to sell veterinary drugs, vaccines, equipment, and livestock feeds

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Digital Sector Platforms

Sector based platforms exist to facilitate service delivery, primarily for internal use, with limited interface for citizens and business. Examples of sector-based platforms include:

- A Social Registry that serves as a gateway for registration and determination of eligibility across multiple social protection programs was established by the Ministry of Local Government and Rural Development (MLGRD). The government plans to improve administrative efficiency of social protection systems with a digital Management Information System (MIS), which will help systematize the management of program beneficiary records to support the registry.

- The Immigration, Passports and Border Control platform by the Ministry of Nationality, Immigration and Gender Affairs, is used for issuance of Passports and Permits and for the Border Control System. The platform is used within the Ministry and has no interface with citizens and businesses.

Digital Citizen Engagement Platforms, Civic Tech and Open Data

The use of digital citizen engagement and feedback platforms has been low but is growing. This is reflected in Botswana's global ranking as 137th (out of 193) on the E-Participation Index.[87] GoB's website (Gov.bw) is not interactive but does guide citizens to selected online services. However, the Government uses social media platforms such as Facebook and Twitter to disseminate information and interact with citizens. Parliament has online initiatives such as "Botswanaspeaks", where electorates can raise issues and concerns with their Members of Parliament to facilitate resolution.[88] The SmartBots strategy plans to introduce more citizen engagement platforms and open data to increase civic engagement, transparency and accountability of government: these platforms will enable citizens and businesses to voice their concerns and provide feedback. An Open Data Portal is planned to aggregate datasets from all government ministries, departments, and parastatal organizations, increasing accessibility to public data.

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87   United Nations, Botswana Country Information
88   www.botswanaspeaks.gov.bw/main

Platform Enablers

The effective application of public platforms requires different enablers, including ID solutions, hosting infrastructure, and cyber-security and data protection.

ID Solutions

Identification plays an important role for citizens to prove their identity, exercise their basic rights, claim entitlements, access government services, and conduct many daily activities. The GoB recognizes this role, and in 2003 established a link between birth registration, national registration, and death registration through a unique identifier. Leveraging health institutions as a source of data, Botswana also instituted *Electronic OnSite Registration of Births and Deaths* in hospitals in 2011, which has significantly improved registration numbers.[89] In Botswana, every citizen must be registered and issued an identity card within 30 days of turning 16 years of age. The Civil and National Registration (CNR) department at the Ministry of Nationality, Immigration and Gender Affairs is the trusted source of National ID data and records.

The paper based 'OMANG' or National Identity Card, enables citizens to access public services, such as social safety net programs. Despite being free and offered through decentralized registration offices across the country, an estimated 34 percent of the population remained unregistered in 2018,[90] which is higher than most regional peers. OMANG is based on manual processes, with citizens relying on paper-driven verification. As a result, IDs cannot easily be used for digital platforms. This means that citizens transacting via digital platforms must use photocopies of the ID, stamped for authenticity by either the police, lawyers, or other commissioners of oaths. There are indications that this has resulted in fraud in the marketplace, data theft and reduced public trust in the systems. The Banker's Association of Botswana (BaB) has however launched a system that facilitates the instant online verification of identity cards against the national database, which is noticeable progress.[91]

Currently, multiple identification documents (driving licenses, national IDs, and passports) are used for transactional business. In addition, many organizations use previously provided hard copies of identification to verify a customer when incurring a new transaction, as they do not have access to the source identification data in the respective Department or Ministry, further increasing risk of fraud. The SmartBots strategy has prioritized developing an electronic ID, alongside reviewing and adopting digital identity authentication mechanisms which cater to disadvantaged citizens and people living with disabilities.

Hosting Facilities

As detailed in the *Infrastructure Chapter*, the limited investment in Government data centres has hampered ability to provide dependable, secure, and resilient hosting capacity for critical platform and services. However, new public data centres are planned. To date, Botswana has had limited capacity to host in-country cloud services, although there are indications that SmartBots includes plans to establish national open and interoperable cloud computing infrastructure. To support cloud migration Botswana will also need to rely on the capacity of existing commercial data centers.

Data Protection and Cybersecurity

Key strategies and legislation related to cybersecurity and data protection have been drafted but implementation is lagging. MTC hosts a Network Operations Center (NOC) and a Security Operations Center (SOC). However, these institutions are in their infancy and do not monitor or support the full footprint of public digital infrastructure, platforms and services. This represents a significant risk for existing and planned e-services, including erosion of public trust in digital platforms. There have been proposals to include a full cybersecurity accreditation program at DIT and SmartBots in order to cater to industry specific standards, specifically for the public sector. This would be an important step towards building internal public capacity.

89   World Bank. 2016. ID4D Country Diagnostic: Botswana
90   2018, Global ID4D Database, World Bank
91   https://news.thevoicebw.com/bankers-association-launches-ekyc/

Constraints Developing Digital Public Platforms

Despite a well-articulated vision and strategy in Smart1Gov, the level of implementation of public platforms has been relatively low. As a result, the gap has been widening between the vision set out in the Smart1Gov strategy and the actual delivery of systems. Several factors seem to account for the implementation lag:

ICT procurement: MDAs oftentimes independently procure new ICT infrastructure and software solutions. As a result, most of these solutions are not geared towards a common objective of interoperability, integration, and attested information exchange. Integration requirements are subsequently siloed and do often not result in a seamless user experience. Developing standard ICT procurement protocols would facilitate ICT integration and interoperability. In addition, Governments in UK (Annex 3, Table 10) and Estonia have introduced "spending controls" where a centralized agency reviews and clears business cases, terms of reference and requests for proposals relating to ICT procurements above a certain threshold to ensure they meet the stipulated standards and also check for duplicate purchases.

- **Enterprise architecture:** Besides being largely siloed, most of the digital systems analyzed emulate the manual processes they replace, rather than re-engineer services to enhance efficiency and usability. However, at the time of writing this report efforts were underway to break the silos and introduce an enterprise architecture approach to ensure a stronger backend and systems aligned with cross government goals.

- **ICT vs. public reform:** A key challenge identified in stakeholder consultations was the perception of Smart1Gov as an information technology project, rather than a public sector modernization and reform project. SmartBots and Government Online have positioned the e-governance plans within a wider digital transformation agenda and applies a whole-of-government approach, which intends to drive necessary cross-government support and coordination and link services with higher-level strategic objectives.

- **Human capital:** One bottleneck that has seemingly delayed Smart1Gov implementation has been availability of specialised staff to drive implementation. Currently, public IT specialists are regularly employed as external consultants, who by default have a short-term perspective and are not aligned with the overarching strategy pursued by Government. This challenge will only grow alongside growing digital ambitions. The public sector in Botswana needs business process analysts, enterprise architects, user experience specialists, cybersecurity experts, and data scientists, as well as specialised staff to oversee ICT procurement and vendors. Finally, vertical IT specialists are needed to support different sectors of the economy, such as digital financial services, public finance management and sectors such as healthcare and education.

- **Standards and regulatory compliance:** Keeping regulation up to speed with rapid digitization is challenging. Likewise developing digital platforms with regulatory compliance at the core has been and will continue to be challenging in Botswana. Standards such as the EU's General Data Protection Regulation (GDPR) and Payment Card Industry/Data Security Standard (PCI/DSS) are pushing best practice globally. Cross-government skills are needed to advise, monitor, and develop compliant solutions.

- **External interoperability:** There is limited integration between Government, public enterprises and private sector ICT platforms. This is important to achieve data correctness, completeness and integrity. For example, as the BURS platforms are not integrated with GABS, banks cannot electronically validate customer ID with national ID data at the Civil and National Registration (CNR) department.

- **Connectivity:** Successful digitization naturally hinges on adequate connectivity. Stable broadband access is currently a challenge both in public offices – and not least in remote rural areas. To ensure inclusive access expanding public access points to online services will be important.

Recommendations

R1: Strengthen enterprise architecture principles to guide cross-government digital projects. To move from *digitization* of individual services to public *digital transformation* a new approach is needed. Other countries have successfully combined *enterprise architecture principles* and *ICT procurement protocols* to ensure software development is both tailored to individual organizational needs and cross-government requirements. See Annex 3, Table 10 for a country example of harmonizing ICT procurement.

R2: Develop a Center of Excellence to support MDAs and enable skill development. Cross-government adoption of new ICT principles requires support, enforcement, and incentives. This could be done by establishing a *Center of Excellence* within or beyond SmartBots to maintain and develop a highly skilled IT team to serve all MDAs and provide technical support and strategic and technical alignment across digital projects. Reference could be made to similar practices in Austria (Federal Computing Center under the Ministry of Economy) and South Africa (State Information Technology Agency, SITA).

R3: Prioritize the sequence of digitization without skipping steps: Before digitizing more services, it is recommended to develop a consolidated register of planned and existing platforms and develop clear criteria for the sequence of service digitization. These criteria can relate to expected user volume and time-savings potential but should also take natural digitization steps into account. Enabling citizens to download all the most-used government forms under a single URL as a first step, and then adding more advanced transactional services on top of this, might for example create more impact than focusing on a few advanced services first.

R4: Strengthen cross-cutting enablers to improve interoperability, prioritizing digital ID. To accelerate digital service delivery, it is advised to invest in the foundational enablers that allow cross-service integration and efficiency. This includes adopting and enforcing an *interoperability framework*, as well as *data standards* and *data validation* mechanisms. Accelerating implementation of *Digital ID* is equally critical to support efficient service access and delivery. Other countries are for instance using COVID-19 vaccination drives to boost enrollment in national digital ID systems. Expediting implementation of the Data Protection Act and Cybersecurity regulation is likewise critical to build public trust to drive adoption of e-services.

R5: Modernize public platforms to become service delivery oriented and user centric. To reap the benefits of digitization, advanced services often require rethinking the service-flow. This can be done by engaging users and evaluating dataflows across existing services and, based on this knowledge, apply business process re-engineering methods to develop, test and refine user-centric solutions. To allow this, the public sector needs to ensure user-experience and business process specialists are recruited alongside other technical staff in IT departments.

R6: Integrate citizen and business engagement mechanisms in public platforms to improve service delivery and enable feedback. The GoB is encouraged to formulate whole-of-government CivicTech strategies focused on developing robust citizen engagement platforms. This could include engagement mechanisms for selected e-services, a government-wide Citizen Relationship Management system (CRM) for case management and complaints handling, and accelerating access to key public information and data in an open data standard format.

Digital Financial Services

Importance of Digital Financial Services

Digital financial services (DFS) consist of a broad range of financial products and services, such as payments, transfers, savings, credit and insurance, that are accessed and delivered via digital technologies. They offer convenience, security, and efficiency for people, businesses, and governments to transact digitally. Given their potential to enhance efficiency and expand access to financial services through a broad range of payments use cases, DFS are increasingly viewed as central to the development and transformation of economies. This also holds true in Botswana, where growing competition in the provision of financial services has led to the emergence of new digital solutions and platforms which can support the provision of card, mobile and internet-based payments, making it easier for customers to link up with merchants and facilitate payments. The solutions, which include payment aggregation, payment gateways, and remittance platforms, are provided by locally incorporated FinTechs, banks and non-bank financial service providers.

Recognizing the importance of DFS, the GoB developed the *National Financial Inclusion Strategy* (2015-2021), spearheaded by the Ministry of Finance and Economic Development.[92] In addition, the Bank of Botswana (BOB) led the development of the *National Payment System Vision and Strategy* (NPSS) following a consultative process with public and private sector stakeholders in the financial sector. [93] These strategies are organized around ten pillars, [94] including retail payments and fintech developments, considered key in creating an ecosystem for DFS. Authorities in Botswana also acknowledge credit market development, consumer protection and financial literacy as priority areas for achieving financial inclusion and DFS targets. To this end, the Ministry of Investment, Trade and Industry (MITI) has established a budget line to support activities in these two areas.

The MITI, in close cooperation with the United Nations agency, UNCTAD, has developed a national e-commerce strategy.[95] If implemented alongside the SmartBots initiative it could propel adoption of digital financial services as well as other services (see details in Digital Business chapter). [96] Specifically, SmartBots aims to (i) secure access to a broad range of appropriate and affordable DFS, (ii) achieve greater transparency and efficiency of business and government processes, and (iii) create platforms to support economic activity.

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92   Botswana, Financial Inclusion Roadmap and Strategy 2015-21
93   Including regulatory authorities Bank of Botswana, Non-Bank Financial Institutions Regulatory Authority (NBFIRA) and Botswana Communications Regulatory Authority (BOCRA).
94   Payment and securities settlement; legal framework; government payments; retail payments; oversight of the NPS; cooperation; access criteria and participation; risk management; public education and outreach programs; financial technology developments.
95   In the context of the SADC e-commerce regional strategy, the Africa Continental Free Trade Agreement and the broader national goal of transforming Botswana from a middle income to a high-income country.
96   Digital transformation agenda under E-services which include e-minerals, e-health, e-learning and e-commerce.

The introduction of the Electronic Payment Services (EPS) Regulations of 2019 also marked a significant milestone in the DFS space in Botswana. In allowing direct entry of non-bank payment service providers into the financial services space, it broadened the network of providers that can offer DFS and played a significant role in creating an enabling environment.

Diagnostic Findings: Current State of Digital Financial Services

Financial Inclusion

As of 2017, every second adult had a bank account in Botswana,[97] a number which has remained fairly constant from 2014 to 2017 (52 percent in 2014 vs. 51 percent in 2017) while those with only a bank account dropped from 49 percent in 2014 to 45 percent in 2017. The reported reasons for this slight decline were insufficient funds (38 percent), cost (12 percent), religious reasons (11 percent), lack of necessary documentation[98] (11 percent), and distance (9 percent). Despite this, Botswana is still ahead of the Sub-Saharan Africa regional average of 43 percent for account ownership but lags behind comparable countries like Namibia (81 percent) and South Africa (69 percent).[99]

FIGURE 6 Current Level of Financial Inclusion Split by Gender, Account (% age 15+)
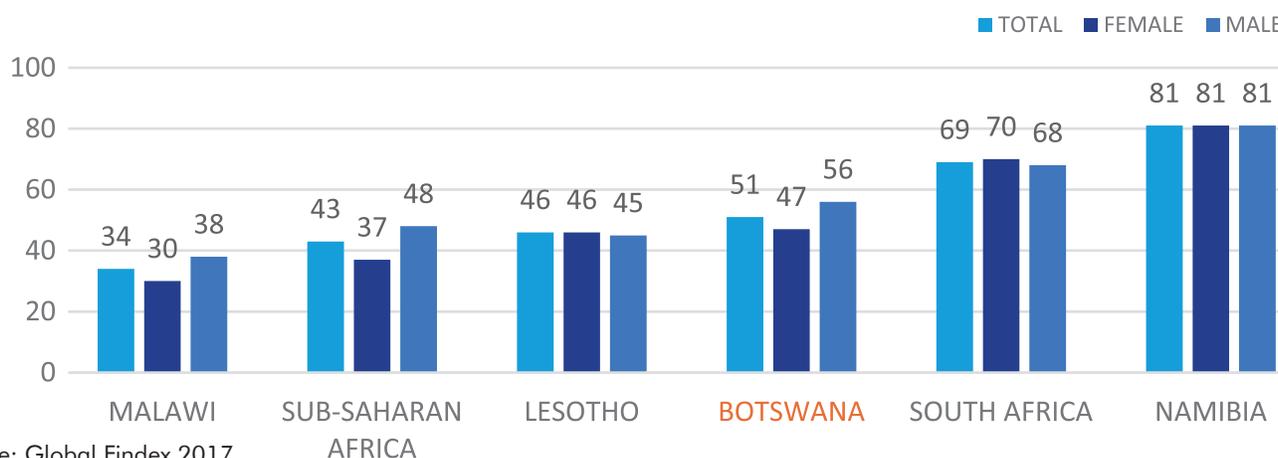
Source: Global Findex 2017

The gender gap in financial inclusion is significant in Botswana: 56 percent of men report having an account at a bank, financial institution, or mobile money service, but only 47 percent of women have a transactional account.[100] The difference in account ownership levels among men and women is wider than in neighboring countries such as Lesotho, South Africa, and Namibia. Account ownership among rural Botswana, however, stands at 48 percent: only slightly below account ownership at the national level (51 percent), implying a low urban/rural divide.

Saving, Borrowing and Insurance

The value of the outstanding credit issued through commercial banks has increased year over year, particularly the ones issued to households. However, the reliance on formal financial institutions to save or borrow is limited: while 47 percent of Batswana reported having saved and 37 percent borrowed in the past year, only 18 percent saved, and 5 percent borrowed from a formal financial institution (Figure 7). Informal channels are hence the dominant means of saving or borrowing and include savings clubs and family or friends. 7

97   2017 Global Findex
98   Such as national identification, wage slip
99   BOCRA
100 Transactional account is an account at a bank or another type of financial institution or mobile money service provider

FIGURE 7 Saving and Borrowing
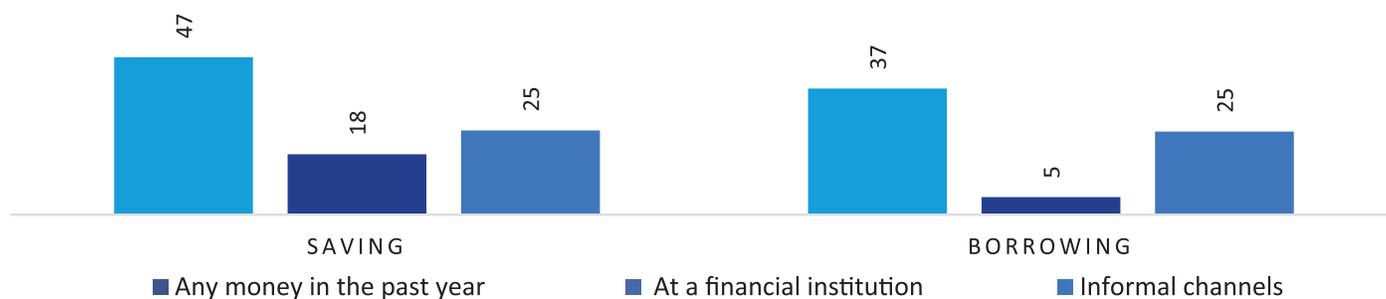
Source: Global Findex 2017

The insurance industry in Botswana is relatively small with many citizens finding premiums unaffordable. The insurance sector has however grown between 2015 and 2019 in terms of gross premium written.101

Remittances

Compared to the other countries in the region, Botswana's remittance inflows are much lower, due to the country's very low migration rate. Botswana's highest ever recorded remittance inflows (8 percent of GDP),102 were in the 1980's when the country experienced high migration to South Africa. Since then remittances have fallen to a point where they averaged 0.4 percent between 2000 and 2017. Remittance outflows are driven by a significant expatriate population and migrants from neighboring countries of South Africa, Zambia and Zimbabwe.

Remittances in Botswana are primarily sent or received through a bank account or financial institution: in 2017, 32 percent of adults sent or received a domestic remittance, higher than the average for upper middle-income countries (27 percent).[103] During the years 2017-2019, cross border personal remittance flows increased, culminating at USD 53 Million in 2019, equivalent to 0.29 percent of GDP. Among the various channels used for remittances, 19 percent used a financial institution or a bank account, and 17 percent either sent or received domestic remittances through a mobile phone. A much smaller proportion relied on an over-the-counter service (7 percent) or used cash (5 percent). Remittances constitute an important use-case for DFS and there is potential to evolve cross-border payments systems to better enable remittance flows from neighboring countries.

FIGURE 8 Sent or Received a Domestic Remittance (% age) 15+)
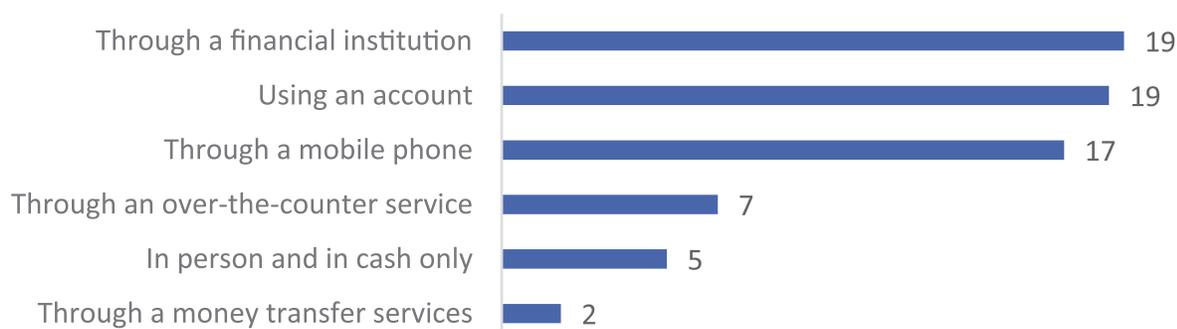
Source: Global Findex, 2017

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101 NBFIRA
102 UNCTAD, 2020
103 Global Findex

Digital Payments

Digital payments are driving the growth of DFS through digital banking solutions, card-based transactions, and mobile wallet transfers provided by banks and non-bank service providers. Botswana Post has made significant advances investing in a platform that has given it an "aggregator" status, with capability to facilitate customer-to-merchant payments throughout the country, including payment of utilities, insurance and person to government (P2G) payments for renewal of driving and vehicle licenses.

Mobile money account ownership increased from 21 percent to 24 percent between 2014 and 2017, while usage of digital channels to make payments remained constant in the same period: approximately 42 percent of adults reported making or receiving a digital payment in both 2014 and 2017.104 However, as shown in Figure 9, card-based transactions via point of sale (POS) terminals, and ATMs increased at a sustained level while electronic fund transfers (EFT) maintained very gradual growth during the period 2018-2020. Use of cheques has declined, alongside ongoing dialogue to discontinue cheque use. During 2020, likely due to COVID-19, POS transactions fluctuated while use of cash remained strong (reflected in ATM usage).

FIGURE 9 Transaction by Payment Instrument/Channel (thousands)
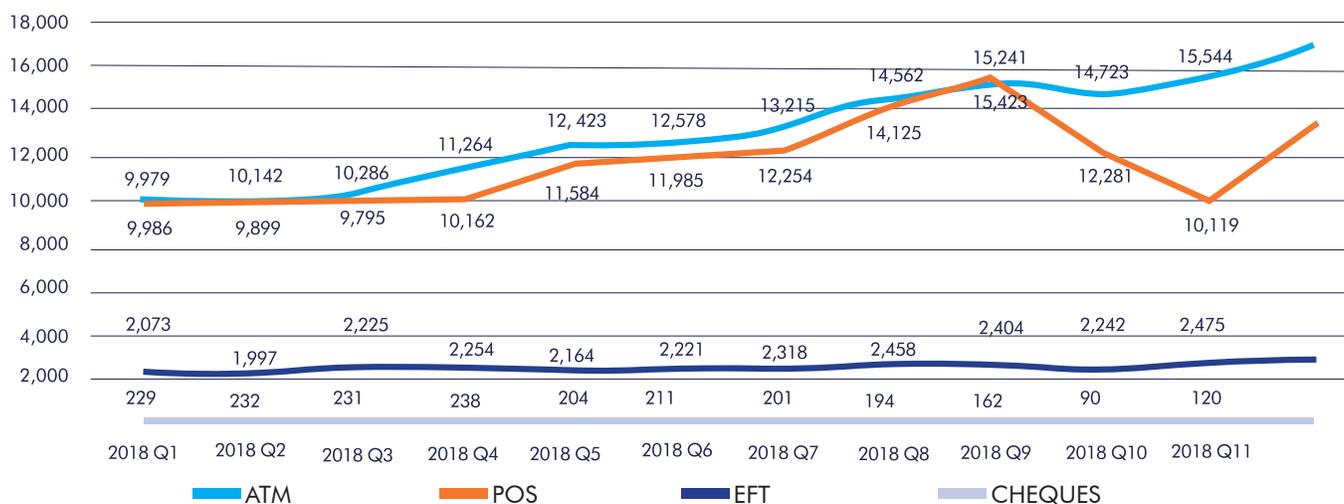
Source: Bank of Botswana, 2019

Banks consulted for this study confirm that the COVID-19 pandemic has accelerated consumer adoption of digital financial services, including increased use of remote and digital banking during 2020. The use of digital payments in Botswana (42 percent) is ahead of the regional average (34 percent) and comparative countries such as Lesotho (38 percent) but lags behind South Africa (60 percent) and Namibia (71 percent) (2017 data).

FIGURE 10 Digital Payments Made or Received (% above age 15)
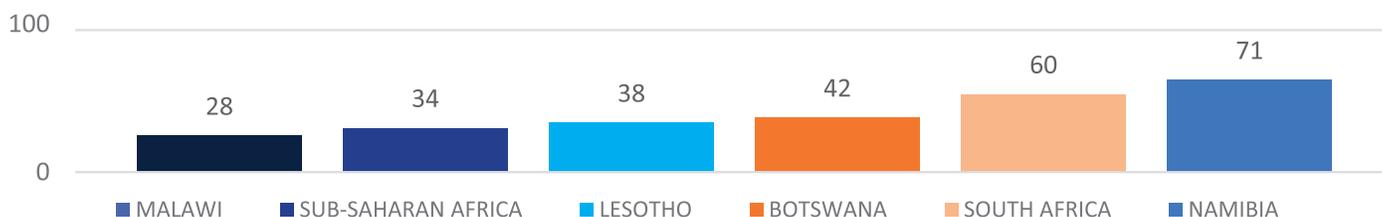
Source: Global Findex 2017, SSA excludes high income

104 Global Findex, 2017

DFS Innovations

To meet growing demand, banks and other DFS providers are ramping up investments in digital channels. Examples of recent payment innovations include credit cards co-branded with mobile money operators, and deployment of mobile based point of sale (POS) solutions, which use a standard mobile phone as a point of sale. A sign of maturing DFS solutions is the use of one-time-pin (OTP) or transaction authentication number (TAN) to access DFS platforms and authenticate orders. However, there is a need for publicly disclosed service level agreements (PSLA) on availability and performance of DFS digital channels to ensure consistent and convenient user experience across these channels.

Despite examples of recent new services, DFS in Botswana remains nascent and is mainly driven by banks that have adopted digital banking, Botswana Post and four FinTechs (including the mobile money operators). Market players have suggested that the lengthy and complicated pre-approval process for new services is a barrier to innovation.

Public Services and DFS

GoB is actively pursuing DFS solutions to enhance public management and services. The automated interface between the Office of the Accountant General (AG) and the BOB as banker to Government marked the first step in introducing efficiency in the disbursement of government payments using the Botswana Interbank Settlement System (BISS) and Botswana Automated Clearing House (BACH) systems. Opportunities exist for supporting the uptake of DFS for government-to-person (G2P) through use of mobile wallets and other instruments and channels; however, this would need to be complemented by processes and solutions to increase the ability of public institutions to accept payments, and the embedding of these into the public service digital delivery offering. Public transport (train, bus, and taxi) transactions are mostly cash based; the promotion of electronic payment acceptance in this sector could foster daily DFS usage. The completion of a public sector central payment gateway is set to enhance safety and efficiency for person-to-government (P2G) payments.

Enabling Environment for DFS

DFS infrastructure

Botswana has made significant strides laying the foundational financial infrastructure to support the evolution of digital financial services. Notable developments include the Botswana Interbank Settlement System (BISS), the real time gross settlement (RTGS) system, owned and operated by BOB; the Botswana Automated Clearing House (BACH), owned by the Banker's Association of Botswana (BAB), and comprised of a cheque clearing system and an electronic funds transfer (EFT) system. Direct access to the BISS and BACH is restricted to licensed commercial banks, the only banks permitted to hold settlement accounts at the central bank.

Banks have access to the services of two credit reference bureaus (CRB), both of which are foreign owned. However, up until recently credit bureau operations were lean, with reporting limited to negative data, creating challenges for evaluation of customer risk profiles. Through strong collaboration at the Bankers Association of Botswana (BAB), participating commercial banks now report positive data as well, thus enriching the credit information data. There is no collateral registry in Botswana; however, this is currently under active consideration along with the Movable Property Bill that will govern its operations. The implementation of frameworks, standards, and protocols for consumer data management, such as for payment related information (PCI DSS) and exchange between banks, are not in place at present. Addressing this by establishing appropriate frameworks and practices, for example inter-bank consumer data portability, would increase efficiency and ensure high security standardization.

The access criteria for the BoB payment systems currently favor commercial banks over other financial service providers. The Electronic Payment Services (EPS) regulation, issued in January 2019, has been a positive development, supporting the involvement of non-bank service providers, for example mobile network operators and other FinTechs in digital financial service development. However, the new interplay between traditional banking and non-banking stakeholders creates regulatory challenges on oversight roles, amongst other things.

The National Clearance and Settlement Systems Act, enacted in 2003, needs to be reviewed to ensure it sufficiently addresses all legal and regulatory aspects of the payment and digital financial services, including explicit guidance on the BOB's oversight role in the national payments system.

Interoperability

The lack of interoperability between payment instruments, namely mobile wallets and bank accounts leveraging Electronic Fund Transfer (EFT), is hampering both DFS development and the general efficiency and convenience of financial services. To address this issue, public and private sector players established the National Payments Task Force (NPTF) in October 2020 to establish a so-called *national switch*[105] - driven by business and policy considerations. It is expected that removing these interoperability barriers will drive new use-cases for both mobile wallets and bank accounts and increase financial inclusion. However, important details need to be sorted out, including pricing levels for market players that connect to the switch infrastructure.

Digital ID and Know-Your-Customer (KYC)

The BOB supervision on licensed entities applies a risk-based approach to anti money laundering and combating financing of terrorism and allows use of simplified customer due diligence (CDD) in line with the financial intelligence regulations. However, customer due diligence processes are oftentimes onerous, according to some stakeholders consulted, regarding especially identity verification and validation. Digital ID is critical for onboarding clients efficiently onto DFS. As described in the Digital Public Platform chapter, Botswana has a foundational ID system, but digital ID is not implemented yet. The BAB has launched a system that facilitates the instant online verification of identity card against the national database.[106] Additional solutions for the financial sector to move to full digital verification and customer data validation during enrollment are still required.

A tiered customer due diligence system for mobile money operators is in place to support financial inclusion: this involves registering consumer data in a privately held database, with BOCRA supervising the process.

The BAB has been spearheading discussions to introduce a centralized KYC registry. At present, key operational industry challenges include (i) identifying higher risk customer profiles, for example politically exposed persons (PEP) and subsequently implementing enhanced due diligence for these customers (ii), undertaking regular due diligence updates and (iii) maintaining customer data for 20 years.[107]

Cybersecurity

Cybersecurity is of paramount importance for the development of DFS, and financial sector authorities and service providers have prioritized it. The BoB are planning cybersecurity improvements through the National Payment System Strategy 2020-2024, including the formulation of an NPS cyber-security policy framework to mitigate cyber risk, and improve capacity to respond to cyber-attacks. However, discussions with market participants highlighted deficiencies both in terms of investments and human capital trained to address the growing threats in cybersecurity.

Consumer and Data Protection

The Consumer Protection Act of 2018 lays the legal basis for consumer protection issues across various sectors. In terms of DFS, relevant provisions of the Act include disclosure and transparency, data protection and privacy, protection of consumer interests and prohibition and control of unfair practices along with dispute resolution mechanisms. The Data Protection Act of 2018 regulates the protection of personal data (see Policy Context chapter). However, as the financial services regulatory authority, the BOB has used these two statutes to draw relevant provisions into the regulations and policy guidance notes relevant to DFS.

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105 A solution providing interoperability between Payments System Providers and Payments System Operators to route transactions between endpoints.
106 https://news.thevoicebw.com/bankers-association-launches-ekyc/
107 Financial intelligence Act: N10, 2019

Digital Financial Services Skills

The maturation of DFS in Botswana will need to be supported by requisite measures aimed at building capacity for regulators to monitor, oversee and supervise these developments. Supervisory capacity in this area remains a challenge, not only for Botswana but for the wider region. Capacity gains would potentially allow the regulatory approach to transition from rule to principle based, which focuses on increased monitoring and dialogue with market participants, including smaller and innovative partners.

The digital skill gap also spills into the private sector, where the lack of a digital savvy workforce is noted as a barrier to innovation. Subsequently, it has been suggested that relaxing visa requirements might encourage and attract specialized foreign workforce. Finally, financial literacy and digital skills among the population in general and especially disadvantaged groups is necessary for successful adoption of DFS and financial inclusion.

As described in the Digital Skills chapter, many students graduate primary and secondary school without adequate digital skills hampering their ability to use DFS services. On a positive note, Botswana is among the most financially literate African countries in a global survey from 2016.[108] However, local stakeholders emphasize financial literacy nevertheless is a persistent challenge especially in the wake of COVID-19 which has negatively affected many households financially. Initiatives exist to strengthen financial literacy, including the Financial Literacy Trust and mobile games such as MogwebiQuest.[109]

Digital Infrastructure

Financial inclusion requires availability and affordability of connectivity across Botswana. As noted in the Digital Infrastructure chapter, mobile coverage is relatively good, and entry-level devices and data packages affordable, while broadband penetration is low and relatively expensive. The available infrastructure hence allows simple mobile money services but hampers roll-out of more advanced digital financial services requiring computers.

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108 Financial Literacy Around the World: Insights from the Standard and Poor's Rating Services Global Financial Literacy Survey, 2016
109 Financial Literacy Botswana and and Mogwebi Quest

Recommendations

R1: Develop a national identity infrastructure that is accessible to financial services and mobile operators through digital means (an API), allowing Payment Service Providers to match the information of the document presented by the citizen to the one issued during enrollment. Moreover, if the system is developed to support transactional authentication, connecting such ID systems to payments would further enhance interoperability. This could enable customers to perform transactions everywhere regardless of device, provider, or account type, by simply verifying their identity. Such a system could help to overcome merchant payments barriers and increase competition by levelling the playing field between banks, MNOs and fintech.

R2. Establish an MoU between BOCRA and BoB to address and formalize inter-institutional cooperation. For good governance, the requirement for electronic money issuers to register as a separate legal entity in line with the EPS regulations should be enforced. Separating the incorporation of mobile financial services providers from parent MNO companies is considered good practice and would clearly demarcate the regulatory oversight by BOCRA and BOB. While there may be no challenges faced in the current set up due to the good cooperation between the two regulatory authorities, a clear-cut position on this is desirable to avoid possible regulatory arbitrage.

Medium-term

R3: Promote the expansion of the number of public services that could be paid for online through a payment gateway, including tax collection. The project for creation of a new central payment gateway is currently at the inception phase, and its results could be applied to services for citizens and companies. Botswana Post led the development of an online payment portal for specific use cases – these capabilities could be leveraged to expand the number of use cases supported.

Longer-term

R4: Adopt interoperability using an open and transparent consultative approach encompassing the widest possible range of stakeholders at the National Payments Task Force level. Central infrastructure that enables transactions across bank accounts and mobile money wallets, and various providers would be beneficial. Conducting a cost study of the payment instruments to assess and determine the appropriate cost components and pricing of a possible interoperability framework is also recommended.

R5: Review and amend the NPS Act to widen access to the payment system and ensure consistency in regulating payment service providers and strengthening regulatory mandate and capacity of BOB in DFS. Targeted measures are needed for building capacity for regulators to monitor, oversee and supervise implementation of the Electronic Payment Services Regulations. This could include adopting a policy position on the introduction of a mobile number portability framework, informed by a study conducted on the topic.[110] The benefits of avoiding one person holding multiple mobile money accounts could be a useful consideration to inform the policy decision.

R6: Create a regulatory sandbox for fintech to stimulate innovation and promote use of DFS products. Experience from other countries (for example UK, Singapore, Thailand, and Malaysia) shows that a regulatory sandbox can be a useful driver and enabler for DFS innovations. However, experiences from these countries also indicate a well-functioning sandbox requires adequate staffing and infrastructure and is first recommended when foundational DFS structures are in place. [111]

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110 The Adam Smith Society has previously assessed the potential of a portability framework.
111 World Bank, Global Experiences from Regulatory Sandboxes, 2020

Digital business

Importance of Digital Businesses

The COVID-19 pandemic has propelled the use of e-commerce platforms and tied digital business to economic recovery in Botswana. There is hence a growing recognition that digital technologies can act as a catalyst and a critical enabler for enterprise development and inclusive growth across sectors and firm size. Additionally, digital businesses are viewed as an important and growing sector in their own right. At the heart of this development, digital entrepreneurship[112] supported by a dynamic ecosystem[113] is critical for the launch of new ventures. These entrepreneurs offer novel digital products, platforms, and services, leverage innovative technology and business models, and open new markets. They can contribute to net employment growth and enhance the competitiveness and productivity of the entire economy.

Digital business is a key priority for Botswana's government, as outlined in the National Entrepreneurship Policy (NEP), SmartBots, and the Botswana E-Commerce Strategy. In 2019, Botswana became one of several African nations to adopt a National Entrepreneurship Policy (NEP) under MITI. The NEP focused on key pillars such as improving the regulatory environment, access to early-stage finance, ICT infrastructure, education and skills development, and technology transfer and innovation for industrial development. The Local Enterprise Agency (LEA), a parastatal organization under MITI, has now been mandated to implement this policy. As described, additional initiatives are underway to strengthen the regulatory environment for digital business and e-commerce. Core legal frameworks governing data privacy, consumer protection, and cybersecurity have been drafted and are in different stages of approval and implementation. Once all critical laws have been passed, effective implementation by the GoB will provide a competitive enabling environment for private investments into the digital business sector.

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112 The term 'Digital Entrepreneurship' commonly refers to the process of creating new Internet enabled/delivered businesses, products or services. The definition used here includes startups that bring new digital products or services to market, as per WBG, 2016. Enabling Digital Entrepreneurs by Welsum, v. D. Start-ups are typically defined as young (under 5 years) firms that are pursuing growth.

113 Entrepreneurship ecosystems usually encompass support organizations (such as incubators, accelerators, innovation hubs and co-working spaces), early-stage financing, human capital as well as a favorable policy and regulatory environment. According to OECD, "an entrepreneurship ecosystem is constituted by a set of interconnected entrepreneurial actors, organizations, institutions, and processes that formally and informally coalesce to connect, mediate, and govern the performance" within a local context. OECD, 2013. Entrepreneurial Ecosystems and Growth Oriented Entrepreneurship: Background paper prepared for the OECD LEED Program workshop.

As described, the 2020 Economic Recovery and Transformation Plan (ERTP) aims to expedite the digital transition. This includes supporting services to digital entrepreneurs and MSMEs, and enhancing connectivity - both critical measures for growing Botswana's emerging e-commerce market and increasing adoption of digital technologies by businesses in the wake of the COVID-19 pandemic. In line with the ERTP, SmartBots is engaging the private sector to leverage digital technologies for public sector transformation, co-create data driven products, and provide knowledge and tools to build a competitive workforce. There are several ambitious SmartBots proposals, such as the 4IR Maun Science Park, rebranding and refocusing the Botswana Innovation Hub (BIH) as a Digital Innovation Hub with a SmartBots Lab and a Commercialization Center, establishing a Science and Innovation School of Excellence, and relatedly, establishment of a Botswana Research and Education network (BotsREN). These projects, if implemented effectively, have the potential to significantly transform digital business in Botswana and attract world-class talent from beyond its borders.

Diagnostic Findings: Current State of Digital businesses

Digital Entrepreneurs and Business

Botswana is home to a growing number of digital startups[114] as well as established digital businesses,[115] including local Internet Service Providers,[116] and several local IT consulting companies. According to the startup database CrunchBase, 47 firms are headquartered in Gaborone. There are several promising startups in animation, web design and web-based solutions, online retail, advertising, and gaming. Startups are also leveraging technology to solve development challenges: for example, agritech startup Anton Tech[117] is developing a solution that allows farmers to take a photo of a disease-infested plant and send it for instant analysis, leveraging wider knowledge networks. In return, farmers receive the suggested disease name and treatment recommendation instead of waiting weeks for an extension worker.

There is clearly potential to build on this growing base and accelerate the creation of new digital businesses that can transform economic growth and create new higher-skilled jobs.

In contrast, few multinational technology companies have a presence in Botswana. These types of companies – such as Google, Microsoft, Cisco, or SAP – have served as anchors for digital business ecosystems in other African countries, leading to spillovers of talent, investment, new ventures, and mentorship for local startups. Botswana's small market makes it harder to attract multinational technology companies. However, Botswana's stable political environment, middle-income economy, and advanced digital ambitions can be leveraged as selling points for attracting such companies in the future.

FIGURE 11 Number of Startups in Botswana & Selected Peer Countries

Number of Startups in Botswana and Selected Peer Countries
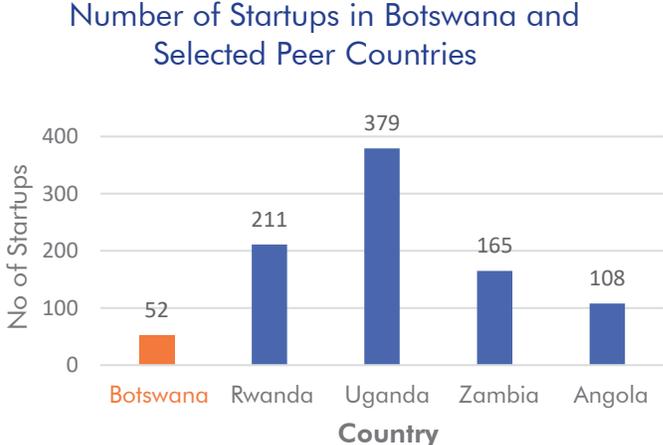
Source: Briter Bridges Database (2021)

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114 Defined as early-stage ventures that create new digital solutions or business models as part of their core products or services.
115 Refers to firms that are mainly large, platform-based and data-driven enterprises that have passed the initial startup stage, having acquired suppliers, con tractors, and consumers rapidly.
116 https://www.bofinet.co.bw/isp_list.php
117 https://anton.co.bw

A WBG report, *Europe 4.0: Addressing Europe's Digital Dilemma*,[118] lays out a framework that can help policymakers realize the potential of 4IR within their economies. The report looks at different types of data driven applications:

1. **Transactional technologies** can match supply and demand to facilitate market transactions by lowering information asymmetries; examples include digital e-commerce platforms and blockchain.

2. **Informational technologies** can exploit the exponential growth of data and the reduced cost of computing; examples include business management software, cloud computing, big data analytics, and machine learning.

3. **Operational technologies** combine data with physical automation to reduce production costs, including labor, materials and, in many cases, energy; examples include smart robots, 3D printing and the Internet of Things (IoT).

Since disparities persist in ICT access and digital skills (see *Digital Skills* chapter) initial public and private sector initiatives should focus on *transactional technologies,* for example through emphasis on technology adoption via uptake of private sector platforms. This typically requires basic digital skills, namely numeracy, ability to use a computer, and access the internet. *Operational technologies* combine data with physical automation to reduce production costs and are relevant to Botswana's advanced industries including diamond mining. Mines are increasingly using advanced software and digital solutions, including drones, to locate diamonds and optimize mining processes as well as grade diamonds. Likewise, there are ample examples of the potential of digital solutions to optimize agriculture and make it more sustainable. This is also a focus area for the SmartBots strategy, which, for example, is seeking to optimize productivity of small stock animal farms through technologies such as drones, sensors and remote monitoring tools and systems.

In Botswana, local digital businesses could explore developing software and other technologies for the mining, agricultural, and tourisms sectors.

Established companies in these sectors typically outsource software/other technology development or purchase existing services and products from foreign companies. Exploring deepened linkages between existing digital business initiatives and traditional sectors could also help accelerate the development of Botswana's digital business environment.

Entrepreneurship Ecosystem

According to the 2019 Global Entrepreneurship Index (GEI), Botswana is the top ranked entrepreneurship ecosystem in SSA.[119] Its current rank of 51 out of 137 puts it ahead of South Africa (58) and Namibia (62). GEI is a perception-based index and while the GEI indicates a favorable perception of Botswana's entrepreneurship ecosystem, it still seems less mature on some fronts than countries like Nigeria, Kenya, Egypt, and South Africa.

Despite a small market size Botswana hosts several entrepreneurship support programs. The main ecosystem actors include the Botswana Innovation Hub (BIH); Stanford Seed Transformation Program; Stanbic Bank's Acceler8; Limkokwing University; a Botswana chapter of the Global Entrepreneurship Network, and Business Botswana. Most of these programs are categorized as *"incubation;"* there are limited acceleration and investment-readiness activities that are better suited for early-stage ventures. While the many programs ensure a diverse supply of services, they also reflect a somewhat fragmented ecosystem as there is little indication of coordination across the programs.

The presence of numerous entrepreneurship support programs is promising, but additional efforts are needed to deepen linkages with regional and international entrepreneurship networks. The SmartBots strategy aims to attract anchor technology companies through the establishment of digital innovation hubs and the Maun Science Park.[120] As noted, large technology companies such as Google and Microsoft do not have Botswana offices. However, telecom company Orange (headquartered in France), ISP provider Nashua (headquartered in South Africa), and Stanbic Bank (pan-African commercial bank) have signaled interest in deepening support to emerging digital startups through corporate social

118   Hallward-Driemeier, Mary; Nayyar, Gaurav; Fengler, Wolfgang; Aridi, Anwar; Gill, Indermit. 2020. Europe 4.0 : Addressing the Digital Dilemma. World Bank, Washington, DC. World Bank.
119   The 2019 Global Entrepreneurship Index. The GEI scoring is based on survey responses.
120   www.maunsciencepark.com

responsibility initiatives or open innovation programs. The success of programs, and therefore the success of supported startups, is intrinsically linked to the quality of services they provide. Beyond anecdotal evidence, little public data exist on the impact and performance of existing structures. Stakeholders point to the varying quality of the services delivered in the programs, and the absence of an integrated suite of services tailored for the different needs of startups at various stages of development. Without this type of support, it is challenging for digital startups to achieve critical milestones that contribute to consistent growth. There seems to be limited monitoring and evaluation by innovation hubs and other programs. More consistent performance data could promote competition among hubs and improve resource utilization. It would also be useful to identify good practices and scale up the most successful entrepreneurship support models.

Digital entrepreneurship activities are concentrated in Gaborone and ecosystem stakeholders have cited a need to expand programs to other locations. This is a priority given the digital divide in Botswana that consistently leaves areas outside of Gaborone out of entrepreneurship support opportunities. However, this progress hinges on e.g., availability of ICT and electrical provision across the country.

A review of current programming for micro, small and medium enterprises (MSMEs) indicate that they primarily focus on business management skills and do not emphasize digitization. This includes use of business management software for accounting, HR, payroll, or to automate other manual business functions. Targeted support for facilitating digital skills acquisition and accelerating digitalization of MSMEs can support the creation of new business models, the delivery of new products and services, and access to new customers and markets. There is a need to ensure that these support activities are co-designed with inputs from private sector stakeholders and targeted beneficiaries, are adequately funded and have robust monitoring and impact evaluation systems in place. There is potential to leverage private financing and resources in the design and implementation of these programs.

According to the Briter Bridges Database only two startups in Botswana disclosed a female cofounder. Like many countries, women-led MSMEs in Botswana tend to operate in lower productivity sectors compared to male peers, and very few digital businesses are led by women. This seems to apply to growth-oriented startups as well. Several initiatives targeting women-led businesses are underway that may help address the situation. These include Spark Ideas, which provides digital skills training and entrepreneurship coaching to women-led firms, and the recent launch of Anandi Capital and the Women First Fund, two private equity funds that are sector agnostic and target women-led MSMEs. However, these funds primarily support medium to large firms, operating in more traditional sectors. Women-led digital businesses still rely on self-funding, grants, angel networks, and venture capital (VC) funds for seed, growth, and expansion stage financing.

Botswana Innovation Hub (BIH) is supported by the Ministry of Tertiary Education, Research, Science, and Technology and is one of the main ecosystem players. However, the role of BIH as an ecosystem builder and hub can be strengthened, and it is envisaged under SmartBots to transform BIH into a "Digital Innovation Hub." Currently, there seems to be some misalignment between BIH's target beneficiaries of Series A+ firms and activities offered, resulting in a small client portfolio. BIH is experimenting with a real estate revenue model that favors established businesses and disadvantages startups and younger firms. There is untapped potential for BIH to partner with private sector actors (both regional and global) to provide more strategic, impactful and integrated support services to digital businesses. Developing a sustainable business model also seems to be a challenge for BIH. There is potential for the business model of BIH and the associated Botswana Investment Fund (BIF) to be modified, based on the experiences of similar hubs elsewhere, to increase uptake of the support services and the available funding. By offering a suite of services and funding that is differentiated to the needs of different segments of the ecosystem, the BIH could position itself as the premier tech hub in Botswana, and, potentially, in the region.

There have been various efforts to increase collaboration, knowledge sharing and networking amongst the ecosystem actors, but more can be done in this regard to increase impact of support programs. Building upon the WBG's historical engagement with Botswana's digital business ecosystem, a small group of actors have come together to establish the Botswana Startup Network (BSN), as part of a regional startup network. These network members are interested in collaborating on enhancing

the design and implementation of incubation, acceleration or investment readiness programs, launching a mentorship program, and addressing misalignment between startup athe BSN is successful in improving the quality of support organizations, this can help nascent digital startups access the right type of networks and mentors (such as founders or CEOs of established digital businesses) and promote a culture of mentorship to further the development of entrepreneurial mindsets.

Early Stage Financing for Digital Startups

Due to the plethora of public and private supported entrepreneurship initiatives, early-stage digital businesses are able to access pre-seed (ideation) and growth-stage (expansion) financing. However, there is a gap for seed and seed+ financing (defined as USS $50,000 to $200,000). It is envisioned that the emergence of angel networks, such as Angel Network Botswana, will fill this critical financing gap, while funds such as the BIF will follow-on by targeting the growth stages of startups. To date, Angel Network Botswana has conducted due diligence on three firms, while the BIF has been unable to meet its investment targets for the third year in a row. BIH, in order to meet investment targets, is experimenting with "convertible grants" in the form of grant financing that can be transformed into debt if a startup becomes successful down the line, but it is unclear if this will be a useful mechanism for prospective investees.

Compared to other small markets, the availability of early-stage financing in Botswana is higher. While Botswana's financial markets are less developed than South Africa's, access to financing is relatively available for nascent startups. Firms seeking to raise $5 million or higher will however often have to go abroad. This implies that digital business founders with strong international networks, typically those who were educated outside of Botswana or have lived abroad, are more likely to succeed versus "homegrown" entrepreneurs who have only lived and worked in Botswana.

When compared to other African peer countries, such as Rwanda, Uganda, or Zambia, the level of disclosed investment activity is relatively modest. [121] The smaller population size explains part of this, as well as the limited number of venture capital (VC) Funds in Botswana, though there are several active private equity (PE) Funds, including Venture Partners Botswana and Aleyo Capital. Some digital firms, such as Alpha Direct Insurance Company,[122] have been able to fundraise from international investors. Until Botswana's private capital markets have matured, Botswana's digital businesses will need to cultivate linkages to international sources of capital at the growth (post-seed to Series A) and expansion stage financings (Series B and later).

Other potential sources of capital for digital businesses include the Botswana Stock Exchange and the programs of the Special Economic Zones Authority (SEZA) and the Botswana Investment and Trade Centre (BITC).[123] SEZA and the BITC were established to promote investment into key sectors, however complementary efforts are needed to diversify sources of financing for digital businesses, especially for businesses in the post-ideation phase.

Digitizing MSMEs

Similar to the case in other countries, digital startups and MSMEs in Botswana receive business advisory support from separate entities and the support for startups and MSMEs are distinctly different. As part of post-COVID-19 recovery, it will be critical to incorporate digitization into MSME and private sector support programs.

As part of efforts to grow the digital business ecosystem, the SmartBots strategy also seeks to drive technology adoption by SMEs. SmartBots envisages activities to drive uptake of informational technologies, such as promoting public procurement tenders for local digital businesses and making data available through open data platform to incentivize new data-driven businesses.

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121   Briter Bridges Database, reviewed on April 30, 2021
122   Alpha Direct Insurance Co. is an insurance-tech startup in Botswana. To enable ease of future fundraising, Alpha Direct Insurance is incorporated in the US and in Botswana.
123   BITC is an Investment Promotion Agency.

Business Environment

Botswana's business environment is relatively favorable. While the entrepreneurship ecosystem is important to support digital entrepreneurs, the ability to grow is equally related to the business environment. According to the WEF's 2019 Global Competitiveness Index, Botswana's overall business dynamism is ranked at 54 out of 141, indicating a relatively conducive operating environment.

Business & Managerial skills

Both private and public sector stakeholders have cited lack of business and managerial skills as a critical growth constraint for digital startups. This was attributed to underdeveloped mentorship networks and a need to embed entrepreneurial mindset into existing enterprise support programs. This finding is in line with recent reports on acceleration programs in SSA, which revealed that many incubation and acceleration programs lacked robust mentorship networks.[124] Specifically, on digital skills, opinions diverged with some stakeholders indicating that the digital skills required for digital businesses were adequate. See the *Digital Skills* chapter for additional analysis.

ICT Infrastructure

According to stakeholders consulted, access to affordable and reliable ICT infrastructure remains a key constraint for digital businesses. Addressing these limitations and providing adequate broadband access to businesses and the general population is critical to digital business development and the market for digital solutions. Innovative initiatives such as Selibe Phikwe Economic Diversification Unit (SPEDU), a special economic zone located in the Central District of Botswana, comprised of four geographical areas, could accelerate the rollout of digital infrastructure and services to support the growth of digital businesses.

Uptake of Private Platforms

Use of private platforms beyond social media platforms - such as ridesharing, tourism, and e-commerce - is becoming increasingly prevalent in Botswana. At the same time, social media services such as WhatsApp, Facebook, Instagram, and Twitter are fairly widely used. As of January 2021, Botswana had registered approximately 1.2 million social media users: these channels are used by 51 percent of the population, with Facebook as the most popular platform in the country.[125] International ridesharing platforms, Uber and Bolt, have yet to enter the market, however local ridesharing platforms, such as Hello Cabs, are active in the market.

Local e-commerce platforms, discussed below, are emerging. In addition to locally developed marketplaces, Jumia is also present in the country. The tourism platform, AirBnB, is also active in Botswana, and given the importance of tourism to Botswana's economy, hotels actively use online websites to promote their business. International and African payment platforms such as PayPal, Venmo, and Flutterwave, are not available in Botswana, but users can transfer funds via mobile money.

Rise of E-commerce and FinTech

Use of private online trading platforms has increased in Botswana, partly driven by the COVID-19 lockdown measures. While many restaurants have launched mobile apps or enabled online ordering for food delivery, larger grocery stores have yet to embrace digitalization efforts. The ecosystem has also reported an uptick in e-commerce activity, yet the extent in growth is difficult to quantify due to limited data on digital financial transactions, and the fact that fintech usage and adoption is still in nascent stages. See the *Digital Financial Services* chapter for additional details.

Botswana is the second African country to launch an e-commerce strategy. Based on UNCTAD's e-commerce index, Botswana is considered one of the top 10 African markets based on internet usage statistics as a share of population (see Table 4 and Table 5).[126] Emerging e-commerce sites in Botswana include Skymartbw, ApexMart, DHL Africa eShop, and Botswana Post E-Services. The forthcoming Botswana E-Commerce Strategy promotes e-commerce regulations, such as regulations related to fraud and other deceptive online practices, modernizing the Trade Act to include startup friendly corporate structures, and prioritizing the digitization of traditional SMEs to allow them to launch or use e-commerce platforms.

124 E.g. Scaling Access to Finance for Early-stage Entrepreneurs in Emerging Markets: Lessons from the Field
125 Statista, Total number of social media users in Botswana from 2017 to 2021 (in millions)
126 The UNCTAD B2B e-commerce Index 2020, Spotlight on Latin America and the Caribbean

TABLE 4 Top 10 developing and transition economies, SSA

Mauritius	Tanzania
South Africa	Ghana
Nigeria	Senegal
Kenya	**Botswana**
Namibia	Uganda

Source: UNCTAD B2C E-commerce Index 2020 in SSA

TABLE 5 Internet shoppers as a share of internet users and of population, (2017)[127]

Economy	As a share of internet users (%)	As a share of population (%)
Botswana	**9**	**3.6**
South Africa	17	7.9
Namibia	24	12.1
Lesotho	10	2.1

Source: The UNCTAD B2C E-Commerce Index 2020

Another critical step to promote e-commerce will be the adoption of DFS, which can be enabled by fintech startups. At present, Botswana does not have a regulatory sandbox for experimentation for emerging fintech startups. As noted previously, Botswana also does not yet have a digital ID, which has significant implications for the compliance of fintech and insurance startups with national and international requirements. In the interim, most consumers pay for goods and services purchased on e-commerce platforms via cash on delivery, payment cards, or mobile money.

According to the Briter Bridges Database, most emerging startups in Botswana operate in the fintech, e-commerce, and DFS sectors; see Figure 12 below. The Africa Investment Report 2020[128] also noted that the funding landscape is heavily skewed towards a limited number of sectors which represent over 75 percent of funding recipients.

This includes the FinTech sector which represents 23 percent of investment activity and e-commerce which represents 19 percent of investment activity in Botswana. This signals that locally developed FinTech, other DFS products, and e-commerce solutions are starting to gain traction on the continent, including in Botswana.

Since many of these solutions must be compliant with local and international standards and regulations, the GoB can support DFS and e-commerce uptake through establishment of a regulatory sandbox to pilot innovative solutions.

FIGURE 12 Emerging Digital Business Sectors in Botswana

Sectors

■	Fintech	22.9%
■	E- Commerce	18.8%
■	Digital Financial Services	16.7%
■	Jobs	12.5%
■	Software	8.3%
■	Mobilty	8.3%
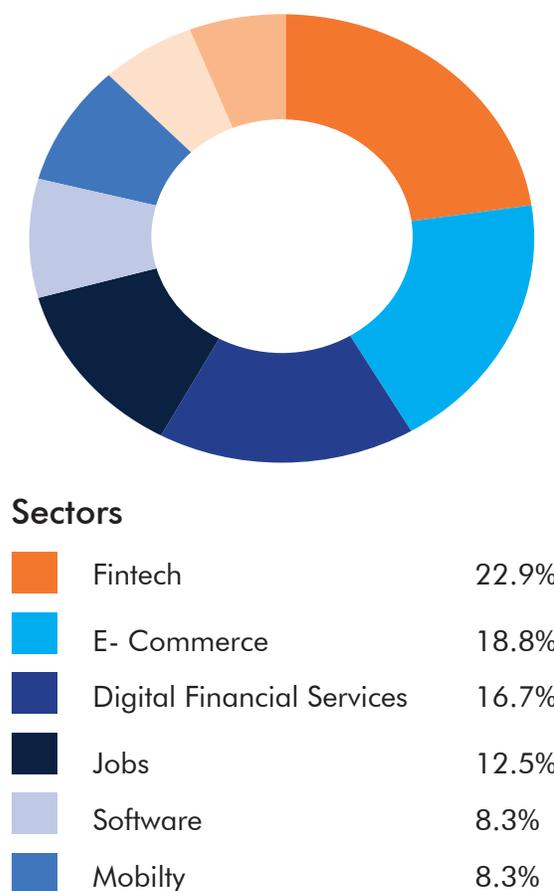
Source: Briter Bridges Database, 2020

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127 The UNCTAD B2B e-commerce Index 2020, Spotlight on Latin America and the Caribbean
128 Briter Bridges Africa's Investment Report 2020: Funding activity across the continent's tech and innovative scene

Recommendations

R1: Harmonize government initiatives to strengthen the enabling environment for digital businesses. Strengthen linkages between the NEP, the Botswana E-Commerce Strategy, and SmartBots to ensure they are complementary and mutually reinforcing. This will also crowd-in private sector input and participation in the SmartBots strategy, designed to be comprehensive.

R2: Strengthen the GoB's investment into the BIH and BIF. The GoB should reposition and refocus the BIH and BIF to ensure they are in line with SmartBots' aspirations. This includes maximizing current service offerings for the benefit of nascent and established digital businesses. It is also important to ensure that future funding to these organizations is linked to outcomes and impact metrics.

R3: Support the development of the Botswana Startup Network to reduce ecosystem fragmentation and tap into financial and non-financial resources available in the national and regional ecosystem. The goal of the Botswana Startup Network is to crowd-in relevant government ministries and parastatals, private sector and public sector partners through results-based programs such as establishment of a mentorship network; train-the-trainer activities; Open Innovation hackathons, and e-commerce training for MSMEs as part of a regional Southern African startup e-community.

Medium-term

R4: Increase the quality of support provided to entrepreneurs through capacity building. Quality across programs varies significantly. A diagnostic of strengths, weaknesses, gaps and opportunities could be conducted to better understand the type of support, the quality, adequacy and impact of services, access to early-stage finance, and sustainability of business models. Based on this diagnostic, private, public or donor funding could be leveraged to set up a "Train-the-Trainer" program for support organizations, including the BIH.

R5: Improve market access for digital businesses. Promote public procurement opportunities for digital businesses through targeted support, access to data and reducing barriers to public tenders. This is a win-win for the GoB and digital businesses. This will provide firms with access to a new, domestic market and source of reliable income, while the GoB can access the latest emerging technologies. Investments, and development of international logistics (including shipping), could also be beneficial for the expansion of manufacturing startups and/or businesses leveraging e-commerce platforms.

Longer-term

R6: Launch a study on early-stage finance in Botswana to inform public incentives that attract venture capital, private equity and angel investments into growth and expansion stage digital businesses. With a pipeline of investible ventures, there is potential to attract early-stage investors, both regional and global, to establish a presence in Botswana and play a role in the ecosystem to support local ventures in the growth and expansion stages.

Digital Skills

Importance of Digital Skills

Digitalized societies require a digitally competent workforce to drive productivity, innovation and growth, as well as digitally literate citizens who can safely navigate through, and benefit from, social media, e-commerce and e-government services. In recent decades Botswana has seen a shift in the sectoral composition of its economy. Partly driven by increasing globalization and cross-border trade, services and manufacturing are increasing their contribution to the economy, at the expense of a shrinking agricultural sector. This shift is also changing the fabric of Botswana's economy, where agriculture still employs a large share of the workforce but has a limited GDP contribution. As a result, workforce skill needs are changing.

A recent report by the Human Resource Development Council (HRDC) on *Priority Skills and Employment Trends in Botswana* suggests that the demand for digital skills in the workforce is likely to dramatically increase in the next 10 years, far beyond the current number of new entrants to the labor market with an ICT background. Shortages in a digitally competent workforce are likely to be pronounced in sectors such as finance, engineering, life sciences, construction and teaching. This has created a sense of urgency for Botswana to strengthen its human capital base by improving the digital capabilities of children, youth and adults in order to reap the benefits of digitization, strengthen local business and the economy, and navigate an increasingly globalized world. Enhanced digital capabilities of youth and adults can in turn offer an enormous impact on digital government, business and financial services. Digital skills do not just refer to an individual's capacity to use ICT devices and gain access to electronic information. A holistic notion of digital skills represents the capacity to access, manage, understand, integrate, communicate, evaluate and create information safely and appropriately. Figure 13 presents a comprehensive digital skills framework covering seven core domains. Digital proficiency levels (i.e., basic, intermediate, advanced and highly specialized) depend on the type of problems one is capable of solving, the degree of independence in dealing with specific tasks and the strategic approach to solving problems.

FIGURE 13 Digital Skill Framework
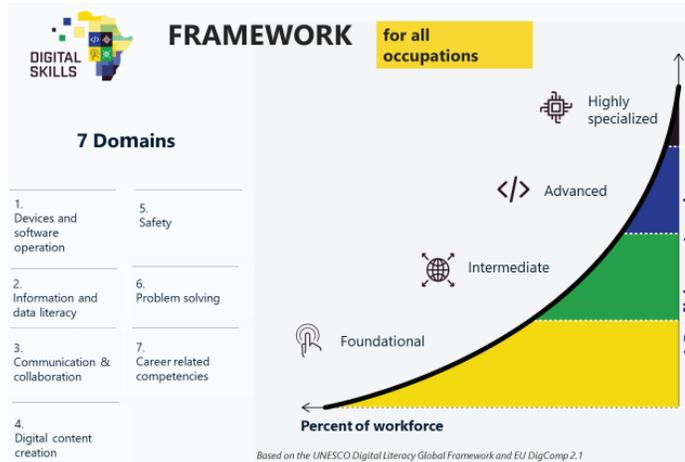
Source: World Bank, 2020

Botswana has already launched a number of policies to mobilize ICT in education and foster digital skills. They include the Revised National Policy on Education of 1994, the Education and Training Sector Strategic Plan (ETSSP, 2015-20), the National Human Resource Development Plan, the General Acceptable User Guidelines for School ICT Resources, and the National UCT Policy e–Education Cluster (2020). An updated version of the e-Education Framework for Botswana is in the final stage of approval. Finally, the Ministry of Tertiary Education, Research, Science and Technology has developed the National Transformative Strategic Thrusts Initiative Implementation Plan, which has emphasis on digitalization and partnerships both regionally and internationally.

A key result of the ICT policy has been the *e-Thuto initiative,* which has driven notable progress in some of its programs. e-Thuto was launched in April 2014 with a goal to (a) provide high speed internet to 100 primary schools (out of a total of over 800) and almost all junior and senior secondary schools, as well as 13 colleges and 40 brigades;[129] (b) integrate e-learning into the curriculum in schools; (c) integrate ICT in teaching and learning; and (d) train teachers in the integration of ICT in teaching and learning, amongst others. As recognized in e-Thuto, digital skills development relies on investments in basic infrastructure, such as electricity and internet access. Efforts to enhance connectivity including the National Broadband Strategy and SmartBots provide significant impetus for digital skills development.

Diagnostic Findings: Current State of Digital Skills

While Botswana has various education and training policies designed to support digital skills development and ICT in education, they tend to be somewhat fragmented, not anchored in an integrated and comprehensive policy framework. As a result, education and training institutions are generally working on their own approach to preparing and delivering digital skills and ICT in education programs. Moreover, there is a lack of a comprehensive, holistic and market sensitive digital skills framework that is agreed across key stakeholders, which can guide effective preparation of the curriculum, assessments, certifications and teacher training. Consequently, educational institutions face the risks of fragmentation, and investing in narrow domains of digital and ICT skills which is likely to be insufficient for the future workplace.

Looking across Botswana, a significant proportion of children and youth are likely to lack the range of digital skills required to flourish in an increasingly digitalized society. Limited internet connectivity in primary schools, the narrow scope of curriculum associated with digital skills, and poor learning progressions for many students are factors that add to this picture. There are, however, evolving bright spots. The number of IT staff in learning institutions is steadily growing, digital learning platforms have been launched successfully, and there is growing awareness about the need for tailored e-pedagogy. The SmartBots strategy also provides a promising avenue for Botswana to prepare the much-needed policy environment, infrastructure, and programs to foster digital skills development. These efforts will however require close collaboration and buy-in from education stakeholders to gain traction and drive results.

The following section summarizes state of play across education levels.

Basic-Intermediate Digital Skills Programs

Connectivity: While most primary and secondary schools in Botswana have access to electricity, many primary schools still lack ICT laboratories and access to internet (see Table 6). For secondary schools, the level of connectivity depends on the location of the school

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129 A type of school native to Botswana targeting a mix of academic subjects and vocational training.

and type of internet access that has been provided; bandwidth varies from 1 Mbps to 10 Mbps. Connecting schools with high-speed internet has been slower than initially envisaged in e-Thuto and is not always sufficiently coordinated with the infrastructure roll-out plan for local communities. Based on dialogue with the SmartBots secretariat, there are plans to expedite connectivity in schools.

TABLE 6 Number of Schools with Access to Electricity, ICT Laboratories and Internet

	Schools in Botswana	Schools with access to electricity	Schools with ICT laboratories	Schools with access to internet
Primary Schools	758	745	2*	n/a
Secondary Schools	241	241	241	241

*Some primary schools have converted selected classrooms into working space for ICTs where there is room (not part of the 2).

Source: Ministry of Basic Education (April, 2021)

All secondary schools have IT officers (around 1 per school) who serve as the first point of contact on ICT technical issues for the school. Currently 68 of 758 primary schools also have IT officers, with significant recruitment planned. Additionally, all secondary schools have teachers specifically appointed to teach ICT: around 3-5 teachers per senior secondary schools and one per junior school.[130] These numbers indicate that significant efforts are being made to expand the level of IT savvy staff in schools.

Curriculum: The national curriculum in Botswana includes elements of digital skills.[131] At the senior secondary education level, the Computer Studies curriculum is designed to provide students with the ability to use computers, solve real-life problems and develop critical and logical thinking skills. At the primary and junior secondary education level, digital skills development is integrated as part of other regular curriculum areas such as English, Mathematics and Science: mainly focused on improving familiarity towards ICT for learning purposes.

For instance, the Computer Awareness Program for the junior secondary schools prioritizes modules such as keyboard skills, word processing and database management. While the national curriculum still follows a narrow notion of digital skills (e.g., mainly focusing on the capacity to use ICT devises and access to information), there are indications that the SmartBots strategy will encompass improving existing curricula and qualifications through review of policies, curricula and qualifications for the knowledge economy.

Programs: As part of the GoB's drive to digitalize learning across the country, the e-Thuto initiative also includes an award-winning digital learning platform being implemented in the north-eastern region of Botswana. [132] It serves close to 35,000 students from primary to high school level, and showcases the potential in Botswana for e-learning platforms. However, it is likely that many primary and secondary schools which are not part of the e-Thuto initiative will be unable to deliver sufficient digital skills programming.

There are indications that even schools with ICT laboratories or internet access are likely to under-utilize ICT in classrooms.[133]

Botswana is increasing the supply of ICT programs at the secondary level; however, it also needs to work strategically to improve the demand. The 2019 Botswana Examinations Council's Report on the General Certificate of Secondary Education shows a substantial proportion of students (around 40 percent) have elected science and/or mathematic as an exam subject, while few students (less than 5 percent) elected computer science as an exam subject. Moreover, for those who have taken courses in mathematics and science, more than two-thirds of the students passed with a grade level below minimum entry requirements for most tertiary education. The majority of the 50 public and private TVET institutions in Botswana offer basic ICT training courses, but there are indications that resource constraints and a lack of qualified

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130 Information provided by MoET.
131 ICT Literacy Policy -Botswana, UNESCO 2016.
132 UN Public Service Award 2020, https://www.un.org/africarenewal/magazine/june-2020/botswana-e-learning-initiative-wins-prestigious-un-public-service-award
133 Public Expenditure Review of the Basic Education Sector in Botswana, World Bank (2019).

teachers have negatively affected the quality of these courses. Enrollment in TVET institutions is around one-tenth of that in secondary education, potentially reflecting a perception of these institutions as low-status, as is the case elsewhere.

Student progression: There are large discrepancies between the net enrollment rates and the gross enrollment rates in Botswana, for example 29 vs. 62 percent for Senior Secondary School (Table 7).[134] This indicates inefficiencies in grade progression for primary and secondary education and hampers learning outcomes in general, including that of digital skills development.

TABLE 7 Net vs. Gross Enrollment rates %

	Primary schools	Junior secondary	Senior secondary schools
Net enrollment rates	87%	57%	29%
Gross enrollment rates	100%	96%	62%

Source: Public Expenditure Review of the Basic Education Sector in Botswana, World Bank, 2019

Teacher training: Interviews with the Ministry of Basic Education (MoBE) suggest that over 95 percent of teachers at the primary and secondary education levels receive basic digital skills training through teacher training institutions. However, stakeholder interviews also suggest that these teachers are likely to face difficulties delivering digital skills programming as they are not trained in ICT didactics, and often teach in schools with intermittent or no connectivity.

The MoBE is currently working to prepare a 6-week course on distance learning with Botswana Open University, including modules on e-pedagogy. Moreover, the Botswana University of Science and Technology is also involved in building teacher capacity in ICT skills. These initiatives indicate growing awareness of the specific didactic skills needed to efficiently teach digital skills.

Capacity of Ministry of Basic Education: MoBE has a department for ICT and Media Services dedicated to ensuring integration of ICT in education through digital means, including educational TV and radio. This department has 71 staff members, of which 23 are administrative/support officers. The remainder are professionals in their fields including educationalists and technical specialists. While there are IT technicians and education officers at the regional and sub-regional level acting as in-service and quality control officers, few education officers are ICT specialists.

Advanced and Highly Technical Digital Skills Programs

Connectivity: Most tertiary education and training providers have access to high-speed internet, smart labs and qualified instructors.

Programs: The tertiary education sector offers various courses related to Science, Technology, Engineering and Mathematics (STEM), ICT and other courses through public and private tertiary education and training providers (Tertiary ETPs) and TVET institutions (see Table 8):

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134 Public Expenditure Review of the Basic Education Sector in Botswana, World Bank. (2019).

TABLE 8 Tertiary education institutions providing digital and ICT skills programs

Institution	List of Programs
Botswana Accountancy College	· BSc. (Hons) Computer Systems Engineering · BSc. (Hons) Applied Business Computing · BSc. (Hons) Mobile Technologies · BSc. (Hons) Network Computing · BSc. (Hons) Information Communication Technology (ICT)
Botswana College of Engineering & Technology	· Electrical and Electronics Engineering
Botswana International University of Science & Technology	· BEng Computer & Telecommunications Engineering · BEng Electrical & Electronics Engineering · BSc in Computer Science & Software Engineering
Francistown College of Technical and Vocational Training	· Advanced Certificate in ICT · Diploma in Systems Administration
Gaborone Technical College	· Advanced Certificate in ICT · Diploma in Systems Administration
Oodi College of Applied Arts and Technology	· Advanced Certificate in ICT · Diploma in Network Technician *Future Programs* · Diploma in Computer Networking
University of Botswana	· Bachelor of Electrical Engineering · Bachelor of Digital Media · Bachelor of Information Systems (Computer Information Systems) · Bachelor of Science (Computer Science) · Bachelor of Science (Information Technology)

Source: Ministry of Tertiary Education, Apr. 2021

Student progression: A total of 11,631 students graduated from tertiary education institutions in the 2018/19 academic year, which is a decrease of 1,990 graduates from the previous census (year). As many as 95 percent of the graduates entered the labor market with a Bachelor's degree as the highest level of qualification. For all levels of tertiary education combined, graduates in the field of engineering and science accounted for 23 percent. Of these, a total of 163 specialized in ICT-related subjects, including 98 BSc (Hon) in Computer Systems Engineering.[135] To fulfill Botswana's digital aspirations efforts will need to be made to increase the number of ICT specialists.

Private sector participation: Overall, there is significant engagement from the private sector in tertiary education. This ranges from curriculum development and delivery of programs, to identifying the qualifications frameworks and accreditations of tertiary institutions. The mining industry in particular maintains very close ties to tertiary institutions. Regarding ICT and computer science, most of the above tertiary institutions have collaborative arrangements with private companies: typically in the form of ICT academies providing a combination of short-term certified courses and degree programs. These programs play an important role in ensuring digital skills are tailored to the needs of the labor market

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135   Data from Ministry of Tertiary Education, Apr. 2021

Rapid Skilling Programs: There is a wide range of rapid ICT skilling programs in Botswana. Most of the above-mentioned higher education institutions offer short-term ICT/digital literacy courses on a commercial basis. In addition, many small private training providers offer similar courses: for example, Pan-African 2KO provides largely online ICT-related courses, including a 5-day course titled "Using IT in Farming for Local Farmers in Botswana". Another example is the *Digital Skills Training for Youth initiative* by Botswana Innovation Hub (BIH) in collaboration with Dare to Dream Foundation.

Adult learning programs: There are several ongoing private initiatives to strengthen digital skills, through short courses offered by IBM (in partnership with the BIH), and others. These also include those delivered by young developers/entrepreneurs such as iCode Hub and Sparkideas. Other digital initiatives at BIH include the establishment of a crowd sourcing center for digitization, which provides rapid training and up-skilling for unemployed young people on content digitization, offering them an opportunity to earn income at the same time. The availability of adult learning programs in IT appears to be at a similar level to other countries in the region.

Cross-Cutting Issues

COVID-19

Like much of the rest of the world, Botswana has been adversely affected by the COVID-19 pandemic, and lockdowns have been imposed. Television and radio lessons have been the principal instruments for the MoBE to deliver the curriculum during the school closures. Consequently, children were less likely to develop digital skills during this period. For students with access to devices and internet, there are indications that the COVID-19 pandemic has increased ICT-usage, including social media, and hence informal learning. Most higher education institutions responded to the pandemic by intensifying the use of the already existing web-based e-learning programs, likely improving many student's level of familiarity with digital devices.

Botswana has also been experimenting with the use of mobile phones to support remote learning during the COVID-19 pandemic. One intervention, aimed at minimizing the fallout of the pandemic on education outcomes, tested the effects of SMS text messages and direct phone calls on education. Based on a sample of 4,500 families with primary-school-aged children, the trial found large, statistically significant learning differences between treatment and control groups. For the combined SMS and phone group, there was a 52 percent decrease in the share of students who could not do any numerical operations on an ASER test,[136] while the SMS-only group had around half this statistical effect. The study concludes that the low-tech interventions tested could have long-run implications for the role of technology, and parents could act as substitutes or complements to the traditional education system.[137]

Gender

While there is close to gender parity at primary school level, female students at the secondary school level accounted for 52 percent of the enrolled students in 2017. At tertiary level, women's participation is even more pronounced: In 2019, they accounted for 60 percent of all enrolled tertiary students. Only at PhD level does the number of male students exceed that of female students. Despite the generally high level of female participation in education, fewer women have shown interest in advanced and highly specialized science programs including ICT and computer science programs, and women constitute 48 percent of enrolment within the field of science. Experience from other countries highlighted that gender-responsive approaches are needed, which could include efforts to actively challenge gender stereotypes, or break disciplinary silos by mixing learning content across subjects that typically attract men and women, as well as integrating real-life skill development more into STEM education.[138]

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136   Annual Status of Education Report

137   Noam Angrist, Peter Bergman, Caton Brewster, and Moitshepi Matsheng, 2020: Stemming Learning Loss During the Pandemic: A Rapid Randomized Trial of a Low-Tech Intervention in Botswana. CSAE Working Paper WPS/202013.

138   Unicef, 2020: Towards an equal future: reimagining girl's education through STEM.

Cybersecurity and Data Privacy

As previously mentioned, data breaches and cybercrimes are growing in Botswana. Despite this fact, the general level of awareness around data protection and cyberthreats is low. Furthermore, basic preventive security practices are unfamiliar, creating vulnerability. Consequently, cyber safety is an important element of digital skills, allowing learners to develop their capacity to (a) protect devices and digital content and to understand risks and threats; (b) protect personal data and privacy; and (c) avoid health risks and threats to physical and psychological well-being (e.g. cyber-bullying). These skills can be effectively taught through school curriculum and specialized programs. According to the MoBE, cybersecurity is covered through computer awareness curriculum.

International Collaboration

Many African countries have seen notable progress on connectivity and research collaboration after developing Research and Education Networks (REN). RENs are able to invest collectively in digital infrastructure and provide important linkages to external resources and networks. There is no REN in Botswana to date, which limits collaborative research, innovation and training opportunities for ETPs in Botswana with the wider region. There are indications that efforts are being made to establish a National REN, including joining UbuntuNet, which is the Eastern and Southern Africa Regional Education Network. Completing this could strengthen Botswana's position in the knowledge economy through greater collaboration with other research universities. The Government of Botswana could also explore partnerships with GEANT (the European Regional Education Network) or the National Research and Education Network (ERNET) in India, as they seek partnerships in the African continent, offering research and innovation collaboration globally.

Recommendations

R1: Improve understanding of the nature of demand for digital skills. The SmartBots strategy aspires to prepare Botswana for the Fourth Industrial Revolution. In order to optimize its readiness Botswana needs a better understanding of the effects of the digital transformation on the economy, including on the qualifications and competencies needed by the different segments of the labor force. The findings of such a survey could allow the government to make the best possible use of the existing resources. The survey should ideally have a sector focus with special attention on sectors affected by the digital transformation such as mining, tourism, agro-processing and finance.

R2: Establish a policy framework for digital skills development and ICT in education. Botswana is recommended to prepare a comprehensive policy framework, including (a) a digital skills framework that reflects Botswana's market and societal needs; (b) a holistic, evidence-based and market-driven approach to digital skills development; and (c) an actionable implementation plan, including institutional roles (including private partners) and how to improve coherence across government institutions. For efficiency, relevant stakeholders should be engaged and endorse the elements of the framework.

Medium-term

R3: Prepare a comprehensive digital skills curriculum and teachers training programs for primary, secondary education and TVET institutions. Existing curriculum on computer studies and guidelines to improve digital skills through other core curriculum areas should be updated to reflect a holistic notion of digital skills. The curriculum content, especially in primary and lower secondary levels, should include not only ways to use computers and the internet, but also how to better communicate in the digital space, how to solve problems, and navigate safely in the cyber space. Teacher training programs should also reflect this broader notion of digital skills.

R4: Ensure all learning institutions at the secondary (junior and senior) and tertiary education levels, including those in the rural areas, are connected, equipped and ready to deliver digital skills curriculum. Botswana would benefit from further enhancing efforts to expand connectivity and delivery of computers in schools. But there must also be a broader focus on delivering digital skills, beyond teaching students to become familiar with computers. Digital skills can be effectively taught through a broad range of curriculum areas (e.g., math can be taught using digital devices involving digital communications and digital problem-solving). Moreover, enhancing connectivity in tertiary education should involve the establishment of a REN, which would not only help enhance digital skills of tertiary students but also their capacity to advance their research and innovations in diverse subject areas.

Longer-term

R5: Ensure all primary schools, including those in the rural areas, are connected, equipped and ready to deliver the digital skill curriculum. Botswana is still behind in expanding connectivity across a large number of primary schools, especially in the rural areas. The success of this will, amongst other things, depend on the progress of the e-Thuto initiative. Given the urgency of expanding connectivity to the remaining schools, the SmartBots initiative may also consider expediting this area to support their overarching goal to drive digital transformation across the country.

R6: Improve inclusiveness in digital skills development by improving female participation in advanced and highly technical digital skills programs in tertiary education. Relatively few women have shown interest in advanced and highly specialized digital skills programs. Encouraging female students' enrollment in STEM-related subjects at secondary education level, and more actively promoting ICT-related higher educations as the "door to the future" could offer a strong path forward.

Conclusion

With good reason, Botswana has put digital development at the forefront of its development strategies. A stronger digital economy can propel Botswana's ambition of economic diversification by enabling other sectors to digitize, and by becoming a strong sector in its own right. This transformation is already taking place. Digital solutions have become an integral part of life for many citizens across Botswana during the COVID-19 pandemic and have the potential to play a key role for economic recovery and future pandemic resilience.

Botswana started its digital journey with successful liberalization and regulatory reforms in the early decades of ICT sector development, but recent progress has been slower than anticipated. After several attempts to change this trajectory, GoB is hoping SmartBots can help change this. So far, the perspectives are promising. If SmartBots is able to institutionalize its bold approach and rally cross-sector stakeholders it will be a strong vehicle to move digital transformation from paper to tangible impact for Botswana's population.

Based on the findings of the DE4A report, five areas are especially important to drive inclusive and efficient digital transformation in Botswana.

Priority 1. Close access gaps

Priority 2. Make digitization worthwhile

Priority 3. Improve the enabling environment

Priority 4: Leverage private sector resources

Priority 5. Look abroad to overcome geographic barriers

Priority 1.
Close access gaps

Prioritizing enablers: The SmartBots strategy calls for leapfrogging towards 4IR while at the same time *leaving no-one behind*. This dual strategy is aspirational and brave but requires a delicate balance prioritizing, and not least funding, the core enabling parts of the digital economy, while at the same time launching advanced projects and technologies. Investing in basic digital enablers such as infrastructure and skills is important *both* because they are prerequisites for implementing advanced technologies, but equally because they will ensure inclusive digital development as envisioned by SmartBots. Showing short-term progress on the foundational elements while preparing for long-term strategic investments, will be important to secure public buy-in.

Bringing broadband to underserved areas: Access to high-speed broadband connectivity outside of urban areas is limited and remains the most important foundational element in achieving a dynamic digital economy. NDP 11 and the National Broadband Strategy (NBS) have defined ambitious goals which have been difficulty to realize, in part due to environmental factors. Botswana's landlocked reality, small population and subsequently small ICT market hampers the economic viability of last-mile investments. If there were easy solutions to this, they would have been implemented already. Instead, public and private stakeholders need to think creatively. The report has pointed towards possible approaches, including last-mile incentives for the private sector, more efficient infrastructure sharing schemes, TowerCo and ESCO models, as well as investigating satellite and other promising emerging technologies.

While the reach of the private sector can be expanded, connectivity is increasingly seen as a public good, and full commercial coverage is likely not viable with current generations of technology. Therefore, the public sector plays an important role filling market gaps and connecting public institutions. Initiatives are underway to link public institutions, including schools, and efforts are underway to leverage infrastructure assets across the public sector to increase connectivity. Improving the strategy and administration of the Universal Service Fund (UASF) is also an important tool towards enhanced services in rural and commercially non-viable areas.

Closing the gender gap: As shown in this report, women lag behind on access, advanced digital skills, economic opportunities, and consumption of digital services. This digital divide exacerbates inequalities and limits the ability of women to contribute to the economy through digital means. It is recommended to implement a strategic gender lens across digital efforts, including understanding gender barriers related to different parts of the digital economy, and monitoring projects for their gender performance to learn and improve. Important areas include enhancing the capacity of business support organizations to support women throughout the entrepreneurial value chain, and investing in tailored programs to develop the digital skills of women across age and demography.

Priority 2.
Make digitization worthwhile

As illustrated in the report, adoption of broadband internet is not only linked to access drivers but equally to the perceived value of digital use-cases. Several people interviewed for the report noted that older family members were not overly impressed with what the internet has to offer. Attractive use cases and communication around them are paramount to drive widespread adoption.

- Improving access and efficiency of **public services** through digital platforms will incentivize adoption. This will require continuous efforts to develop user-centric and interoperable digital public platforms.

- Increasing the supply, quality and ease of digital **financial services (DFS)** has driven adoption in other countries and eased the lives of citizens. Accelerating DFS will require cross-sector collaboration and enabling infrastructure and regulation.

- The COVID-19 pandemic has demonstrated a keen public appetite for **e-commerce solutions.** Botswana's e-commerce strategy is an important step to support this development but will require cross-sector efforts to implement.

- Multiple **digital business** examples within and beyond Botswana's borders illustrate the digital potential to solve pertinent development challenges. To realize this, Botswana needs to strengthen its growing entrepreneurship ecosystem and support digitization across sectors.

Priority 3.
Improve the enabling environment

Creating momentum amidst strategy apathy: The digital economy rests on a relatively strong regulatory framework and ambitious strategies. A key challenge, even explicitly referenced in several of these strategies, has been coordination and implementation. The SmartBots initiative is designed to alleviate bottlenecks through a whole-of-government approach and a dedicated implementation unit.

The implementation process is creating critical momentum but also reshuffling priorities and mandates, and in turn shifting decision centers. This type of change risks creating the type of friction and push-back that has rendered other efforts inefficient. For SmartBots to succeed it is critical to challenge business as usual while mobilizing and incentivizing the complex group of stakeholders needed to drive progress and stave off lethargy around policy processes.

Establishing mature digital economy building blocks: Botswana has already made solid foundational progress on digital ID, cybersecurity and data protection; what remains is expedited roll-out. Adopting and enforcing this legislation will have ripple effects across the digital economy, including impact on the application of digital systems in social protection, e-commerce, and not least shaping an enabling environment for a wider and safer adoption of digital technologies. To create a strong and coherent framework for the digital economy, the planned regulatory review is also important. Based on this the GoB will likely need to proceed with selected regulatory and institutional reforms, some of which may require significant political will to overcome institutional inertia and vested interests.

One challenge for Botswana and countries globally is the mismatch between the exponential speed of technological development vs. regulatory evolution. This challenge is especially pertinent for countries that proactively adopt emerging technologies such as AI, as planned in Botswana. Experience from other countries shows the importance of avoiding both under- and overregulating evolving technologies, but allowing them to mature while managing risks. To strike this balance, Botswana will need to implement an agile regulatory scheme which, among other things, includes staying abreast of technological developments and risks with regular review cycles and close cross-sector consultations.

Improving digital skills capacity in government: Besides cross-cutting coordination, stakeholders have also noted the lack of specialized digital skills as a key factor slowing previous implementation efforts. Attracting these skills to the public sector is challenging in many countries. To break this barrier, Botswana needs to invest in the talent pool inside and outside the public sector and make digital transformation an attractive agenda. Centers of Excellence, such as those seen in South Africa and Rwanda, can pool resources, while rotation schemes can shift digitally skilled staff between learning centrally and ensuring efficient deployment across institutions and sectors.

Priority 4:
Leverage private sector resources

While the private sector was engaged in developing the National Broadband Strategy there has seemingly been little follow up to discuss progress and how the public and private sector can work together to achieve strategy goals. Re-establishing this dialogue, for example through SmartBots, and collaborating to improve the enabling environment across the broadband value chain would be a very constructive outcome. This also includes creating a clear and predictable division of labour between BoFiNet and telecom companies, leveraging comparative strengths.

Priority 5:
Look abroad to overcome geographic barriers

Looking to global peers for inspiration: While highly dependent on regional neighbours, Botswana can also benefit from inspiration further afield from countries with similar conditions, for example small economies and land locked geographies. As described in the report Botswana can look towards other large nations for last-mile solutions, and to small economies on how to support a vibrant telecom market, as well as towards landlocked countries on reducing transit costs.

Strengthening regional ties: To accelerate digital development, Botswana can benefit from further regional integration, including maximizing linkages to undersea cables, implementing and supporting regional rules and regulations, developing a national research and education network (NREN) and connecting this with a regional REN (e.g. Ubuntu Alliance), establishing cross-border payments systems to better enable remittance flows from neighbouring countries, supporting regional ecommerce platforms, and exposing entrepreneurs to regional funding types that are scarce in Botswana.

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Annex 1: DE4A High-Level Scorecard Indicators

GOAL	INDICATOR	DE4A Interim target (2021)	DE4A FINAL Target (2030)	Findings
INFRASTRUCTURE				
Increase access to broadband internet	"Unique" mobile-broadband subscriptions per 100 inhabitants **(by IDA, FCV)**	32	67	49% (2022)[139]
Increase quality of broadband internet	Average Mobile Broadband download speed (Mbit/s) **(by IDA, FCV)**	3Mbps	10Mbps	2.78Mbps
Increase affordability of broadband internet	Mobile broadband basket (prepaid, **500MB)** price per month (% of a country's average monthly GNI per capita) **(by IDA, FCV)**		2	0.95% (2021)[140]
PLATFORMS				
Increase availability and adoption of secured and interoperable digital platforms for public services	Digital Adoption Index (DAI) (Government cluster) **(by IDA, FCV)**	0.45	0.80	0.47 (2016)
Increase ID coverage for adults	Percent of the 15+ population with an officially recognized identity credential (a "foundational" ID)	70%	100%	66% (2018)
DIGITAL FINANCIAL SERVICES				
Increase access to digital financial services	Percent of adults with access to a transaction account (by gender, income group, education level, urban/rural; and by IDA, FCV)	50%	90%	77% (2019)*
Increase usage of digital financial services	Percent of adults who made a digital retail payment in the past year (by gender, income group, education level, urban/rural; and by IDA, FCV)	50%	90%	42% (2017)**
DIGITAL BUSINESS				
Increase the number of digital solution firms	Number of IT startup firms with HQ in Africa graduating from Incubator/Accelerator programs and/or receiving private funding from Angel, Early Stage VC, Product Crowdfunding or, Seed round	240	600	74

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139 WB calculation based on Mobile broadband capable connections (GSMA, 2022), SIMs per unique subscriber (GSMA, 2022) and Total population (UN Population Prospect, 2019).

140 Alliance for Affordable Internet, https://adi.a4ai.org/extra/baskets/A4AI/2021/mobile_broadband_pricing_gni.php

Increase the number of firms using digital technologies for business purposes	Share of formal firms having their own website or online presence (by size of firm, female vs male ownership; and by IDA, FCV)	38%	62%	n/a
DIGITAL SKILLS				
Increase internet connectivity in education institutions	Percent of lower-secondary schools with access to internet for pedagogical purposes (by urban/rural; and by IDA, FCV)	55%	100%	n/a
Increase availability of digitally competent workforce	Proportion of youth and adults with advanced digital skills (by gender, urban/rural; and by IDA, FCV)	3%	6%	5%*** (2014)

* Note: Number of depositors with commercial banks per 1000 adults, IMF financial access survey, 2019
 **Made or received digital payments in the past year (% age 15+), Global Findex, 2017

***Note: Data comes from UIS's SDG Indicator 3.3.1. (http://data.uis.unesco.org/). "Proportion of youth and adults with advanced digital skills" is proxied using the "proportion of youth and adults who have written a computer program using a specialized programming language." This measure was used in ITN's Measuring the Information Society Report (2018).

Annex 2: Digital Infrastructure

FIGURE 14 Mobile Network Coverage Maps
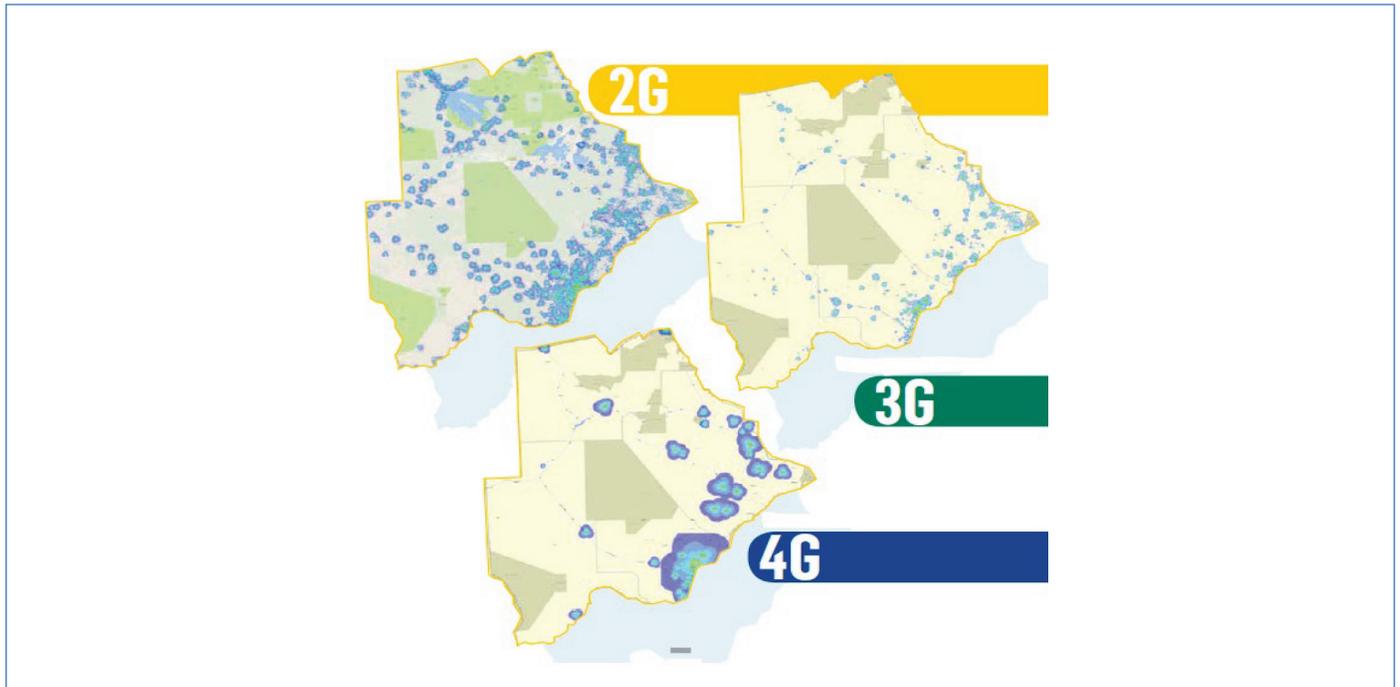
Source: BOCRA Annual Report 2019[141]

MAP 2 Submarine Cable Connectivity in African Region
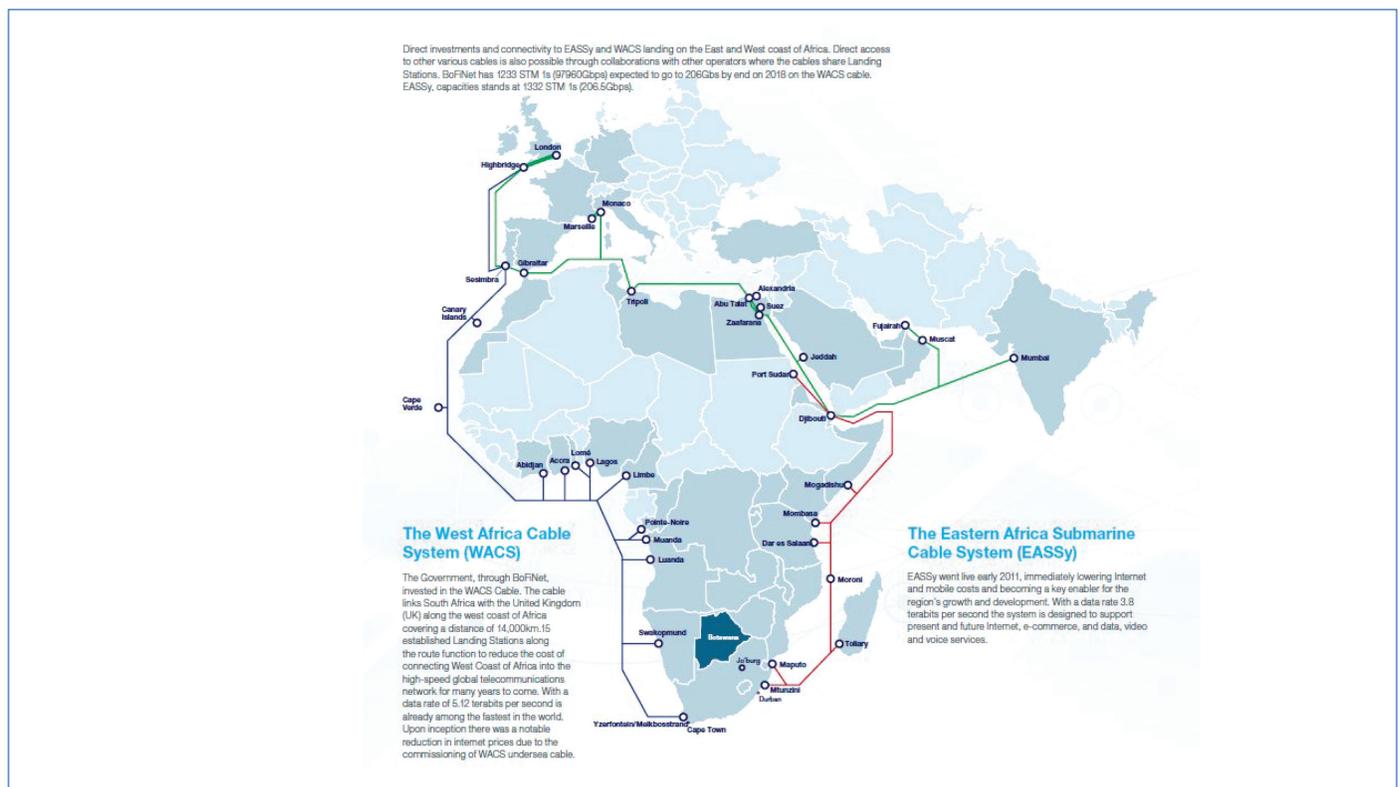
Source: BoFiNet 2019 Annual Report

141 BOCRA Annual Report 2019: Available at: https://www.bocra.org.bw/sites/default/files/documents/Bocra-AR19-web.pdf

MAP 3 National Backbone Network

Legend
— Exsiting Fibre Network
— Ongoing Fibre Network
— Planned Fibre Network
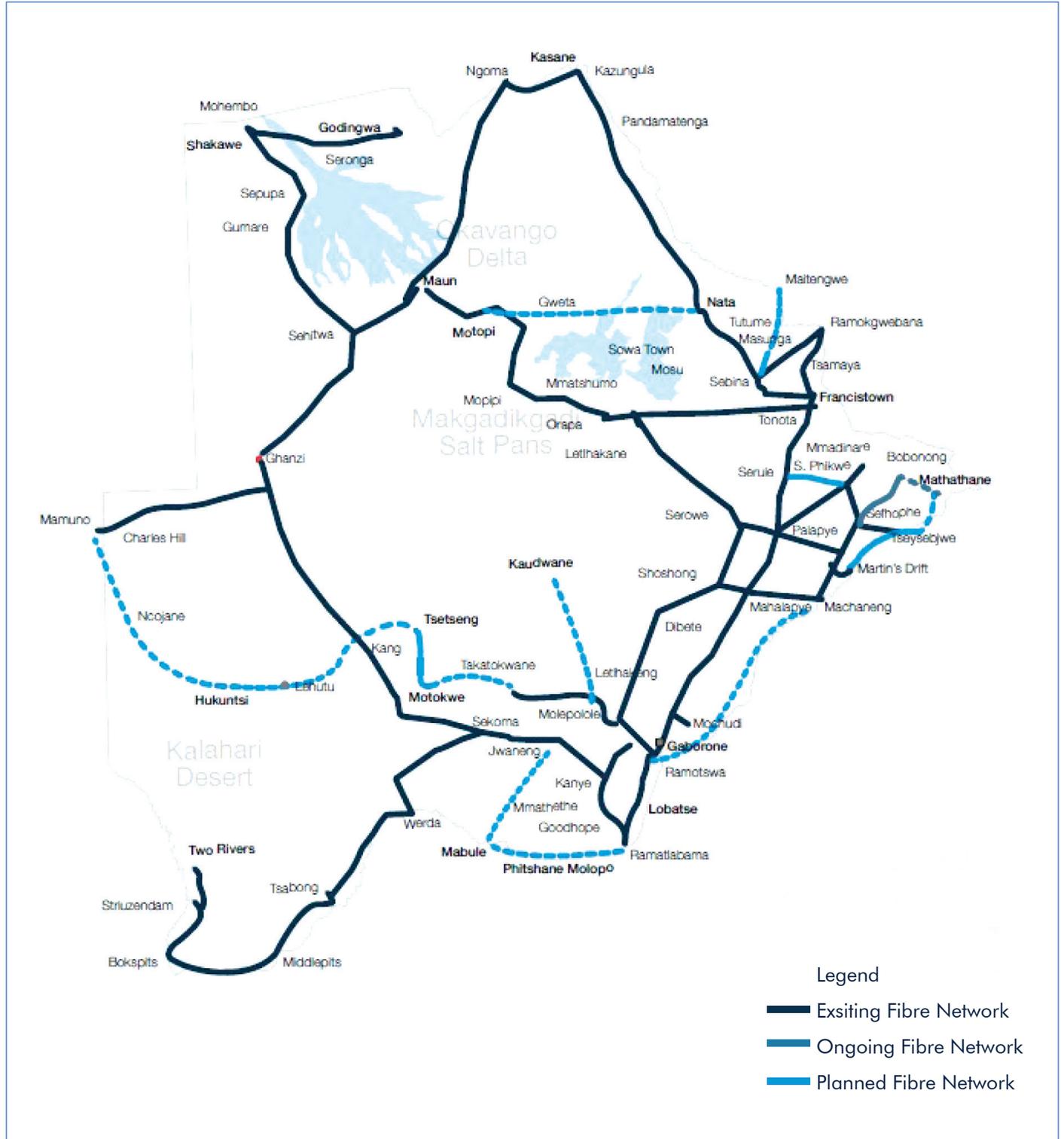
Source: BoFiNet 2019 Annual Report

Annex 3: Digital Public Platforms

TABLE 9 Overview of Selected Digital Public Platforms in Botswana

	Ministry/ Department	Platform Use	Extent of Use
Government Budget and Accounting System (GABS)	MFED and DPSM	The core modules provide: • General Ledger consolidation and reporting • Fixed Assets Register • Standard Procurement • the Public Sector Budgeting and Planning module.	Internal to Government. No customer facing interfaces
Government Payroll		The system provides payroll management and administration for all Government employees	
Supply Chain, Inventory and Warehouse Management		These modules are used for the procurement of consumables, resources, movable assets, parts, maintenance and repairs of government fixed and movable assets.	
Human Resources Management System		Used for the administration of the employees of the Central Government by DPSM	
Cash Management and Banking		Used for Government Banking (through Bank of Botswana and other commercial banking services) for the payment of suppliers and all other accounts. It offers direct EFT and RTGS capabilities directly to the banks	
Revenue Management (RODM)		Used for the collection of funds through interfaces exposed to other government departments that receive and/or disburse funds to the public.	

Integrated Procurement Management System – (IPMS)	Public Procurement and Asset Disposal Board (PPADB)	The system is used for the management of tender publishing, submission, evaluations, contracting and adjudication	The system has widely been rolled out: contractors have been registered on the system and the system is being used to manage the tender process online. It still needs to be fully rolled out, interfaced with BURS tax system, incorporation Unique Identification Number for bidders/contractors, and conducting more training for bidders on the use of the system.
Tourism Visa Applications	Ministry of Investment, Trade and Industry (MITI)	Tourism Visa Applications	Available to public as standalone system (not integrated)
MTIS (EDD Applications)		MTIS (EDD Applications)	
Local Authorities for Import Permits		Local Authorities for Import Permits Consumer Complaints (transferred to Competition Authority)	
Fleet Tracking Maintenance and Management System (FTMMS)	Ministry of Transport and Communications (Central Transport Organization)	Fleet Tracking and Monitoring	Currently unused. No public interfaces
Transport Systems -Driver's License -Permits -Vehicle Registration Licensing -Weighbridge System	Ministry of Transport and Communications Department of Road Transport & Safety (DRTS)	Transport Management Systems	Vehicle Registration extended to Botswana Post, Botswana Police No online services
Elections Management System	Independent Electoral Commission	Elections Management System	Internal to Independent Electoral Commission
Social Benefits Payment and Reconciliation System (SOBERS)	Ministry of Local Government and Rural Development	Records of payments made by the Old Age Pension, the Veterans Program, and the Destitute Program	Extended to Botswana Post, Zebra Card and Banking

Form 4 Selection	Ministry of Basic Education	Form 4 Selection and Placement System (Junior to High School)	Used internally for Student Placement (Junior to High School)
Student Loans Management System	Ministry of Tertiary Education (DSPW)	Students Loans Management System	Used internally by MOTE for Student Loans/Grants
National Archives and Records Management System's (NARMS)	Ministry of Youth, Sports and Culture (BNARS)	National Archives and Records Management System (Records Management Unit Subsystem, Records Centre Subsystem and the Archives Subsystem)	Used Internally
OMANG National ID System	Ministry of Nationality, Immigration and Gender Affairs	Civil and National Registration	Drives all National Identity services for Government only
Births and Deaths Registration	Ministry of Nationality, Immigration and Gender Affairs	Civil and National Registration	Drives all National Identity services for Government only
Integrated Tax Management Systems	Botswana Unified Revenue Services	Tax, Customs, CRM and Online Payment System	Payments, Tax Registration, self-services by the Taxpayers
Botswana Animal Information and Traceability System (BAITS)	Ministry of Agricultural Development & Food Security (MOA)	Livestock Registration and Tracking System (used by farmers in implementing Animal Identification and traceability in Botswana)	Used internally by Ministry of Agriculture
Crime and Criminal Recording System (CCRS)	Ministry of Defense Justice and Security (Botswana Police)	Crime and Case Recording System	Used internally by Botswana Police
Case Management System	MDJS (Administration of Justice)	Case Management System	Internal to MDJS. Available to the public (Search Only)
Immigration, Passports and Border Control	Ministry of Nationality, Immigration and Gender Affairs	Immigration, Passports, Permits issuance, Border Control System	Internal to Immigration. No interfaces to external customers or public

|			
Lands Management System (LAPCAS)	Ministry of Lands & Housing	Land Administration Procedures, Capacity and Systems (LAPCAS) Program	Internal to Ministry of Lands. No online services
Integrated Patient Management System	Ministry of Health and Wellness	Patient Management System (Primary Healthcare)	Not available to the public. Restricted to Government facilities
Online Business Registration System (OBRS)	Ministry of Trade (CIPA)	Registration of Companies and Intellectual Property	Available online and widely used

TABLE 10 Country example – United Kingdom Government Digital Services spending control

The United Kingdom's Cabinet Office's program of IT spending controls was introduced in 2011, as part of a wider suite of Cabinet Office spending controls. Spending controls apply to any government IT spending over certain thresholds, such as technology spending over £5m. This includes all spending on the types of front-end digital projects that Government Digital Services (GDS) was beginning to bring back in-house, such as identity assurance and 'any external-facing digital transaction'. In 2014, additional 'red line' IT procurement restrictions were brought in, including a ban on IT contracts over £100m. The spending controls have several aims: not only reducing government IT spending by breaking up large contracts, but also bringing about changes in the way government thinks about IT. For example, when submitting a business case to the GDS spending control team, departments must outline the 'user need' that will be met through this additional spending and show that due consideration has been given to open-source and cloud-based solutions. The Cabinet Office has declared the IT spending controls a success, citing savings of £391m by 2014/15. The National Audit Office has questioned the accuracy of GDS's spending controls savings claims in the past but has nevertheless suggested that – although a 'blunt instrument' – they have resulted in 'large spending reductions' for departments. Extra layers of control can prevent innovation and add transaction costs. But the spending controls have been an important tool for getting departments to a new way of thinking and working. As departments have enhanced their capacity, the controls are now being reviewed to ensure that departments' varied needs are met.

Annex 4: Digital Financial Services

FIGURE 15 Number of Mobile Money Accounts by Provider

Mobile Money Accounts (Thousands)

Mascom, Orange, BTC, Botswana Post

	Q1 201	Q1 2016	Q1 2017	Q1 2018	Q1 2019	Q1 2020
BTC	2	2	2	2	0.24	8
						39
Orange	267	381	466	621	752	658
Mascom	143	175	205	229	397	554
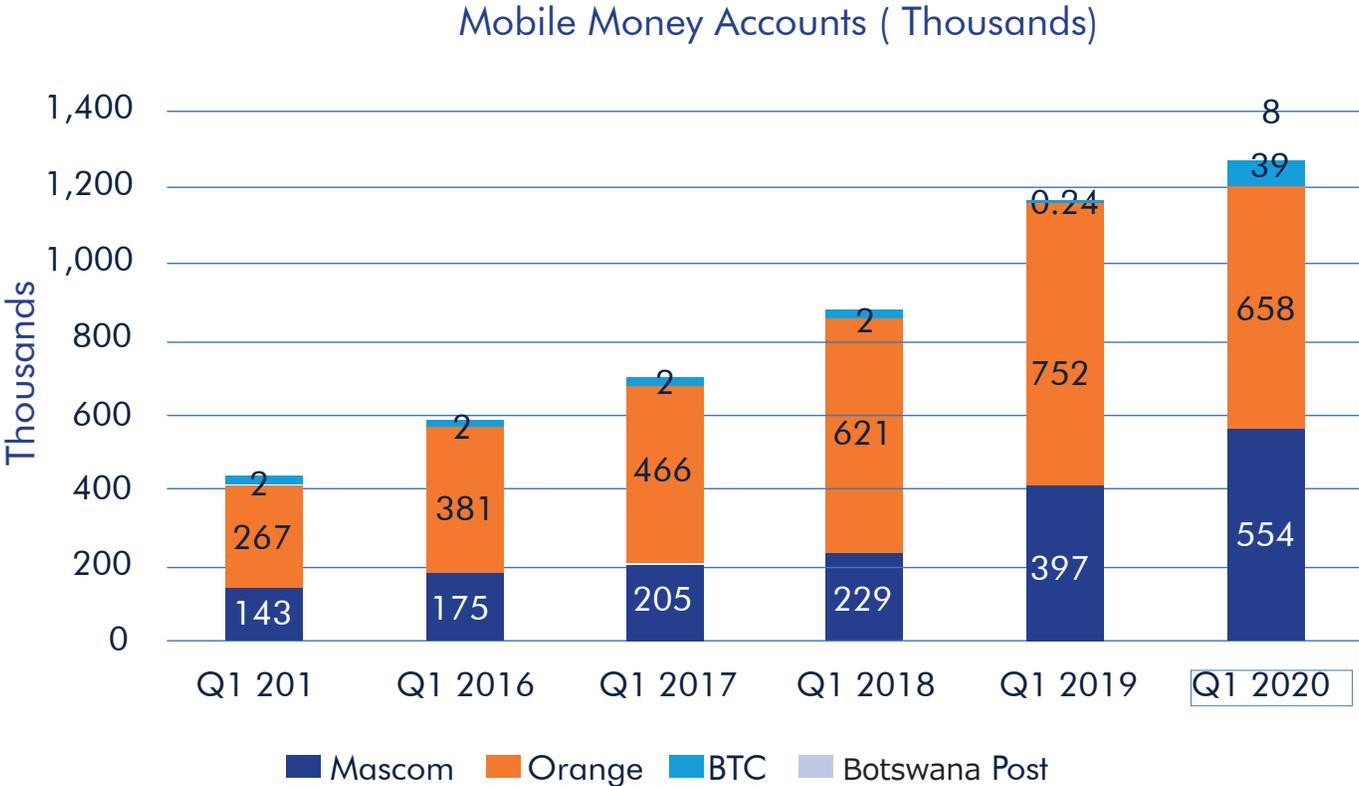
Source: BOCRA, 2020

Annex 5: Digital Business

TABLE 11 Entrepreneurship Programs in Botswana

Category	Secondary Category (if any)	Program	Sponsor(s)	Beneficiaries	Funding Provided & Amount (if available)	Status	Website
Access to Finance	Corporate Innovation	Orange Social Ventures	Orange Botswana	Ideation	Yes	Active	https://startup.orange.com
Access to Finance		Botswana Innovation Fund	Ministry of Tertiary Education, Research, Science, and Technology	Approx. 15 startups	Yes	Active	https://www.bih.co.bw
Access to Finance	Angel Network	Angel Network Botswana	Private – membership dues	Initial portfolio not yet finalized, 3 startups undergoing due diligence	Yes	Active	https://angel.co
Access to Finance		Universal Services Access Fund	Botswana Communications Regulatory Authority	All MNOs	No	Active	https://www.bocra.org.bw
Access to Finance		Business Program	Botswana Development Corporation	Scale-Ups	Yes	Active	https://www.bdc.bw
Access to Finance		United Nations Supplier Development Program	United Nations	Scale-Ups	Yes	Active	https://www.bw.undp.org
Access to Finance		Horticulture 40 Project	Local Enterprise Authority(LEA)	Startups and Scale-ups	Yes	Active	www.lea.co.bw
Access to Finance	Corporate Innovation	Kickstart program	Kgalagadi Brewery Limited	Startups	Yes	Active	https://kickstart.co.bw
Co-working space		Botswana Women's Coworking Space	Institute of Entrepreneurial Development Botswana	Women-led businesses	No	Yes	https://iedbotswana.co.bw
Digital Skills		The Clicking Generation	Atlas Service Corps, Inc	Ideation	No	Active	https://atlascorps.org/
Digital Skills		She Rock Female Accelerator	SHETech Bw	Women	No	Active	N/A

Entrepre-neurship Training		Botswana Insurance Holdings Limited Trust	Botswana Insurance Holdings Limited Group	Scale-Ups	Yes	Active	https://www.bihl.co.bw
Entrepre-neurship Training		First National Bank Trust	First National Bank Botswana	NGOs	Yes	Active	https://www.fnbbotswana.co.bw
Entrepre-neurship Training	Access to Finance	Entrepreneurship Development Centre	ABSA	MSMEs	Yes	Active	https://www.absa.co.bw
Entrepre-neurship Training		Leather Industry Park	Local Enterprise Authority	Startups and Scale-Ups	Yes	Active	www.lea.co.bw
Entrepre-neurship Training		Entrepreneurship Courses	Institute of Entrepreneurial Development Botswana	Startups	No	Active	https://iedbotswana.co.bw
Entrepre-neurship Training		Young Entrepreneurs leadership Program	Institute of Entrepreneurial Development Botswana	Youth-led Startups	No	Active	https://iedbotswana.co.bw
Entrepre-neurship Training		Kidpreneur Entrepreneurship Program	Institute of Entrepreneurial Development Botswana	Youth	No	Active	https://iedbotswana.co.bw
General Business Support	Corporate Innovation	Linking Applied Research to Industry as a service	Infers Group	Startups and ScaleUps	No	Active	https://www.infersgroup.com
Incubator		Botswana Innovation Hub	Ministry of Tertiary Education, Research, Science, and Technology	Startups and Scale-Ups	Yes – through Botswana Innovation Fund	Active	https://www.bih.co.bw
Incubator	Corporate Innovation	Stanbic Acceler8	Stanbic Bank	Startups	In development	Active	https://www.stanbicbank.co.bw
Incubator		Digital Innovation Hub	First National Bank Botswana	MSMEs	Yes	Active	https://www.fnbbotswana.co.bw
Incubator	University	Stanford Seed Transformation Program	Stanford Graduate School of Business	MSMEs	No	Not active	https://www.gsb.stanford.edu
Incubator	Entrepre-neurship Training	Tokafala	Techno serve/ Anglo American	Startups	No	Active	https://www.technoserve.org

Incubator		Kutla Incubation Centre	Local Enterprise Authority	Startups and Scale-Ups	Yes	Active	www.lea.co.bw
Incubator		Venture Incubation Program	Institute of Entrepreneurial Development Botswana	Startups	No	Active	https://iedbotswana.co.bw
Incubator		Venture Acceleration Program	Institute of Entrepreneurial Development Botswana		No	Active	https://iedbotswana.co.bw
Incubator	Entrepre-neurship Training	Stanford go-to market	Botswana Development Corporation		No	Not active	https://www.bdc.bw
Intellectual Property Rights		Companies and Intellectual Property Authority	Ministry of Investment Trade and Industry		No	Yes	https://www.cipa.co.bw
Network		Botswana Startup Network	Non-financial support from World Bank	TBD	TBD	Pipeline	https://www.genglobal.org
Network		Youth Alive Foundation	Youth Alive Foundation	Ideation	No	Active	http://yaf.designs.co.zw
Network		Google DevFest Summit	Google Developer Group Gaborone	Students	No	Active	gdggaborone.org
Network		Start Up Smart	Young Minds Association	Youth Led Businesses	No	Active	https://youngmindsafrica.org.bw/
Network		Global Entrepreneurship Network: Botswana Chapter	GEN	Startups	No	Active	https://www.genglobal.org
Pre-Incubator		Venture Creation Program	Institute of Entrepreneurial Development Botswana	ideation	No	Active	https://iedbotswana.co.bw
University		Entrepre-neurship lab	Botho University	Startups	No	Active	https://botswana.bothouniversity.com
University		Limkokwing University	Limkokwing University	Students	No	Active	https://www.limkokwing.net

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