DIGITAL DEVELOPMENT PARTNERSHIP

DIGITAL ECONOMY FOR AFRICA (DE4A)

Country Diagnostic of Senegal

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ABBREVIATIONS

ACE	African Coast to Europe
ADEPME	Agency for the Development and Supervision of Small and Medium-Sized Enterprises *(Agence de Développement et d'Encadrement des Petites et Moyennes Entreprises)*
ADIE	State Informatics Agency *(Agence de l'Informatique de l'Etat)*
ADSL	Asymmetric Digital Subscriber Line
AfDB	African Development Bank
AGE	Architecture of Government Enterprise
AIGF	Agence Ivoirienne de Gestion des Fréquences Radioélectriques
AML/KYC	Anti-Money-Laundering/Countering the Financing of Terrorism Framework (WAEMU)
ANAQ-SUP	National Quality Assurance Authority for Higher Education *(Autorité Nationale d'Assurance Qualité de l'enseignement Supérieur)*
ANSD	National Agency of Statistics and Demography *(Agence Nationale de la Statistique et de la Démographie)*
ARTP	Regulatory Authority for Telecommunications and Post *(Autorité de Régulation des Télécommunications et des Postes)*
ASUTIC	Senegalese Association of ICT Users
ATM	Automated Teller Machine
BCEAO	Central Bank of West African States *(Banque Centrale des États de l'Afrique de l'Ouest)*
BIPEN	Information and Digital Economy Promotion Bulletin
BPI (France)	Public Investment Bank
CA	Certification Authority
CDP/PDC	Personal Data Commission
CDMA	Code-division Multiple Access
CERT	Computer Emergency Response Team
CIA	Central Intelligence Agency
CII	critical information infrastructure
CNC	National Competition Commission *(Commission Nationale de la Concurrence)*
CNN	National Digital Council *(Conseil National du Numérique)*
COPIL-PKI	Steering Committee for National Public Key Infrastructure Management *(Comité de pilotage du projet de mise en place d'une Infrastructure nationale de gestion des clefs publiques)*
CRR06	Regional Radio Communication Conference 2006
CST	Special Contribution of the Telecommunications Sector
CTIC	Center for Technology, Innovation and Competition
CUSCAR	Customs Cargo Report Message
DAF	File Automation Directorate, Ministry of Interior *(Direction de l'Automatisation des Fichiers)*
DAI	Digital Adoption Index
DDP	Digital Development Partnership
DE4A	Digital Economy for Africa
DECA	Digital Economy Country Assessment

DEED	Digital Entrepreneurship Ecosystem Diagnostic
DER	Delegation for Rapid Entrepreneurship *(Délégation Générale à l'Entreprenariat Rapide pour les Femmes et les Jeunes)*
DFS	digital financial services
DGID	Directorate-General of Tax and Estates *(Direction G*énérale des Impôts et des *Domaines)*
DGRA	Digital Government Readiness Assessment
DNS	domain name root server
DPENP	Digital Economy and Partnership Promotion
DSO	digital switch-over
DTAI	Direction du Traitement Automatique de l'Information (Ministry of Finance)
DTT	Digital Terrestrial Television
ECOWAS	Economic Community of West African States
EGDI	United Nations Electronic Government Development Index
EIB	European Investment Bank
e-ID	Electronic Identification
EMI	electronic money issuer
EMV	Europay, MasterCard and Visa (global standard for chip-based debit and credit card transactions)
ENBIC	ECOWAS National Biometric Identity Card
e-Port	digital port
ESB	enterprise service bus
ESP	Ecole Supérieure Polytechnique
ESPS	Senegal Poverty Monitoring Survey *(Enquête de Suivi de la Pauvreté au Sénégal)*
e-Tax	digital taxation
FCFA	CFA frank (currency of African Financial Community *(Communauté Financière Africaine)*
FDN	Digital Development Fund *(Fonds de Développement Numérique)*
FONSIS	Souvereign Strategic Investment Fund *(Fonds Souverain d'Investissements Stratégiques)*
FSP	financial services for the poor
FTTB	fiber to the building
G2P	government to people
GAFA	Google, Apple, Facebook, Amazon
GDP	gross domestic product
GE06	Geneva 2006 Agreement (on frequencies)
GEI	Global Entrepreneurship Index
GHz	gigahertz
GIM	Electronic Money Interbank Group
GoS	Government of Senegal
GSMA	Global System for Mobile Communications Association
HHI	Herfindahl-Hirschman
ICTA	Turkish Information and Communication Technologies Authority
IFC	International Finance Corporation
IMF	International Monetary Fund
INFOSEC	Institutional Framework of Information Systems Security
IPO	initial public offering

IoT	Internet of Things
IPRES	Retirement Pension Institution *(Institution de Prévoyance Retraite du Sénégal)*
ISM	industrial, scientific, and medical
ISP	Internet service providers
ITU	International Telecommunication Union
IXP	Internet exchange point
LL	local loop
LLO	local loop operator
LPWAN	low-power wide-area networks
MCTPEN	Ministry of Communications, Telecommunications, Post and Digital Economy *(Ministère de la Communication, des Télécommunications, des Postes et de l'Economie numérique)*
MEFP	Ministry of Economy, Finance and Planning *(Ministère de l'Économie, des Finances et du Plan)*
MESR	Ministry of Higher Education and Research *(Ministère de l'Enseignement Supérieur et de la Recherche)*
MGI	McKinsey Global Institute
MHz	megahertz
MSME	micro, small, and medium enterprises
MVNO	mobile virtual network operators
MUX	multiplexers
NFC	near-field communication
NTP	network time protocol
OA	open access
OECD	Organization for Economic Co-operation and Development
OGD	open government data
OPGW	optical ground wire
OPTIC	Organization of Information Technologies Professionals
OTT	over the top
P2G	pay to government
PAD	Dakar Port Authority
PAFI	electronic payment and financial inclusion
PAIPN	Program to Support Digital Promotion Initiatives
PAP	Priority Action Plan *(Plan d'Actions Prioritaires)*
PCH	Peering Clearing House
PCI DSS	Payment Card Industry Data Security Standard
PFM	public finance management
PKI	public key infrastructure
POP	point of presence
PPNR	Digital Education Promotion Project
PPP	public-private partnership
PSE	Emerging Senegal Plan *(Plan Sénégal Émergent)*
PTN	Digital Technologies Park (*Parc des Technologies Numérique)*
QoS	quality of service
RCCM	Commerce and Real Estate Credit Registry *(Registre du Commerce et du Crédit Mobilier)*
RTGS	real time gross settlement
SaaS	Software as a Service

SAIE	Supporting Structures for Innovative Entrepreneurship
SAT-3/WASC	South Africa Transit 3/West Africa Submarine Cable
SDE	Senegalese Water Company *(Sénégalaise Des Eaux)*
SENIX	Senegal Internet Exchange Point
SFD	decentralized financial system
SIGTAS	Integrated Tax Management Software
SMEs	small and medium enterprises
SMP	significant market power
SMS	short message service
SNEL	National Electricity Company *(Société Nationale d'Électricité)*
SSN2025	Digital Senegal Strategy 2025 *(Stratégie Sénégal Numérique)*
STEM	science, technology, engineering, and mathematics
STM1	Synchronous Transport Module Level-1
TDS	Tele-Diffusion of Senegal
TPE	Trans-Pacific Express (submarine telecommunications cable)
TVET	technical and vocational education and training
UNDP	United Nations Development Programme
USSD	unstructured supplementary service data
UK	United Kingdom
UNCITRAL	United Nations Commission on International Trade Law
UNDP	United Nations Development Programme
UVS	Virtual University of Senegal
VC	venture capital
WDR2016	World Development Report 2016
WAEMU	West African Economic and Monetary Union
WEF	World Economic Forum
WFP	World Food Program
WURI	West Africa Unique Identification for Regional Integration and Inclusion
XML	Extensible Markup Language

EXECUTIVE SUMMARY

Introduction

While Senegal's digital evolution has been impressive, the country has more to achieve in advancing its digital economy

The rapid technological advancement is now disrupting the global economy and creating new business and development models, offering countries opportunities to leapfrog over traditional paths for economic growth. Over the past years, digital technologies have been spreading throughout the world at a faster pace than previous waves of technological innovation, re-shaping consumer behavior, social interaction, businesses and governments. The digital economy (DE), which encompasses a wide range of new applications of information technology in business models and products, can spur economic growth, productivity and employment and, with appropriate policies to mitigate inherent risks, has a potential to support inclusive outcomes. While the extent of the exact impact of digital technologies adoption on productivity and inclusion is still an open empirical question and more systematic data collection and rigorous impact evaluation of these effects and associated policies are required to maximize DE's social and economic gains, existing research has been providing positive correlational evidence. For example, a recent study based on three different datasets that together cover 12 African countries with a combined population of roughly half a billion people, finds significant positive effects of fast Internet on both the share of skilled jobs (with little to no job displacement across space) and average incomes in Africa, and – at least in the Ethiopian context – productivity and employment in manufacturing[1].

In this global context, digital transformation of the economy has become a major objective for the Government of Senegal (GoS). Over the past decade, Senegal has embarked on a series of economic reforms which were accelerated with the launch in November 2012 of a new development masterplan - Plan Senegal Emergent (PSE). PSE aims to boost sustained and inclusive economic growth and make Senegal an emerging economy by 2035, making ICT sector, as a core enabler for a broader digital economy, a prominent priority. The long-term sectoral vision is further specified in the Digital Senegal Strategy 2025 that was launched in 2016 and specified priority axes.

In support of Senegal's aspirations for unleashing the potential of its DE, the World Bank Group (WBG) has launched a technical assistance engagement to conduct a comprehensive digital economy diagnostic, presented in this report. The report provides a snapshot of the state of DE in Senegal and uses several World Bank tools and international best practices to provide actionable recommendations to the GoS. These recommendations include specific public sector policy interventions and actions that could improve the socio-economic impact of the country's digital economy.

Methodology

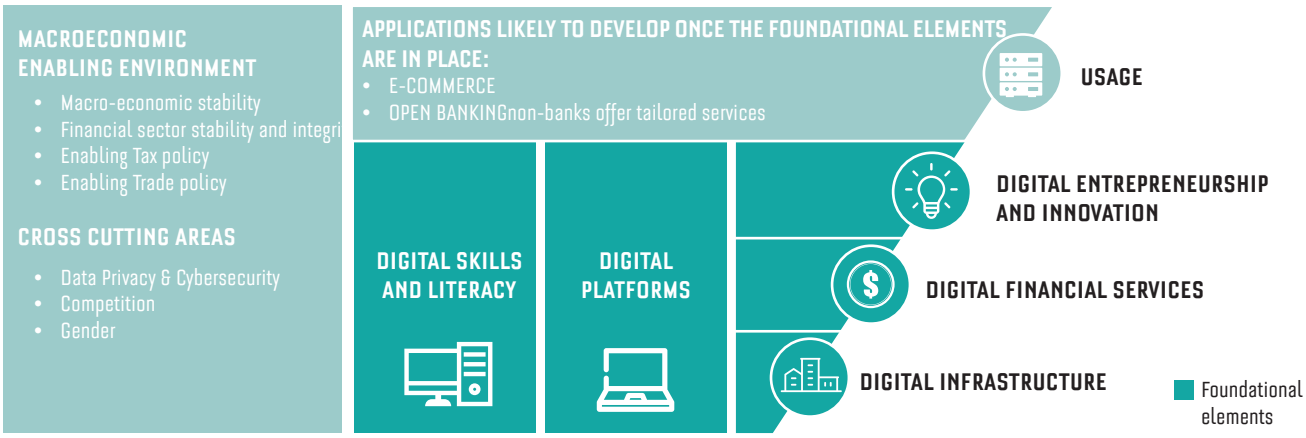
The report leverages the Digital Economy for Africa's (DE4A) integrated diagnostic framework to map current strengths and weaknesses of the national DE ecosystem (Figure 1), as well as to identify opportunities for future growth through recommended policies and interventions. This diagnostic framework that forms the basis of this report focuses on five foundational elements of DE:

- **Digital Infrastructure:** the availability of affordable and quality Internet, which is instrumental to bringing more people online.
- **Digital Platforms:** the presence and use of digital platforms that can support greater digital exchange, transactions and access to public and private services online.
- **Digital Financial Services:** the ability to pay, save, borrow, and invest through digital means, which is key to accessing digital services and increasing the rate of online transactions.
- **Digital Skills:** the development of a tech-savvy workforce with both basic and advanced digital skills to support increased technology adoption and innovation.
- **Digital Entrepreneurship:** the presence of an ecosystem that enables firms to generate new products and services, leveraging new technologies and business models.

The report is the first in the series of DE4A Country Diagnostics, although the DE4A conceptual framework has been finalized after the start of the project. The technical assistance to the GoS was initiated as a different study that was retroactively reshaped and enriched, when a more

1 Hjort, J. and Poulsen, J. 2019. *The Arrival of Fast Internet and Employment in Africa*. American Economic Review 2019, 109 (3): 1032-1079.

Figure 1. Key Components of the DE Ecosystem



Source: The World Bank 2018.

comprehensive DE4A analytical framework was finalized. Two additional WB tools were leveraged to conduct the stocktaking analysis, including the Digital Economy Country Assessment[2] (DECA) and the Digital Government Readiness Assessment[3] (DGRA), that allowed to reinforce the analysis as well as identify remaining knowledge gaps. Finally, the evaluation also benefited from a deep policy dialogue and comprehensive consultations[4] with the key national stakeholders.

Key Findings

The analysis of the digital economy foundational elements in Senegal starts with a look at cross-cutting issues. The findings illustrate that development of digital economy in Senegal has long been slowed down by inadequate regulatory framework, lack of competition and the complexity of the governance context with overlapping stakeholders' responsibilities. Therefore, after the adoption of the Digital Senegal Strategy (SN2025) in late 2016, the recently adopted (December 2018) Code on Electronic Communications[5] ends a long period of regulatory uncertainty, marking a turning point for the sector and demonstrating the interest and willingness of the Government of Senegal (GoS) to reshape sectoral legal and regulatory framework to cope with the fast pace of change in technologies and business models.

Digital Infrastructure. The report provides careful analysis of the coverage, cost, and quality of access to digital infrastructure in Senegal. To date, three existing telecommunications operators (Sonatel, Tigo and Expresso) held licenses that authorized them to provide services in Senegal. However, the Senegalese telecommunications value chain remains tied up in bottlenecks. The affordability of access to mobile broadband represents a challenge as prices still too high despite their recent decline. Cost of mobile broadband services represents 12 percent of average monthly gross income per capita income in Senegal, compared to 6 percent in Kenya. Moreover, the coverage still needs improvement and digital divide is high with limited access in secondary cities[6]. Furthermore, Senegal has not yet deployed a complete 4G network despite the existence of an adequate radio spectrum for providing connectivity services. While the former legal framework did not contain rules for more efficient allocation and assignment of the radio spectrum, the new code is now directing the frequency fees to the public treasury which removes the conflict interest that affected ARTP who was setting the amount of frequency fees and collecting/perceiving those fees at the same time, with limited

2 The Digital Economy Country assessment tool was developed under the Digital Development Partnership (DDP)'s Digital economy enabling environment pillar which seeks to help countries improve regulations, remove bottlenecks to the development of digital ecosystems, and foster competition, addressing the interface between digital or ICT regulations and other sector regulations.

3 The Digital Government Readiness Assessment toolkit (P163466) is intended as a practical hands-on big picture survey of the state of digitization of any government (World Bank, 2018).

4 This includes a consultation workshop entitled "Digital Economy for Inclusive Growth in Senegal" with representatives from the public sector, private sector, academia and consumer agencies in March 2018, Dakar.

5 The new ICT law was adopted, and three key decrees were also adopted; ARTP published two important regulation decisions (on the list of relevant markets and list of dominant players) that are pretty aggressive against the incumbent. On the governance side, the Conseil National du Numérique (CNN) was created by decree and its 20 members have been nominated by a Prime Minister arrêté. On the competition side, two improvements would need to be noted: entry of 3 ISPs in 2017/8 with 2 having already launched their services, and attribution of 4g frequencies to TIGO in early 2019 (resulting in introduction of competition on 4G). More recently, the government is finalizing the attribution of an authorization to an infrastructure operator (GUESPA).

6 Data from the 2017 Gallup Survey shows that, between 2016 and 2017, internet broadband access in Senegal deteriorated in both urban and rural areas while the urban-rural Internet divide widened by 4 percentage points during the same year.

incentive to reduce the amount of fees so as to encourage infrastructure investment. This context also impedes facilities-based competition not only in large markets (international connectivity, backbone national, backbone, last mile) but also in retail markets[7].

As for data depositories, there is a multiplicity of data centers that mainly serve hosting State data and IT applications[8] in key line ministries[9]. Despite the existence of a broadband network that interconnects all the buildings of the central administration, these data hosting facilities operate in silos due to limited integration and sharing strategy. The proliferation inevitably leads to non-optimized investments and operating costs. To address such challenge, ADIE has recently initiated an effort to develop a national cloud for the government, including universities, schools, health pyramid structures, and local governments.

Digital Government Platforms - The results of DGRA show that Senegal is making progress in developing its digital government. The country has also secured a government-wide digital network, a wireless WiMAX network as well as multiple data centers. However, several reforms and activities still are necessary to accelerate a comprehensive digital government transformation. The government' multiple platforms and shared services remain autonomous and lack integration. Even though they use common data on persons or goods, many government platforms are not interlinked to facilitate, or even allow, data-sharing. The fact that neither operational reference standards nor a government-wide enterprise architecture exists makes sharing significantly challenging.

The report looks at two important digital government platforms: digital identification and digital taxation. Senegal, and Ghana, pioneered digital identification systems in the Economic Community of West African States (ECOWAS) with the deployment of National Biometric Identity Card (ENBIC). This e-ID system is mandatory for all citizens and is used for identification to access several services. The unique number generated by the Files Automation Department (DAF) can serve as a basic identifying reference. However, 25 percent of Senegal's population remain not yet registered and do not have any identification. As for the digital taxation, a full deployment can accelerate the ongoing reform initiatives and transformation of public administration. Senegal aims at making the regular interactions between taxpayers and the tax authority paperless by switching to a more transparent and more efficient online filing and payment approach. The emphasis of current targeted initiatives is on strengthening governance of revenue administration to properly monitor taxpayers' observance of the law[10].

Digital Financial Services - In Senegal, effective usage of Digital Financial Services (DFS) is still limited despite the growth in mobile money account ownership. With only 42% percent of adults reporting to having an account at a financial institution (Findex 2018), DFS offer great potential to meet the financial needs of poor and unbanked consumers. In terms of usage, airtime purchase currently represents 40% of the annual volume of transactions, the remainder is allocated mainly to person-to-person (P2P) transfers (12%) and cash withdrawals (12%). To date, mobile payments at the merchant level are still scarce at 6% with only a limited 1,300 service points.

The expansion of DFS in Senegal is confronted with several challenges including the prevalence of cash. The absence of regulatory framework governing fintech and the lack of interoperability among current digital payment services are hindering scalability. The high cost of unstructured supplementary service data (USSD) is adding another challenge.

Digital Skills - The rise of a vibrant Digital Economy in Senegal is hindered by a lack of qualified and competent human resources[11]. This is mainly due to the status of Senegal's public education (i.e., primary and secondary) which is confronted with lack of resources and infrastructure. Today, only 7.4 percent of the Senegalese population is also enrolled in tertiary education. On the other hand, the Ministry of Higher Education and Research (MESR) is leading an ambitious reform program to promote the digital agenda and STEM education. A decentralization plan for higher education has been adopted with the opening of 14 specialized universities and graduate schools and the launch of the Virtual University of Senegal (UVS), a digital educational infrastructure open to more than 20,000 students.

To cope with the qualitative and quantitative shortage of digital training in the Senegalese ecosystem, private digital training providers are aiming to complement the

7 For example, Sonatel has a dominant position as it owns the country's largest optical fiber network and is the sole operator to provide asymmetric digital subscriber line (ADSL) Internet connection, 4G license granting. It has access to the main international gateway which effectively gives it de facto monopoly over data transmission, high cost for the portability of telephone numbers dissuades telecommunications operators from transferring numbers, capacity supply (backbone-type leased lines).

8 Applications such as messaging, telecoms services and video conferences, websites, and some national data such as geomatics.

9 Data centers are located in Direction du Traitement Automatique de l'Information (DTAI) in the Ministry of Finance, and Direction de l'Automatisation des Fichiers (DAF) in the Ministry of Interior, and ADIE.

10 In 2016 for instance, approximately 10% of the enterprises of a representative sample declared a turnover representing less than half of the declared volumes of their importations and payroll.

11 The country ranks 128 out of 192 on the Human Capital Index 2017 (WEF) and as 162 out of 194 on the Human Development Index (UNDP).

digital training offered by Senegalese higher education institutions. These new private actors sometimes partner with major technological firms such as Atos, Facebook, and Orange, which already are active or are searching for means to participate in upgrading digital skills in Senegal. The private digital training actors have yielded good results to date, but their impact remains limited and will require scalability.

Digital Entrepreneurship - Senegal has one of the most dynamic digital entrepreneurship ecosystems in francophone West Africa. Three drivers help this nascent start-up nation to rise including a relatively widespread use of technologies in West Africa with 36% smartphone adoption rate; a high entrepreneurial activity rate with 39% of the population aged 18 to 64 is either setting up or heading a new company; and availability of diverse co-working spaces including 15 incubators and accelerators, serving the needs of a community of over 2,500 startups and entrepreneurs.

A major challenge for entrepreneurs in Senegal remains lack of access to finance during their pre-seed and seed phases. The availability of risk capital is one of the lowest scored components of Global Entrepreneurship Index (GEI) for the country. While a dedicated legal and regulatory framework tailored to the needs and challenges of entrepreneurs is being developed, its enforcement requires a lacking concerted effort among various governmental entities to stimulate the digital economy.

Recommendations

This report recommends key policy actions to unleash Senegal's Digital Economy potential and achieve the digital dividends:

- **Enforce a single governance framework to address the lack of coordination and steering and to strengthen the institutional and governance framework of the Digital Economy.** For some years, the sector context was marked by a multiplicity of bodies, each with specific and sometimes competing, prerogatives. The situation has improved with the creation and implementation of the Conseil National du Numerique, an umbrella high-level consultative structure for the ICT sector, mainly composed of private sector stakeholders. Moreover, and following the recent post-election government restructuring, the Ministry of MPIP was dissolved and the ADIE was put under the Ministry of ICT, as recommended by WB. Furthermore, a change at the ARTP top management level is being made with a view to reduce political influence over the regulator's activity. Despite this recent progress, a stronger sector leadership is needed to bring a unified strategic management for advancing digital economy by building on the synergies between effective digital government, digital entrepreneurship dynamic ecosystem and human capital capacities development.
- **Promote private sector competition to advance Digital Economy and maximize financing for development in Senegal.** It is important to improve regulation and promote the complete opening of the digital sector to competition by making the legal regimes of licenses and authorizations open and transparent. The report has suggested to foster the private sector's commitment further by (a) finalizing the implementation of the new Digital Economy Code by adopting key implementing decrees including on frequency management, (b) strengthening the ex-ante asymmetric regulatory framework, (c) easing the regulatory burden for operators who lack significant market power; (d) reinforcing infrastructure-sharing regulations and access to alternative infrastructure (ADIE, the government's IT network); and (e) restarting the process of granting and extending 4G licenses to operators with global licenses.
- **Advance the implementation of the SN2025 strategy with a focus on the proposed key foundational elements of digital economy. The following is a set of recommended actions:**
- **Digital Infrastructure –** The aim is to ensure affordability and access to quality broadband by promoting infrastructure-sharing, improving spectrum management and frequency allocation, awarding 4G licenses in transparent and open processes, and authorizing IoT experiments.
- **Digital Government platforms –** There is a need for accelerating progress towards government-as-a platform to increase the whole-of-government efficiency and enhance the services delivery to citizens and businesses. This will require simplifying processes, ensuring interoperability, developing shared services, and securing the government platforms. Both taxation and unique identification will need further progress as priority platforms.
- **Digital Financial Services –** To expand the adoption of digital financial services, the report emphasizes the importance of three key areas including adoption of a digital payment interoperability regulation given the existence of payment initiatives in closed loops (i.e., Orange, YUP, TigoCash, and Wari), update the law on electronic transactions, and set by decree the cost of access to telecom infrastructure through unstructured supplementary service data (USSD).

- **Digital skills and capacities development –** The report highlighted the importance for ensuring digital capacity development for public servants and relevance between supply and demand for talents in Senegal. Key recommended actions include integrating digital technology in all levels of the education system, promoting the dissemination of a digital culture, and ensuring the growth of private providers of digital training.
- **Digital entrepreneurship –** To foster a promising digital entrepreneurship ecosystem in Senegal, the government can improve the current regulatory framework. Recommendations include adding different forms of tax incentives, direct financial support (i.e., operationalizing the Digital Development Fund), and access to public markets through innovative public procurement approaches.

The report also proposed three high-impact projects to accelerate the growth of Senegal's Digital Economy including:

- **Digital identity (e-ID)** to (a) complete the coverage of the e-ID beyond the current 70 percent of the population and (b) strengthen the sustainability and security of the e-ID system using public key infrastructure (PKI).
- **Digital taxation (e-Tax)** to (a) generalize the adoption of e-taxation to improve the quality of service for taxpayers and the collection of tax revenues; (b) modernize the fiscal administration; and (c) increase tax collection and reduce tax evasion.
- **Digital port (e-Port)** to set up an integrated port management system to improve land zone utilization, drive insights, ease interoperability of various actors' data systems, and open opportunities to set up a one-stop-shop for e-payment transactions.

Finally, this report identifies the need for future work in further priority areas. While the report did not fully analyze private platforms, it recognizes some concerns that may arise of market dominance by single privately-owned platform providers. This important area of focus will need further analysis and additional work beyond the current study. Also, the report represents an opportunity to call for more rigorous evaluation and data collection on the impact of digital on the economy. This could include a mechanism for multiple ministries to collaborate on setting up an observatory.

1. INTRODUCTION

A. Context

Global Digital Economy on the Rise

The rise of digital technologies and digital economy (DE) offers unique opportunities for accelerated economic growth, innovation, job creation and access to quality services. The accelerating pace of technology diffusion, technological convergence, and the emergence of global platforms are disrupting traditional development and business models, expanding access to global markets, facilitating services provision, delivering productivity gains, and generating employment. Although more rigorous empirical work to demonstrate causal impact of digital technology adoption on productivity and inclusion outcomes is necessary, burgeoning research has been offering positive correlational evidence[12]. Between 2001 and 2011 the employment growth in the technology sector in the Middle East and North Africa (MENA) region, for instance, was 27 times higher than in other sectors[13]. The MIT Sloan Research demonstrates how digital technologies can significantly boost business productivity by estimating that companies adopting them are 26 percent more profitable than their sectoral counterparts[14]. On the national level, a study by Deloitte stipulates that bridging the Internet penetration rate gap with developed economies could enhance productivity in developing countries by up to 25 percent, generating US$2.2 trillion in additional gross domestic product (GDP), creating more than 140 million new jobs, and lifting more than 160 million people out of extreme poverty. Overall, the global DE, worth estimated US$11.5 trillion or 15.5 percent of global GDP in 2016, is expected to reach 24.3 percent in less than a decade (by 2020)[15], far outpacing the growth of the 'traditional' economy'. The full rollout of 5G technology alone is estimated to unlock US $12.3 trillion in revenues in various industries by 2035, equivalent to 4.6 percent of global production, supporting 22 million new jobs[16]. If managed well and accompanied with appropriate risk mitigation strategies and equity-enhancing policies, these technologies can, in principle, be harnessed for the benefit of the poor by lowering information barriers and asymetries, decreasing informality, limiting uninsured risks, and reducing prices of goods and services as well as the cost of public service delivery. In Kenya, for example, the impact of mobile money on increasing remittances to rural areas and lowering transaction costs has had a direct impact on reducing poverty rates[17], while in Peru mobile phone expansion between 2004 and 2009 increased household real consumption by 11 percent, reduced poverty incidence by 8 percentage points (p.p.) and decreased extreme poverty by 5.4 p. p.[18]

The Digital evolution in Africa has been important with impressive progress in many areas, however it is yet to become a real revolution. DE in Africa is currently at an inflection point, whereby the falling cost of technology is allowing scalable innovations. For instance, cellular subscriptions are sky-rocketing – with 420 million unique mobile subscribers in Sub-Saharan Africa (SSA), reaching 44 percent of the continent's population at the end of 2017, up from 25 percent in 2010. Mobile Internet penetration reached 240 million people (or 26 percent penetration) in 2016[19], with mobile technologies and services generating 7.1 percent of GDP or US$110 billion in 2017. Moreover, mobile money is driving financial inclusion, particularly in SSA, with the number of accounts doubling to 21 percent between 2014-17[20]. African e-commerce is also growing rapidly, at an estimated annual rate of 40 percent. These dynamics have come on the back of a tenfold increase over the past five years in the supply of new intermediaries and support structures, such as incubators, accelerators and tech hubs, among others, numbering more than 200 across the Africa region today. Overall, the African DE is expected to grow to over US$300 billion by 2025, yet much more can be achieved and while, as cited above, global DE accounted for 15.5 percent of global GDP in 2016, African countries enjoyed only a tiny fraction of these benefits. This can be holistically explained by the fact that in general, the gains of the digital expansion, as evidenced by the 2016 World Development Report (WDR 2016), have thus far been *"skewed towards the wealthy, skilled, and influential, better positioned to take advantage of new technologies"*[21].

12 For example, cross-country evidence suggests a positive relation between ICT expansion and economic development, as per Roller and Waverman, 2001. *Telecommunications Infrastructure and Economic Development: A Simultaneous Approach*; Torero and Von Braun, 2006. *Information and Communication Technologies for Development and Poverty Reduction: The Potential of Telecommunications*; Djiofack-Zebaze and Keck, 2009. *Telecommunications Services in Africa: The Impact of WTO Commitments and Unilateral Reform on Sector Performance and Economic Growth*.

13 World Bank. 2018. *Middle East and North Africa Economic Monitor, October 2018: A New Economy for Middle East and North Africa*. Washington, DC: World Bank. © World Bank. Available here.

14 Bonnet, D., Westerman, G., McAfee, A. 2014. *Leading Digital: Turning Technology into Business Transformation*. Massachusetts Institute of Technology and Capgemini Consulting. Available here.

15 Oxford Economics, Huawei. 2017. *Digital Spillover: Measuring the True Impact of the Digital Economy*. Available here.

16 IHS Economics and Technology. 2017. *The 5G Economy: How 5G technology Will Contribute to the Global Economy*. Available here.

17 World Bank. 2010. *Kenya Economic Update, 2010, Edition 3: Kenya at the tipping point, with a special focus on the ICT Revolution and Mobile Money*. Available here.

18 Beuermann, D., McKelvey, C., Vakis, R. 2012. Mobile Phones and Economic Development in Rural Peru. Journal of Development Studies 48 (11), November 2012.

19 GSMA intelligence. 2017. *The Mobile Economy in Sub-Saharan Africa 2017*. Available here.

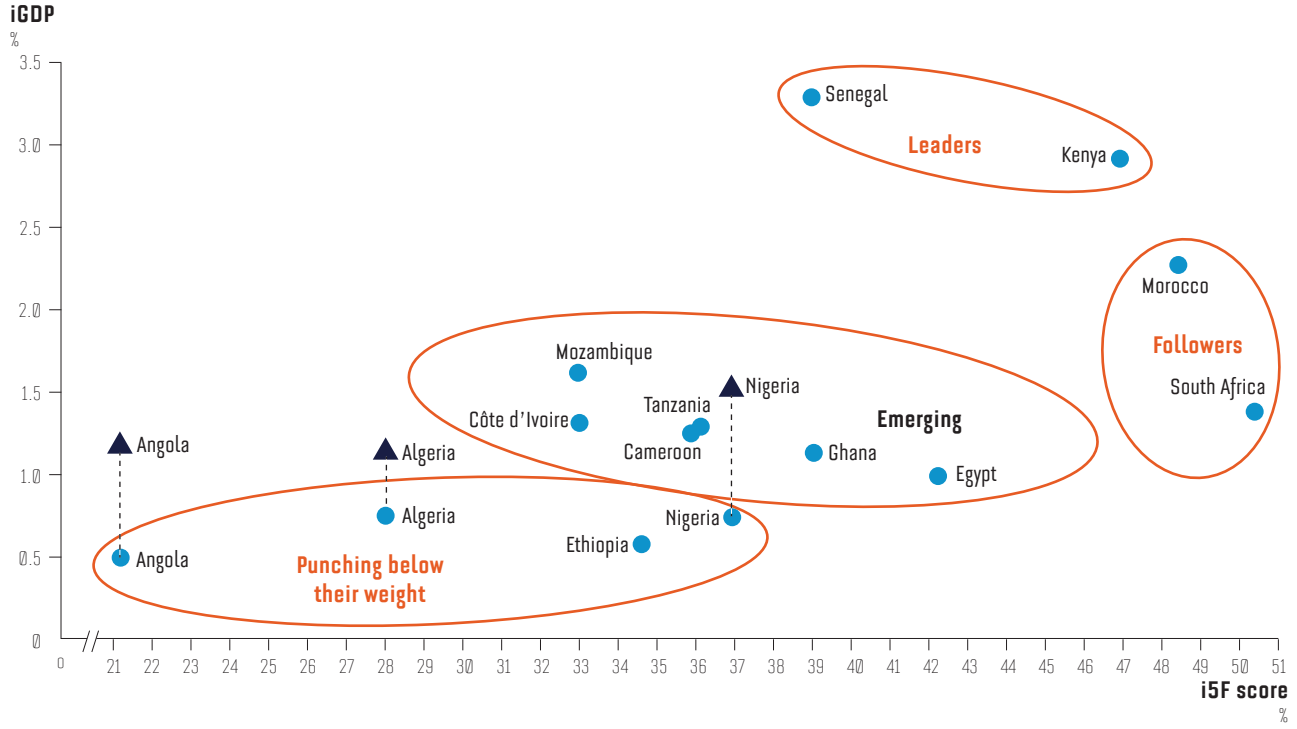
20 World Bank. 2018. Global Findex. Available here.

21 World Bank. 2016. *World Development Report 2016: Digital Dividends*. Washington, DC: WB. Available here.

Strategic Assets and Sound Foundations Position Senegal Well to Benefit from DE...

In these global and regional contexts of expanding technological innovation, a small, open and politically stable country like Senegal with historically strong institutions and a growing young, largely urban, population is well positioned in Africa to take full advantage of the transformational potential of digital technologies. The Senegalese environment is relatively DE favorable and is characterized by a young (62 percent of the population is under 25 years old) and growing urban population (+3.6 percent per annum) as well as big and active diaspora providing skills, networks in developed markets, and financial support. The favorable conditions are amplified by a widespread use of technologies (Senegal's smartphone adoption rate is among the highest in West Africa at 35.6 percent), a high entrepreneurial activity rate (39 percent of the population aged 18 to 64 is either setting up or heading a new company), and an evolving innovation ecosystem, currently counting more than 15 incubators, accelerators, co-working spaces, serving the needs of a community of over 2,500 startups and entrepreneurs. Moreover, Senegal has a bandwidth of 23 Gigabytes/second (Gb/s) through three submarine cables (South Atlantic 3 (SAT3), Atlantis 2, ACE) and satellite connections as well as more than 4,000 km of publicly owned national fiber optic network with its information and communications technology (ICT) infrastructure ranking among the most developed and successful in West Africa. Against this background, the McKinsey Global Institute (MGI) observed in 2013 that Senegal, alongside with Kenya (as per Figure 1), had *"emerged as <one of> the continent's leaders in terms of the relative economic contribution of the Internet"* to GDP, with its Government undertaking concerted efforts to stimulate Internet demand and private consumption of digital services, accounting for more than 85 percent of its iGDP.[22] Overall, DE in Senegal has a high potential to play a catalytic role in boosting competitiveness and productivity across all sectors of the economy as well as in improving the country's inclusion outcomes. At the same time, DE presents not only opportunities and new avenues for rapid, innovative and job-creating economic growth, but also strategic challenges and risks. There is also much to lose if Senegal is too slow to implement an ambitious and inclusive digital agenda, as a whole generation of Senegalese could be excluded from the rapidly unfolding global DE of tomorrow.

Figure 2. Contribution of the Digital Economy to GDP in Africa (iGDP1), 2013 (%)



Source: McKinsey Global Institute, 2013.

22 McKinsey Global Institute (MGI). 2013. "Lions Go Digital: The Internet's Transformative Potential in Africa". Mickinsey & Company 2013. Available here.

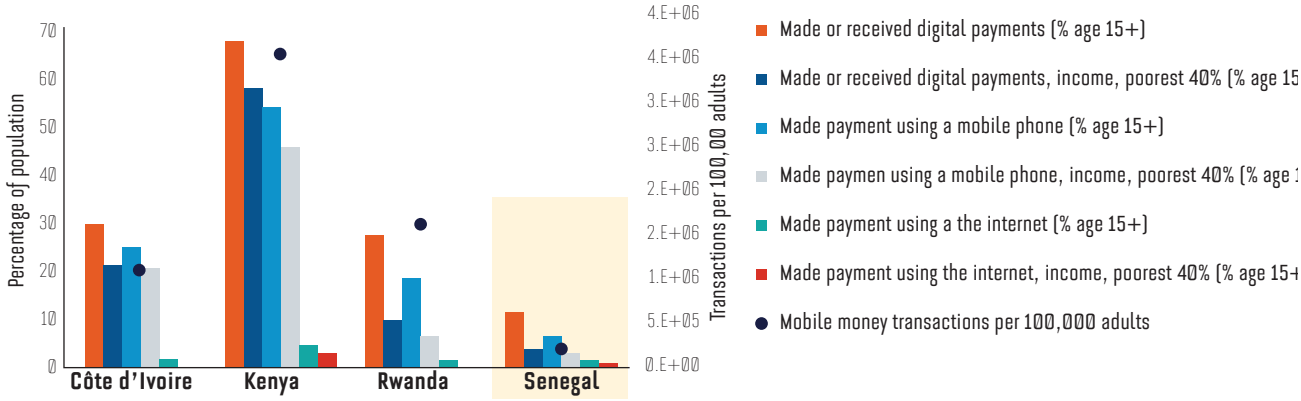
...However, Challenges Persist, and Significant Lags Have Accumulated

Despite important assets and relatively favorable environment, Senegal has been progressively losing its leading digital position in the region, largely linked to limited availability of adequate and affordable digital infrastructure and reflected in weak development of downstream digital solutions and applications. Over the past 10 years, Senegal has been steadily forfeiting its chance for a regional leadership position in the ICT and DE domains, as access to the Internet broadband has remained quite limited with mere 7 percent of population enjoying fixed broadband and 19 percent mobile broadband in 2017[23]. Coupled with relatively expensive mobile Internet connections, this has inhibited the development of even basic support services, such as back office functions, let alone sophisticated digital public and private solutions and applications. The number of secure Internet servers per 1 million of people in Senegal is extremely low at 16.7 in 2018 against 35.9 in Rwanda, 219.1 in Kenya and 760.4 on average in SSA[24], posing a serious challenge for a wide adoption of digital technologies and e-commerce. Moreover, despite a relatively solid 2G cell phone coverage across Senegal (with the lowest being around 72 percent), the computer usage is much lower, with some regions at less than 1 percent[25], presenting yet another hurdle for digital solutions dependent on the frequent use of computers. Largely as a result, the contribution of the ICT sector to GDP growth in Senegal has been stagnating over recent years (Figure 3). Likewise, despite a relatively good mobile penetration even for the bottom 40 percent of the population, Senegalese households are lagging peers in the adoption of digital services, such as online payments, enabled by such infrastructure (Figure 3).

Moreover, Senegal is burdened by significant spatial inequities in digital infrastructure provision that directly stifle equitable growth, job creation and innovation across the country. Amid significant variances in inter- and peri-urban connectivity, access to digital infrastructure and digital services that in turn facilitate access to labor markets, knowledge, information and economic and social opportunities has concentrated around a handful of growth poles, particularly Dakar. This has resulted in uneven spatial economic development, leaving rural and congested areas of deep poverty, where the expected positive externalities of infrastructure provision are the highest, either with no or limited coverage (as per Maps 1). Moreover, the existing public financing mechanisms, such as the Universal Service Fund, do not focus on bridging the geographic divide in broadband Internet infrastructure. Rural areas, secondary cities and peripheral districts are particularly disadvantaged. Not only do they lack connectivity appropriate to their size and population, but they also benefit the least from the positive effects of competition. For example, the number of districts with adequate competition between three main telecom providers is much lower in Pikine than in Dakar. Even in the capital, many urban households and businesses are excluded from the benefits of competition, because they live or operate in neighborhoods covered by only one operator.

This comes against the background of a distorted and highly concentrated market structure, competition on which is stifled by restrictive public regulations and inadequate regulatory capacity to push back against constraining quasi-monopolistic arrangements. Historic

Figure 3. Digitally-enabled Access to Finance, 2014



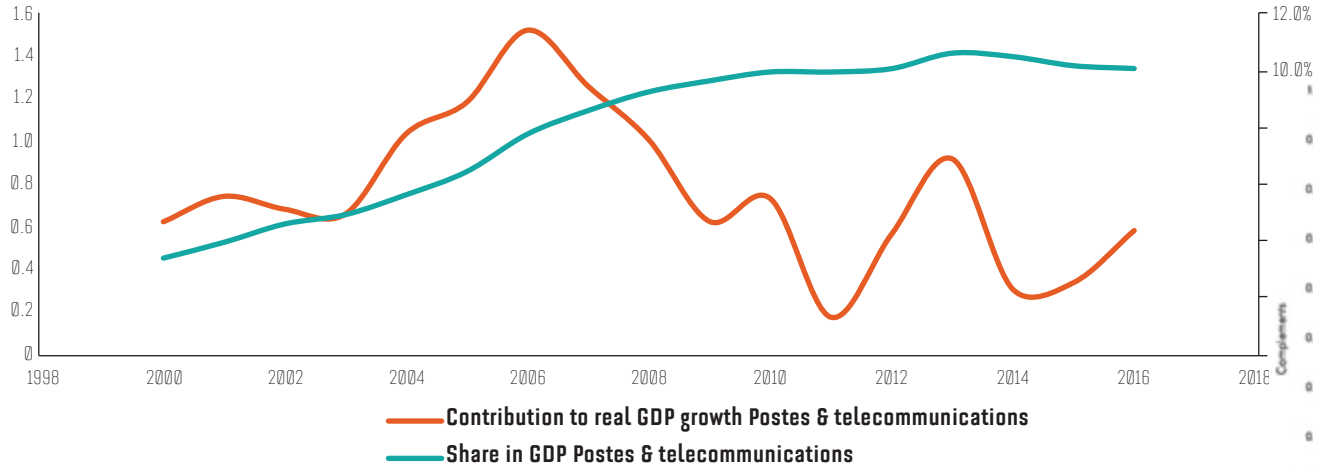
Source: World Bank Staff estimations based on the 2014 G20 Financial Inclusion Indicators from WDI.

23 International Telecommunication Union (ITU). 2017. Statistics. Available here.

24 World Development Indicators (WDI), 2018. Available here.

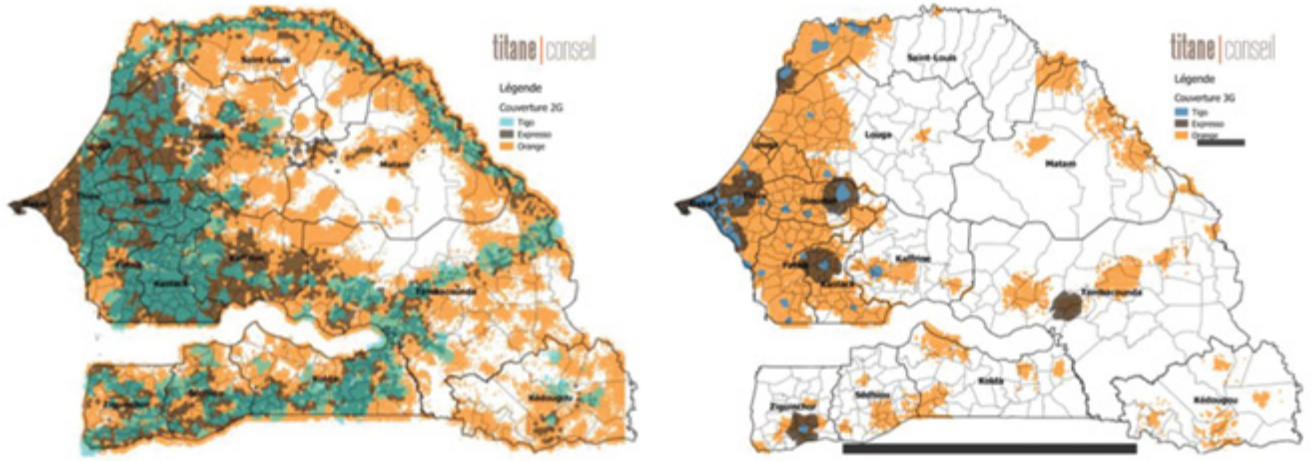
25 World Bank Staff estimations based on Global Monitoring Database, using the 2011 ESPS household survey.

Figure 4. ICT Contribution to GDP growth in Senegal, 2000-16*



Source: World Bank, 2018. Systematic Country Diagnostic of Senegal.
* Although the contribution of the ICT sector (as a stand-alone sector) to GDP growth has stagnated over time, it may be possible that its contribution to economic growth could be increasing over time due to potential indirect effects including production and employment generation in downstream firms that are users of goods and services provided by the ICT sector.

Map 1. Connectivity Coverage in Senegal: 2G (left panel) and 3G (right panel), 2017



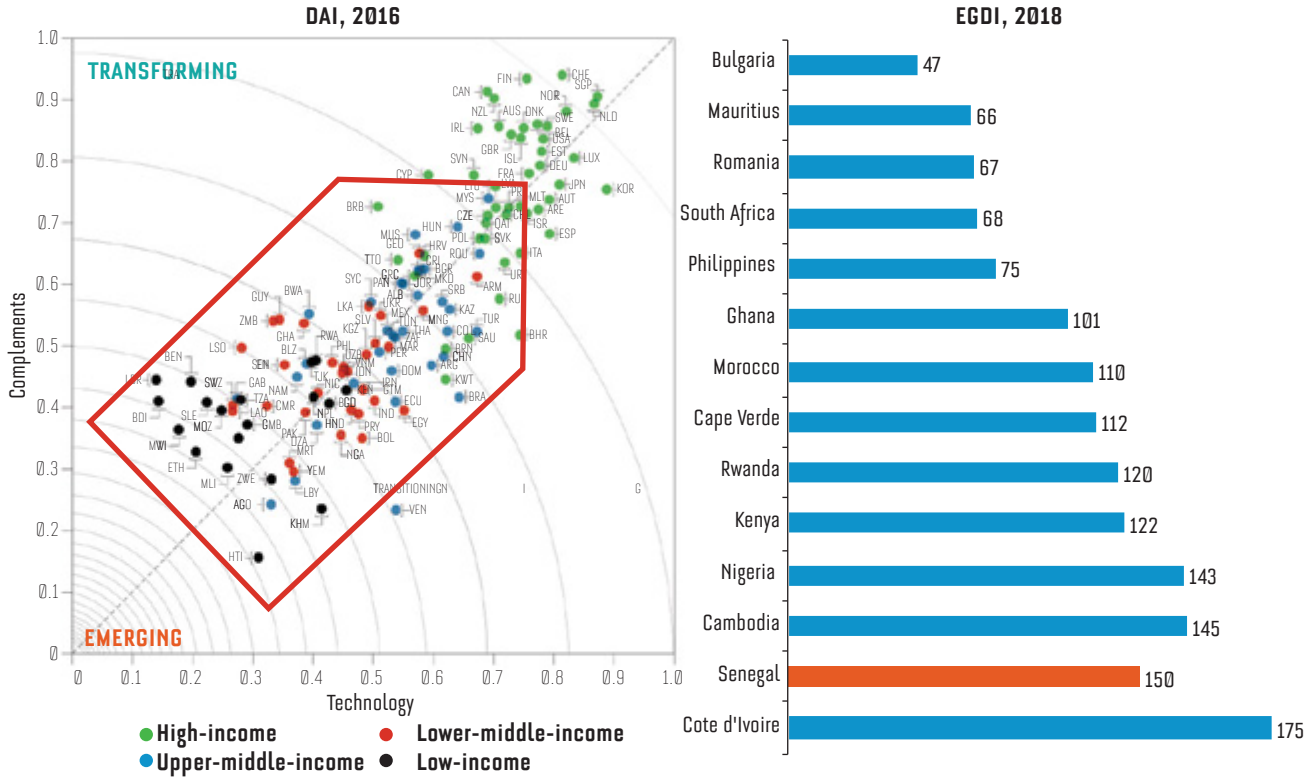
Source: MCTPEN and Titane Conseil, 2018. «Actualisation de la Stratégie d'Accès au Service Universel des Télécommunications du Sénégal».

state-owned telecom operator Sonatel, which owns the country's largest fiber optic network, is the sole operator to provide asymmetric digital subscriber line (ADSL) Internet and until recently the only holder of the 4G license acquired on a non-competitive basis. The uneven and non-transparent granting of 3G and 4G licenses have exacerbated long-lasting imbalances in market competition. The basis used to determine the level of charges is not clear, but the operators consider them high compared to other neighboring countries, such as Morocco. As a result, according to the product market regulation indicators of the Organization of Economic Co-operation and Development (OECD), the telecommunications regulation in Senegal appears relatively more restrictive in Senegal than in other African countries.

Overall, Senegal is still transitioning towards broad digital technologies dissemination. The Digital Adoption Index (DAI) built within the framework of the WDR 2016 to measure the worldwide dissemination of digital technologies (on a 0-1 scale) demonstrates the status of technology adoption by Senegal compared to other 179 countries. Senegal's results in 2016 (Figure 4) were higher for the government (0.43 against 0.59 in Kenya and 0.67 in Rwanda) compared to businesses (0.39 against 0.57 in Kenya and 0.42 in Rwanda) and people (0.23 comparable to Kenyan 0.20 and Rwandan 0.19)[26], signaling the need for additional incentives to stimulate broad technology adoption by individuals and enterprises. At the same time, another global indicator, the United Nations Electronic Government Development Index (EGDI) 2016, illustrates evident gaps

26 World Bank. 2016. *Digital Adoption Index Database*. Available (in excel) here.

Figure 5. Senegal's Position on the Digital Adoption Index (DAI), 2016 (left panel) and Electronic Government Development Index (EGDI), 2018 (right panel)



Source: World Bank (2016) *World Development Report: Digital Dividends*; UN DESA (2018). *E-Government Survey*.

in Senegal's e-government performance vis-à-vis global and regional leaders (Figure 5)[27], reflecting the need for a holistic approach, going beyond technology, in creating an enabling governance environment for a thriving DE.

To Address These Gaps the Government Has Developed Appropriate Strategies and Policies

Recognizing the strategic relevance of the DE potential and persisting challenges in unlocking it, the Government of Senegal (GoS) is committed to sectoral reforms and reinvigorating the country's regional digital leadership. Adopted in 2014 national development plan, *Plan Senegal Emergent (PSE)*, that has just entered its second implementation phase through *Plan d'Action Prioritaire II for 2019-2023 (PAP2)*, identifies DE as one of the key pillars of strong, inclusive and sustainable growth. PAP2 clearly formulates the GoS commitment to *"promote an innovative and value-creating digital industry and boost technology transfer opportunities with the ambition of becoming a reference country in Africa in the digital domain"*. In this context, key government priorities include digital infrastructure, innovative digital technologies and their diffusion across priority economic sectors, ICT/digital skills and entrepreneurship. These commitments build on the Digital Senegal Strategy, *Stratégie Sénégal Numérique 2025 (SSN2025)*, aligned with international best practices and focused on improving sectoral competition, access and governance. It is structured around the slogan *"digital for all and for use in everything in Senegal by 2025, enhanced by an efficient enabling ecosystem and a dynamic and innovative private sector"*. The four main axes of SSN2025 are: *(i)* enhancing broadband connectivity for all and promoting high-quality, affordable and reliable telecom services; *(ii)* digitally connecting public entities to dematerialize and facilitate administrative procedures, while ensuring synergies, reduced costs and eliminated transaction delays; *(iii)* creating an enabling environment for a thriving local digital private sector, promoting investment and facilitating exports; and *(iv)* promoting the innovative use of digital resources to increase productivity and competitiveness of the overall economy.

27 Mathematically, EGDI is a weighted average of three normalized scores on three most important dimensions of e-government, namely: (1) scope and quality of online services (Online Service Index, OSI), (2) development status of telecommunication infrastructure (Telecommunication Infrastructure Index, TII), and (3) inherent human capital (Human Capital Index, HCI), as per United Nations. 2016. *E-Government Survey: E-Government in Support of Sustainable Development*. UN, New York, 2016. Available here.

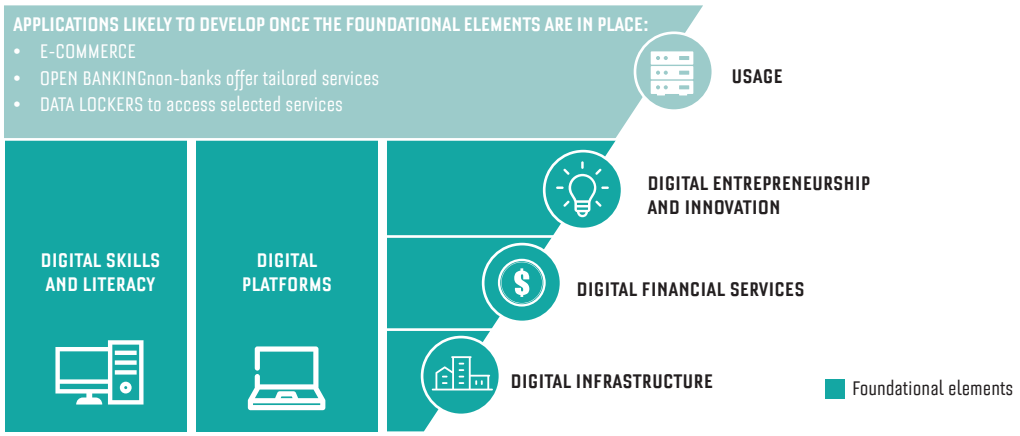
Despite these important and well-formulated policy orientations, key stakeholders share a view that the pace of their effective implementation remains slow and uneven. Difficulties explaining the widely documented and equally symptomatic for other sectors "implementation gap"[28] are linked, among others, to the following factors: *(i)* the lack of political leadership and institutional alignment in the sectoral strategic governance, *(ii)* inconsistent policies among a plethora of various public institutions, resulting in *(iii)* a weak quality of public-private dialogue, *(iv)* the absence of an updated legal and regulatory framework favorable to the full opening of the digital infrastructure sector to competition exacerbated by *(v)* the historical operator's capacity to withstand the political outcomes that would attempt to correct its monopolistic status, as well as *(vi)* regulatory gaps in digital finance sector and insufficient support for digital entrepreneurship.

B. Methodology

This report is based on the WBG Digital Economy for Africa (DE4A) analytical framework. Recognizing the transformative potential of digital technologies as sources of productive and inclusive growth, the WBG, in close partnership with key public and private stakeholders, launched in April 2018 the DE4A initiative that marks a more holistic approach to work with African governments to boost their still nascent and plagued by challenges DEs. The DE4A offers a comprehensive analytical framework that elaborates on five foundational blocks of dynamic, inclusive and safe DE. These five critical foundations are as follows (Figure 6).

1. **Digital Infrastructure** that brings online people, businesses, and governments, and includes, among others, connectivity (high-speed Internet and Internet exchange points), Internet of things (network of interconnected and interacting devices) and data repositories (data centers and clouds), all of which must be secure, appropriately accessible and capable of supporting high bandwidth and transmission speeds;
2. **Digital Platforms** that offer products and services accessible through digital channels, such as digital ID systems, digital people-facing government services (civil and business registries, e-taxation and e-customs, etc.), and commercial digital platforms (social media and e-commerce, ride-sharing and streaming services, data analytics and augmented reality, digital education and health, etc.);
3. **Digital Financial** Services that enable electronic transactions essential for e-commerce and government services and open a pathway to a range of services beyond payments, including credit, savings, and insurance, stimulating stronger financial inclusion of unbanked households and businesses;
4. **Digital Skills** that include basic digital literacy, core digital user skills as well as professional and advanced technology skills combined with business acumen and knowledge, necessary to create local content and drive made-in-Africa solutions, which are needed to ensure that the continent is not only on the consumer side, but also plays a vital role in producing technology.
5. **Digital Entrepreneurship** that creates an ecosystem to bring DE to life with innovative growth-oriented businesses (both new and transformed existing) contributing

Figure 6. Digital Economy for Africa (DE4A) Framework



Source: The World Bank 2018.

28 World Bank. 2018. *Systematic Country Diagnostic of Senegal*. World Bank, Dakar. © World Bank. Available here.

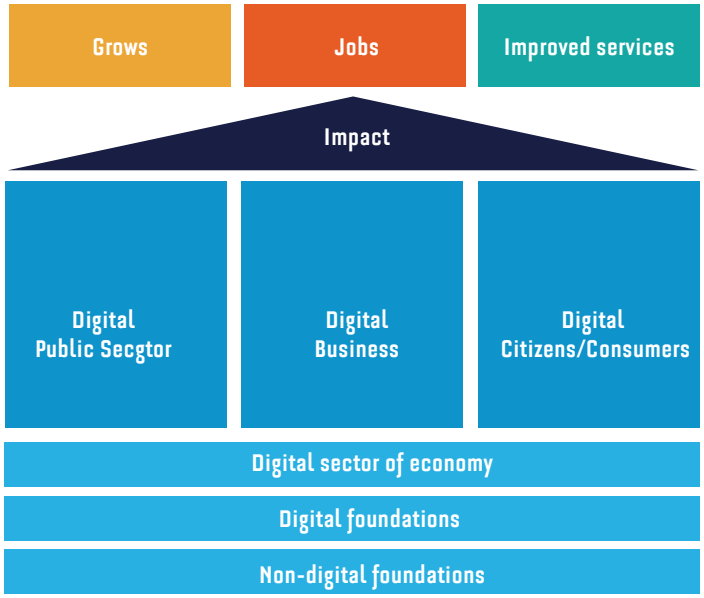
Figure 7. DECA Methodology

A. Assessing Foundations of DE
I. 'Analog' Components
- ✓ National policies and strategies
- ✓ Leadership and institutions
- ✓ Laws, regulations and standards
- ✓ Human capital
- ✓ R&D and ICT Innovation
- ✓ Business environment
- ✓ Trust and security

II. Digital Components
- ✓ Digital infrastructure
- ✓ Shared digital platforms
- ✓ New/emerging technologies

B. Benchmarking Current DE
- Public sector
- Business
- Citizens/consumers
- Digital economy sector (ICT, content and media)

C. Social and economic impact
- Overall assessment
- Economic impacts
- Social impacts



Source: World Bank, Digital Development Partnership, 2018.

to net employment growth and helping enhance countries' competitiveness and productivity;

To successfully build each of these foundations and accelerate the growth of various economic sectors dependent on them, **enabling policies and a strong regulatory and intuitional governance are essential.**

To deepen the team's situational analysis of the DE in Senegal under the DE4A framework, two WB diagnostic tools were leveraged to derive main conclusions of this report – the Digital Economy Country Assessment (DECA) and the Digital Government Readiness Assessment (DGRA). DECA focuses on assessing the existing level of the DE development (its snapshot, as per Figure 7) to determine its maturity level based on quantitative international benchmarking and qualitative assessment informed by a series of in-depth expert interviews and broad consultations with key stakeholders. Core focus areas of the analysis are *(i) non-digital foundations*, including policy and strategic planning, leadership, institutions, regulatory framework, and human capital; *(ii) digital foundations*, including digital infrastructure, shared digital platforms, and emerging technologies; and *(iii) digital economic sectors*, comprising ICT as well as content and media sectors.

The DGRA is a strategic planning tool focused on governmental digital platforms and services. As such, it evaluates the existing digital government (e-government) development potential using eight key dimensions: *(i)* leadership and governance; *(ii)* user focus; *(iii)* business process change; *(iv)* capabilities, culture and skills; *(v)* shared infrastructure; *(vi)* data-driven management; *(vii)* cybersecurity, privacy and resilience; and *(viii)* enabling national ecosystem. For each dimension, a status-quo assessment as well as an identification of future development work have been undertaken.

The analytical work conducted using these diagnostic tools helped to identify the level of maturity and a reference point of the DE development in Senegal as of 2018. The analysis identified major gaps, challenges and opportunities to determine judicious public-sector interventions and high-impact transformative projects. This evaluation has a potential to contribute to the formulation of strategic guidelines on key areas, which, however, will require deeper analysis before decisions are taken on key reforms and priority investments in enabling digital technologies.

The report findings were enriched and validated by inputs from key stakeholders in Senegal and within the WB, as the analytical work was deeply anchored in the ongoing WB policy dialogue with the GoS. In July 2017, the WB participated in a discussion with the GoS and private sector representatives organized by the Performances Group, a private consultancy, concerning the role of the digital sector in the Senegalese economy and Africa in general.

Subsequently, broad stakeholder consultations[29] were conducted throughout 2018 in the context of the second multi-sectoral Development Policy Financing (DPF) operation in support of Senegal's efforts to enhance governance, private sector participation and inclusive access in the electricity and broadband Internet sectors, as well as to boost the development of a currently nascent DE[30]. Moreover, a two-day consultative workshop co-organized by the report team and MEFP in close collaboration with IFC and Microsoft took place in March 2018 focused on *"Digital Economy for Inclusive Growth in Senegal"*. Convened to deepen the dialogue on Senegal's digital transformation and to consult, reflect, and share experiences, the workshop was attended by relevant decision-makers of various ministries and public agencies as well as representatives of the Senegalese and international private sector. The two main themes identified as government priority projects by the MEFP were (1) digital taxation as a government-enabling platform to increase the use of electronic payments and digital transactions and (2) transport sector (particularly the Port) to leverage enabling digital technologies to facilitate trade and improve supply chain management and logistics. Finally, continuous discussions were held with the WB Task Team Leaders to systematically share with them main report findings, on the one hand, and gather from them pertinent sectoral comments, on the other hand.

In this context, the main objectives of this report, which provides a snapshot of Senegal's DE today, are three-fold. Building on existing national strategy and legal documents, WB reports, international indicators and good practices as well as wide consultations, the study aims to *(i)* conduct a stocktaking analysis of key issues, achievements, government policies and interventions in each of the five foundational areas of the DE, *(ii)* identify key constraints and opportunities per area, and *(iii)* recommend appropriate reforms, priority actions, and relevant projects to address them and ignite an accelerated DE development.

29 Key public actors included, but are not limited to the following: Ministry of the Economy, Finance and Planning (MEFP); Directorate-General of Tax and Estates (DGID); Minister of Communications, Telecommunications, Post and Digital Economy (MCTPEN); State IT Agency (ADIE); Post and Telecommunications Regulatory Authority (ARTP); TV Broadcasting SA (TDS); Dakar Port Authority (PAD); Organization of Information Technologies Professionals (OPTIC); Association of ICT Users (ASUTIC); Delegation for Rapid Entrepreneurship (DER); Agency for the Development and Supervision of Small and Medium-Sized Enterprises (ADEPME). Key private sector actors included, but are not limited to the following: Telecom operators (Orange, TIGO, Expresso); banks (EcoBank and Société Générale); investment funds (Partech Ventures and Teranga Capital), incubators (CTIC Dakar and Jokkolabs); higher education and digital training institutions (Simplon and l'École Supérieure Polytechnique).

30 World Bank (2018). *Senegal – Second Multi-Sectoral Structural Reforms Development Policy Financing*. Program Document. World Bank, Washington DC. Available here.

SHUTTERSTOCK / ANTON_IVANOV

2. DIAGNOSTIC OF THE DIGITAL ECONOMY IN SENEGAL

A. Foundational Elements: Regulation, Competition, and Governance

This section reviews the main foundational elements laid by Senegal in its legal and regulatory framework, focusing specifically on Internet connectivity and broadband access, as digital infrastructure is a core to the success of other dimensions of digital transformation, including digital finance and entrepreneurship as well as to the development of other sectors that, together, form the basis of a successful DE.

1. Legal and Regulatory Environment in Transition

An outdated regulatory framework has persistently acted as a brake on the development of an accessible and affordable digital infrastructure in Senegal. The country has transposed relevant sector provisions of the Economic Community of West African States (ECOWAS) and West African Economic and Monetary Union (WAEMU) into the national law through the 2011 Telecommunications Code[31], amended belatedly in 2017[32]. However, in effect, the GoS has never developed a set of implementation decrees for the 2011 Code, leaving the sector to operate under an incomplete legal framework[33]. The situation has been exacerbated by a multiplicity and an instability of decision centers, rendering the application of law and the sector oversight erratic, and by the ability of the historical operator to resist policy outcomes that limit its monopolist status. Overall, in a rapidly evolving environment, the lack of a modern regulatory framework, compounded by a difficult political economy context, has prevented an effective reform implementation to boost sector competition and efficiency.

The recently adopted Telecommunications law ends a long period of regulatory uncertainty, marking a turning point for the sector. The GoS profoundly reshaped sectoral legal and regulatory framework by adopting in December 2018 a new Code on Electronic Communications[34] that focuses on accelerating competition and improving the efficiency of universal access public policy and programs. Concurrently, key accompanying implementation decrees on critical aspects related to competition, sector regulation, and universal access policy were approved. The GoS also issued a decree on the creation of the National Digital Consultative Council *(Conseil National du Numérique - CNN)*, hosted under the Prime Minister's office to facilitate private sector participation in sectoral governance and strategic initiatives. Additionally, the Code coexists with five other important laws on the information society[35] that are currently under revision launched by the Ministry of Communications, Telecommunications, Post and Digital Economy *(Ministère de la Communication, des Télécommunications, des Postes et de l'Economie Numérique - MCTPEN)*.

However, the law is still fraught with several important limitations, one of which is related to the legal regime of licenses and general authorizations that remains lengthy and constraining. The new Telecommunications Code, which is supposed to add flexibility and adaptability to the access regime of licenses and authorizations (described in Table 1), stops short of establishing the principle of not limiting the number of licenses, even though, similar to the ECOWAS sectoral laws, Senegal's law clearly targets promoting competition. In fact, legal provisions remain too restrictive, leaving the whole regime neither completely open nor transparent for the following main reasons: *(i)* the scope of licenses is still defined excessively broadly (including all types of networks opened to the public, except Internet access providers (ISPs), regardless of whether scarce resources are used or not); *(ii)* the attribution procedure remains long (authorizations are granted by the Minister on the advice of the sector regulator *(Autorité de Régulation des Télécommunications et des Postes – ARTP)*, and delays can be up to five months) and restrictive (invitations to tender in all cases); *(iii)* although exclusive rights are definitively prohibited or repealed, the number of licenses is necessarily limited due to the attribution procedure; *(iv)* authorizations are individual (with specifications) rather than general.

Another important weakness of the new Telecommunications Code pertains to provisions, covering market analysis and asymmetrical regulation, that appear relatively excessive. The market analysis mechanism, regulated by Articles 78 et seq. of the new Code, establishes a specific procedure. First, ARTP determines the list of relevant markets (with the periodicity of market analyses not specified), taking into consideration obstacles to effective competition, and then designates reputable operators with significant market power (SMP). Subsequently, leading operators are subjected to specific obligations with

31 Law n°2011-01 of 24 February 2011. Available here.

32 Law n° 2017-13 of 20 January 2017. Available here

33 Apart from *(i)* the guidelines on the interconnection, adopted by the Regulatory Authority for Telecommunications and Post *(Autorité de Régulation des Télécommunications et des Postes – ARTP)* in 2014, and *(ii)* the transferability of numbers, no implementing decrees have been adopted.

34 Law n°2018-28 of 12 December 2018. Available here.

35 These laws include the following: *(i)* Law n° 2008-10 of 25 January 2008 containing guidelines on the *Information Society*; *(ii)* Law n° 2008-08 of 25 January 2008 on *Electronic Transactions*; *(iii)* Law n° 2008-11 of 25 January 2008 on *Cybersecurity*; *(iv)* Law n° 2008-41 of 20 August 2008 on *Cryptology*; *(v)* Law n° 2008-12 of 25 January 2008 on *Personal Data Protection*.

Table 1. Senegalese Market Access Regime, 2017

	Type of Activities	Condition	Financial Contribution	Competent Body
Licenses	• Establish and exploit telecommunications networks or services accessible to public, using scarce resources or not	Yes, all licenses are granted through tendering	Yes, specified in tender documents	MCTPEN
Authorizations	• Establish and operate independent networks as well as • Infrastructure operators • Internet service providers • Mobile virtual network operators (MVNOs)	To date, no infrastructure operator authorized	Yes, although not specified in the law	ARTP (independent networks); MCTPEN (infrastructure operators, Internet access providers, MVNOs)
Free Entry (subject to prior declaration to ARTP)	• Provision of value-added services using available capabilities of telecommunications networks accessible to public	No	No	ARTP

Source: Report Authors based on Law n°2018-28 of 12 December 2018 (available here).

respect to interconnection and access, including the obligation to publish a technical and interconnection tariff proposal, approved beforehand by ARTP. The reference offer of leading operators should cover a minimum range of services, including the collocation and provision of leased lines, while the tariffs of the range of services listed in the catalogue should be cost oriented. Access obligations, such as local loop (LL)[36] unbundling, national roaming, or access to mobile operator network (for MVNOs) and to underwater cables should be implemented, regardless of any market analysis, as is the case in many other ECOWAS countries. The Code prequalifies the essential infrastructure, to which holders deemed powerful in relevant markets are obliged to provide access, to include: underwater cables, landing stations, virtual landing points, Internet exchange points, national transport networks, LL and local sub loop. This list, however, appears excessive and uncorrelated with a proper market analysis. In fact, if the right of access to essential infrastructure is intangible and in line with international best practices, the qualification of essential infrastructure itself is likely to evolve over time and henceforth cannot and should not be fixed by law.

Following this regulation, ARTP has recently determined a new list of relevant markets for a four-year period[37] as well as the SMP operators and their obligations in these markets for 2018[38], however underlying market analyses justifying the selection have never been published. Based on the ARTP decisions adopted in October 2018, the four following retail markets were found relevant: mobile Internet access services, high-speed and very-high-speed residential and nonresidential Internet access services, and mobile voice services. Bitstream wholesale offers were limited to the consumer market, while LL wholesale offers were segmented into business termination links, urban/interurban operator links, and international links[39]. Sonatel was found dominant in all markets, whereas Expresso and Tigo were deemed dominant in voice and SMS terminations, access to special services, and LL operations (Expresso only in the last-noted market). The proposed obligations imposed on dominant operators include (i) an obligation to grant open and nondiscriminatory access to their essential infrastructure and to publish a reference offer with cost-oriented tariffs on wholesale markets[40]; and (ii) an obligation of replicability of commercial offers and nondiscriminatory tariffs between on-net and off-net traffic on the retail markets. Unfortunately, the underpinning market analyses substantiating this list and the designation of dominant operators have never been published or scrutinized[41].

36 In telephony, a local loop is a wired connection from a telephone company›s central office to its customers› telephones at homes and businesses; this connection is usually on a pair of copper wires called twisted pair.

37 Decision n°2018-004 determining for 2018–21 the relevant markets of the telecommunications sector.

38 Decision n°2018-005 fixing for 2018 the list of powerful operators in the relevant telecommunications markets.

39 At the same time, the national and international fixed voice transit wholesale markets were abolished.

40 The obligation related to wholesale markets to allow access to national and international connectivity to better address broadband needs requires (1) technical reference offers to be adapted in terms of the interfaces and speeds offered, and (2) the capacity-leasing services on submarine cables to be supplemented by terrestrial links to enable access to the cable landing stations, and adapted colocation offers.

41 In particular, in its December 2018 Decisions the ARTP refers to *"two studies that should enable it to, on the one hand, obtain all the cost items borne by the operators, and on the other, suggest ways of improving the interconnection, especially with the advent of Internet Access Providers (IAPs), MVNO and infrastructure operators, for the next three years"*. These are (1) a Study on the Technical and Economic Criteria of the Interconnection in Senegal, which the Decision 2018-004 openly refers to; and (2) an Audit of Prices charged by leading operators for the 2014–16 period.

Box 1 Over-the-Top Regulation in Senegal

The definition of "telecommunications services" adopted by the ECOWAS as well as the 2011 Telecom Code excludes "services consisting in providing contents using telecommunications networks and services", de facto leaving the over-the-top (OTT) out of the regulatory purview. Based on available public information, Senegal has no specific regulation applicable to OTT, although the issue has been under discussion since late 2017, and ARTP has initiated a study on the "regulatory framework for new digital players/services" with four main components:

- Analysis of the OTT's impact on the telecommunications ecosystem in Senegal;
- Benchmarking against international best practices of the treatment of new players;
- Evaluation of new digital developments (Internet of Things (IoT), Big Data, mobile financial services) as well as applicable and appropriate supervision, development, and regulatory mechanisms;
- Elaboration of criteria for integrating and monitoring the activity of new players.

Unfortunately, any information pertaining to the completion of this study is yet to be published by ARTP.

In addition, the new Telecom Code clearly establishes the principle of *net neutrality* through *(i)* the obligation imposed on operators and ISPs to provide an open Internet and *(ii)* strict traffic management control. However, there is a significant loophole in this mechanism, as it provides ARTP with the possibility "*...to authorize or impose any traffic management measure, which it considers useful to preserve fair competition and ensure the equitable treatment of similar services in electronic communication sector".* (Article 28, last subparagraph, Telecommunications Code of 2018). This provision has triggered heated debate and strong opposition from the Senegalese Association of ICT Users *(Association Sénégalaise des Utilisateurs de TIC – ASUTIC)* that has raised concerns that the state might use this provision to legitimize Internet outage or block certain communication services.* In this context, for example, Facebook's Free Basics offer, marketed in Senegal by the Tigo operator, could be prohibited.† *Sources:* Report Authors based on relevant regulations.

* *Open Letter to President Macky Sall by ASUTIC on the new Electronic Communications Code*. December 2017. Available here.

† Facebook's Free Basics principle, deployed in many African countries by providers holding licenses in partnership with Facebook, is to provide free access to Internet with the possibility of accessing only Facebook and other provider-selected sites, while all other Internet services and sites are blocked.

2. Challenge of Competitive Imbalances

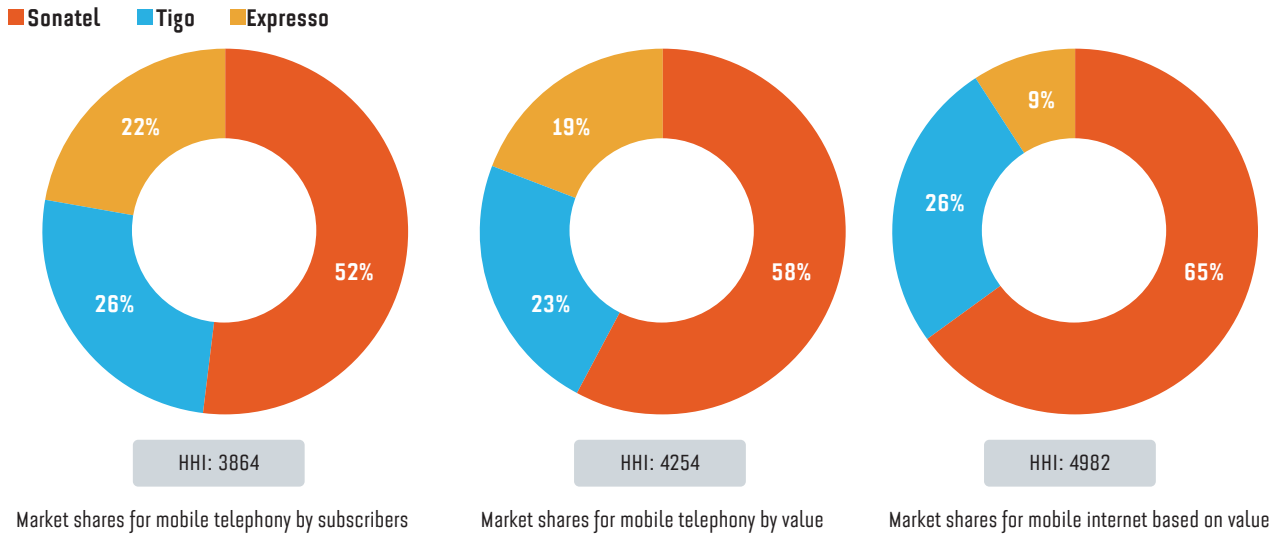
The evolution of the telecom market in Senegal and the absence of pro-competition regulatory environment have bred a quasi-monopoly market structure, which negatively affects accessibility, affordability and quality of Internet services, while inhibiting private sector investment and innovation. In a context marked by the need to tighten public spending and investments, the infrastructure of the Senegalese national telecommunications network and its historical state-owned operator Sonatel *(Société Nationale des Télécommunications du Senegal)* was privatized in 1997 with Orange/France Telecom acquiring a 42.33 percent stake (further increased to 52.2 percent in 2009[42]). Following this privatization, the State did not deem it necessary to significantly change the competitive dynamics of the sector and pursued a controlled liberalization, or guided deregulation, strategy, as a result of which over 15 ISPs present on the market as of the end of the 1990s have eventually left. These exits took place in the context of absent institutional, legal and regulatory framework sufficiently adapted to their activity, exacerbated by the reluctance of the GoS to authorize access providers to deploy their own facilities, thuswise compelling them to rent Sonatel's facilities at excessive prices, unavoidably causing market shrinkage. Admittedly, rather than stimulating the development of independent players and competition, the sector authorities have systematically strived to consolidate the market around the historical operator, eventually granting telecommunications licenses to only two other global operators, Millicom's Tigo[43] (operating in Senegal since 1999) and Sudatel's Expresso (operating in Senegal since 2009), both of which remain much smaller in the scale of their operations and coverage than Sonatel. Indeed, Sonatel accounts for 58 and 65 percent of the mobile telephony and mobile Internet markets by value respectively, owns the largest fiber optic network and is the only provider of fixed Internet and 4G services, dominating all key market segments (Figure 8), including:

- *Fixed telephony* (call termination on the fixed network, collection of traffic on the fixed network, national traffic, and international traffic);
- *Mobile telephony* (call termination on a mobile network and termination of short messages on a mobile telephone network);
- *Data transmission* (access to broad band and access to the LL);
- *Capacity services* (capacity leases and access to the international capacity).

42 The Senegalese government has remained Sonatel's second-largest shareholder with 17.28 percent of the operator's capital.

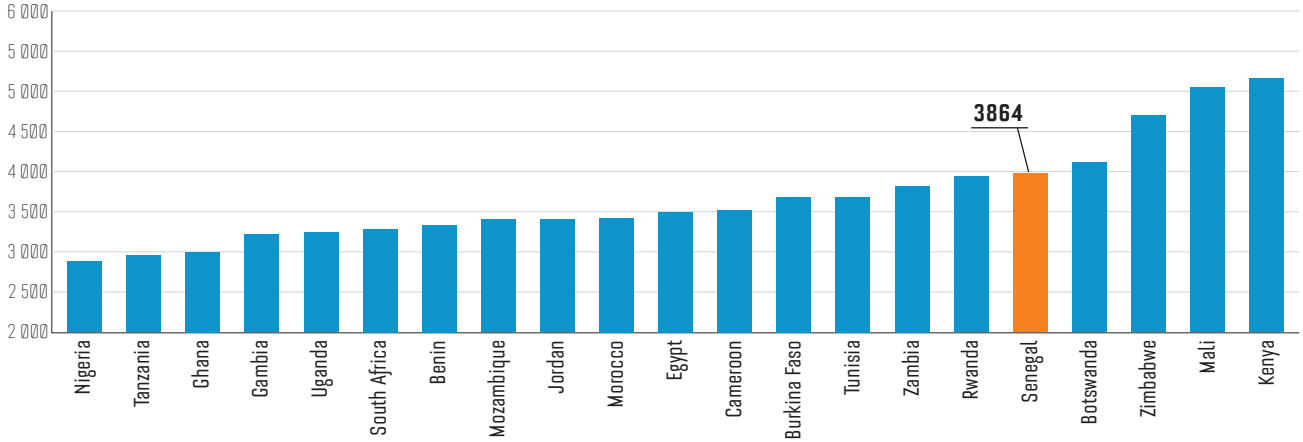
43 In May 2018 Swedish mobile telecom giant Millicom completed the sale of TIGO Senegal to Saga Africa Holdings consortium - a special purpose vehicle, whose shareholders include French billionaire Xavier Niel's private holding company, NJJ; Malagasy millionaire Hassanein Hiridjee's Sofima and Senegalese tycoon Yerim Sow's Teyliom Group.

Figure 8. Market Share of Mobile Operators in Senegal, 2016 (%)



Source: ARTP 2016; World Bank Survey.

Figure 9. Comparison of Concentration Index of Mobile Markets, 2016

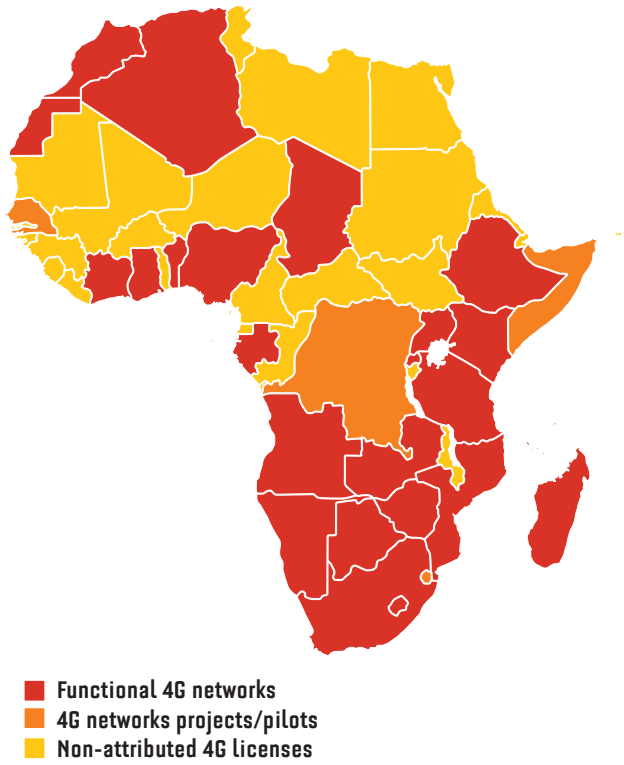


Source: ITU 2017.

The recent entry of three new ISPs has boosted competition, but the situation remains fragile, as reflected in an unfavorable international benchmarking of Senegal vis-à-vis other countries in the region and beyond. On top of three AIs (Waaw SA, Africa Access, and Arc Informatique), in June 2017 three MVNO licenses were granted to You Mobile, Sirius Telecoms Africa, and Origines SA. However, restrictions continue to exist on the provision of certain highly demanded services, such as VoIP (Voice over Internet Protocol) and IPTV (Internet Protocol TV) services, on top of the lack of regulation on dominant operators. The 2016 experience with opaque and ad hoc 4G license allocation via direct bilateral negotiations with the incumbent operator in violation of the Telecom Code and best international practices, also reflects uncompetitive practices and non-transparent sector regulation that has resulted in the de facto monopoly on the 4G market[44]. In 2018, the GoS finally decided to proactively seek to attribute additional 4G frequencies to interested

44 Contrary to best international practices, GoS allocated the 4G spectrum through direct negotiations after the incumbents appeared to have agreed to jointly boycott an open tender. More specifically, after the initial call for tenders for 4G licenses that was launched in January 2016 (limited to existing companies and thus fraught with a higher risk of collusive behavior), all three mobile operators collectively refused to submit bids. In a joint letter to ARTP, they argued that the price of FCFA 30 billion (equivalent to approximately US $52 million) for a 20-year concession was excessive and offered their own assessment of FCFA 14.5 billion for the 3 licenses (Ecofin Agency, 2016). Despite the common boycott, ARTP did not open a transparent investigation of a violation of the competition rules set out in the 2011 Telecommunications Code (Survey Plus, 2016). Instead its Board of Directors voted to sanction Sonatel for violating public procurement rules but, ultimately, took no action against the company. In the meantime, the GoS seemed to have chosen to sideline ARTP by resorting to direct bilateral negotiations with Sonatel to renew its global license (fixed and mobile), including extending its scope to deploy a 4G network. ARTP does not seem to have participated in this process that resulted in Sonatel acquiring a 17-year 4G license for FCFA 32 billion (equivalent to approximately US $55 million). On top of FCFA 32 billion for 1800MHz (2x10MHz) and 800 MHz bands, the total cost for Sonatel of FCFA 100 billion included FCFA 68 billion to renew its concession for 2G and 3G. Since then two other operators have been negotiating their 4G licenses with TIGO finally acquiring it in December 2018 for FCFA 27 billion.

Map 2. Deployment of 4G in Africa, 2016



Source: Open Signal Database (available here).

licensed operators, with the aim of allowing for a level playing field competition in this important segment. However, the progress is still nascent and the concentration of the mobile market, as measured by the Herfindahl-Hirschman Index (HHI), is still relatively high in Senegal vis-à-vis most other countries (Figure 9). And while as many as 32 countries across the continent had already developed 74 next-generation 4G networks by 2016 (compared to only one country in 2011), including neighboring Benin, Côte d'Ivoire, The Gambia, and Ghana (Map 2), Senegal has still not completed the development of its own 4G network, largely failing to join the global trend, despite the availability of the spectrum that can be used for 4G.

Moreover, bottlenecks continue to persist along the entire telecom value chain, impeding facilities-based competition not only in large markets (international connectivity, national backbone, last mile), but also in retail markets. Senegal's telecommunications regulation is quite burdensome for the operators without real market power. Until 2017, the asymmetrical regulation based on SMP was ineffective (due to the GoS's limit on IAPs in the market), particularly since the obligations stipulated in the ARTP Guidelines are not legally binding. Moreover, this relative weakness was not offset by an effective after-the-fact regulation of the competition law by the National Competition Commission (CNC) or the ARTP (at the national level). More specifically, at least six value chain bottlenecks are evident in Senegal

1. Sonatel's access to the main international gateway effectively gives it a monopoly over data transmission. The absence of regulatory measures focused on the access to the international gateway further strengthens the dominant position of the historical operator and is likely to contribute to the high cost of international calls and data transmission in Senegal.
2. The fact that mobile network operators have no obligation to host the branded MVNOs – You Mobile (Sonatel network), Sirius Télécoms (Tigo network) and Origins SA (Expresso network) – at an equitable cost endangers the existence of these recently emerged operators.
3. The high cost (US$10) coupled with the mobile number portability (MNP) dissuades telecom operators from transferring numbers. One year after the launch of the MNP, only 3,243 of 6,337 transferability requests were met[45].
4. The capacity supply (backbone-type leased lines) is limited in the 2016 Sonatel catalogue to 155 Mbits (1 Synchronous Transport Module Level-1 - STM1), which is extremely low given the growth of uses.
5. The frequency spectrum's management and price-setting modalities are inefficient and should be reviewed, as shown in the 4G file processing.

Finally, the information published on the ARPT site seems confusing and incomplete, impeding effective and transparent sector regulation. Some examples include appearance of incidental information, non-publication of reference offers approved in 2016 (and renewed in 2017), and non-publication of the list of operators and licensed and/or authorized IAPs.

3. Governance Complexity and Limited Stakeholder Coordination

Persistent issues related to the DE governance in Senegal pose a fundamental challenge of cross-sectoral coordination. By nature, DE issues are cross-cutting and hence involve multiple institutional actors. Senegal, like a wide range of other countries, has a plethora of public institutions, covering various aspects of DE – each with specific obligations and prerogatives, yet all lacking clear leadership for strategic steering.

- Nominally, MCTPEN is responsible for supporting broad DE development in Senegal with its Department of Digital

45 TeleGeography. 2016. *Tigo - Senegal Biggest MNP Beneficiary in First Year*. September 2016. Available here.

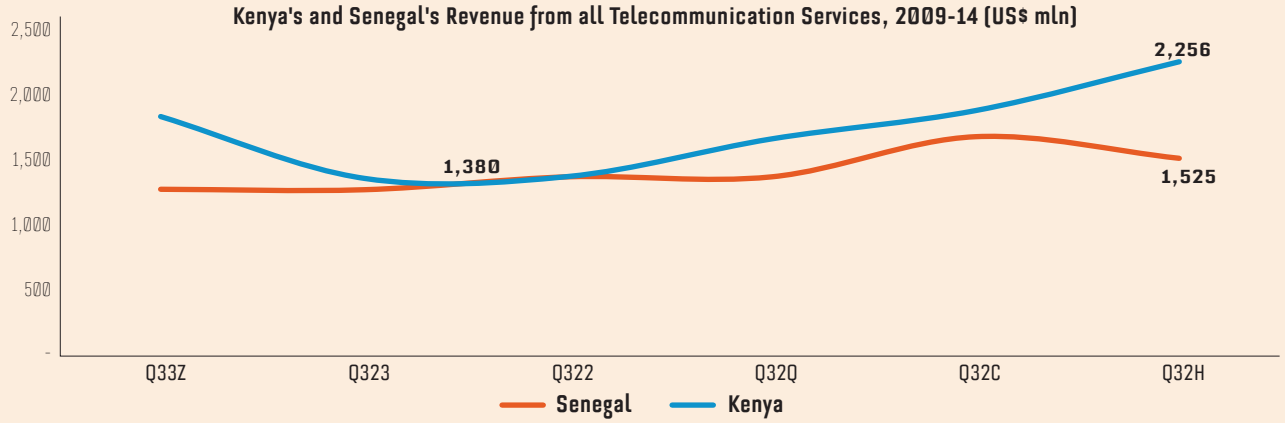
Box 2. Effects Expected from a Full Opening of the Telecommunications Sector to Competition

Achieving the objective of ensuring 100 percent access to high-speed Internet by the population and businesses would invariably generate significant positive effects throughout the entire Senegalese economy. Each 10 percent increase in broadband penetration increases GDP growth rate by 1.38 percentage points as well as significantly boosts the volume and value of exports. Moreover, the spread of high-speed Internet increases labor productivity in services and industry, boosting the development of the Industry 4.0 phenomenon* and virtual manufacturing processes, and acts as a vehicle to modernize public administration by making government services more efficient, transparent and accessible.

The experience of some African and Eastern European countries that recently liberalized their telecommunications sectors demonstrates that the increased level of competition generated by the entry of new ISPs and wholesale operators can boost the supply of services, leading to significant price reductions and enabling more people to enjoy access to the Internet. At the same time, the analysis of the sector revenues evidences that, despite reduced prices, overall revenues tend not to fall, being compensated by the increased consumption of digital services. Moreover, in addition broad economic modernization, increased competition significantly increases the state's tax revenues (through value-added tax (VAT), corporate income tax, and customs duties).

For example, Turkey fully liberalized its telecommunications sector in 2008 with the entry of 87 ISPs and 16 infrastructure operators (Information and Communication Technologies Authority, or ICTA 2017). Subsequently, the turnover of Turkey's telecommunications sector increased from US$15.5 billion in 2009 to US$16.8 billion in 2013, falling back to US$15.3 billion in 2015. Similarly, Bulgaria allowed as many as 670 ISPs to enter the market (Rood 2010). However, between 2009 and 2015, the sector's overall turnover hasn't changed much, remaining at approximately US$1.5 billion.

In Kenya and Senegal, the comparative evolution of the sector's turnover illustrates the favorable impact of Kenya's structural reforms. Even though in 2011, the sector's turnover was the same in Kenya and Senegal (US$1.3 billion), by 2014 it had reached US$2.2 billion in Kenya, while stagnating in Senegal at US$1.5 billion (as per Figure on the left).



Total liberalization of the sector may negatively affect the financial performance of the incumbent operator, however, as reflected in the Turkish example, this effect is temporary and stimulates a necessary change in the operator's business model, rendering it more competitive. Despite its resistance to the complete liberalization of the sector, Turk Télékom (55 percent of which was privatized in 2005) was unable to block the entry of many ISPs and infrastructure operators. As a result, it recorded a significant 25 percent drop in its revenues in the fixed-line market as early as 2008. To maintain its market share, it was forced to diversify its revenue structure (particularly digital media and services) and invest significantly (US$500 million) in broadband infrastructure (fixed and mobile). Consequently, by 2014 Turk Télékom had succeeded in stabilizing its fixed-line revenues and significantly increasing those from broadband and mobile telephony.

* Industry 4.0 (also referred to as the 'fourth industrial revolution') is a term given to the current trend of automation and data exchange in manufacturing technologies, which includes cyber-physical systems, the Internet of Things (IoT), cloud computing, and cognitive computing.

Economy and Partnership Promotion (DPENP) conceived to render stronger coherence, effectiveness, and synergy in structuring and managing public DE initiatives, while providing technical support and additional visibility to projects and programs of line ministries. However, due to insufficient technical capacity, limited financial resources and relatively weak political capital as well as absent clear regulatory framework for institutional oversight, the Ministry faces significant difficulties in providing strategic leadership and implementing effective sector coordination across a wide range of other actors.

- State IT Agency ADIE, which has the technical mandate for e-government[46], is linked to another ministry – the Ministry of Investment Promotion, Partnerships and

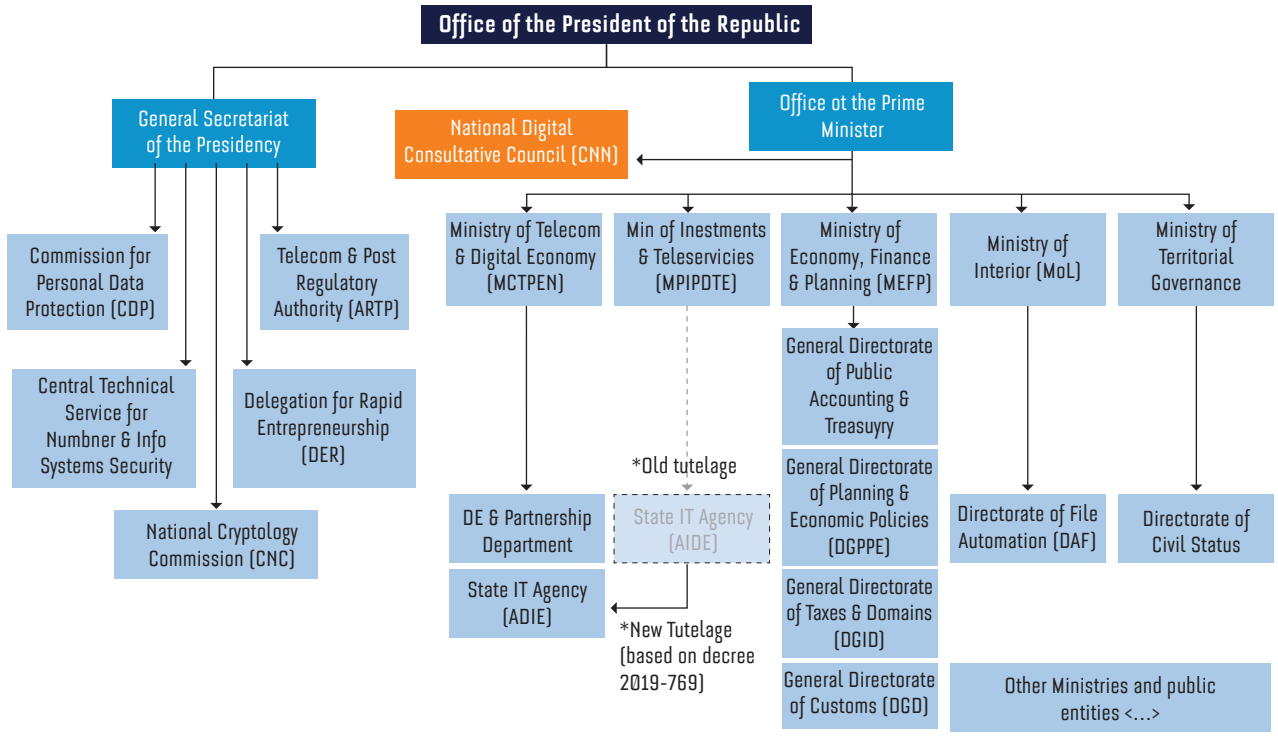
46 ADIE is mandated to modernize the Senegalese Administration by making administrative procedures paperless and building a national network infrastructure to interconnect State structures. ADIE also participates in defining Senegal's E-Government strategy to provide citizens and companies with a decentralized interface to access the Administration.

Development of Teleservices of the State (Ministère de la Promotion des Investissements, des Partenariats et du Développement des Téléservices de l›Etat – MPIPDTE), while the sector regulator ARTP reports to the President's Office under the administrative responsibility of its General Secretariat and drawing its resources directly from collecting fees from telecom operators.

- In addition, the Commission for Personal Data Protection (Commission de Protection des Donness Personnelles – CDP), the National Cryptology Commission (Commission Nationale de Cryptologie – CNC) and the Central Technical Service for Numbers and Information Systems Security (Service Technique Central des Chiffres et de la Sécurité des Systèmes d'Information) are yet three other independent administrative authorities, attached directly to the Presidency.
- So is the recently established Delegation for Rapid Entrepreneurship (Délégation Générale à l'Entrepreneuriat Rapide – DER), charged with providing financial and technical support to the entrepreneurship ecosystem, including digital entrepreneurs, along with the Agency for the Development and Supervision of Small and Medium-Sized Enterprises (L'agence de Développement et d'Encadrement des Petites et Moyennes Entreprises – ADEPME) and the Ministry of Commerce, Informal Sector, Consumption, Promotion of Local Products and SMEs (Ministère du Commerce, du Secteur Informel, de la Consommation, de la Promotion des Produits locaux et des PME - MCSICPP).
- At the same time, the Ministry of Higher Education and Innovation is responsible for the digital skills agenda, MEFP coves e-taxation and e-finance issues, while the Ministry of Interior and Public Security, particularly its Directorate of File Automation, manages critical State data, including identity and real estate (cadaster and land registry).
- Finally, large departments in various line ministries have strong internal capacity and budgets to develop their own digital projects that are often conceived and implemented in silos.
- The interface with the private sector and civil society is also limited and ad hoc, despite a recent creation of the yet-to-be-functioning National Digital Consultative Council (Conseil National du Numérique – CNN)[47] – an advisory structure under the Prime-Minister's Office, composed of 20 voluntary members, mostly from the private sector, and mandated to focus on facilitating national consensus and stakeholder mobilization for strategic sector initiatives.

A more detailed (however not exhaustive) outline of main sector actors is presented in Figure 10.

Figure 10. Current DE Institutional Framework in Senegal (nont exhaustive)



Source: WB analysis.

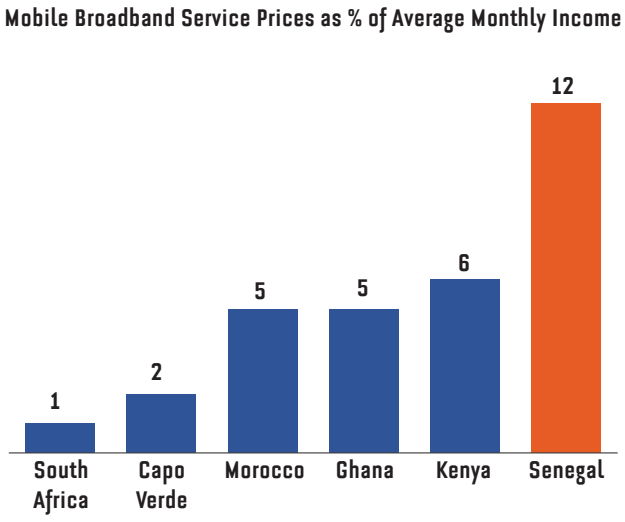
47 The CNN members were appointed by the President in February 2018, but the Council is yet to convene its first meeting (as of April 2019).

B. Access and Digital Infrastructure

1. Coverage, Cost, and Quality

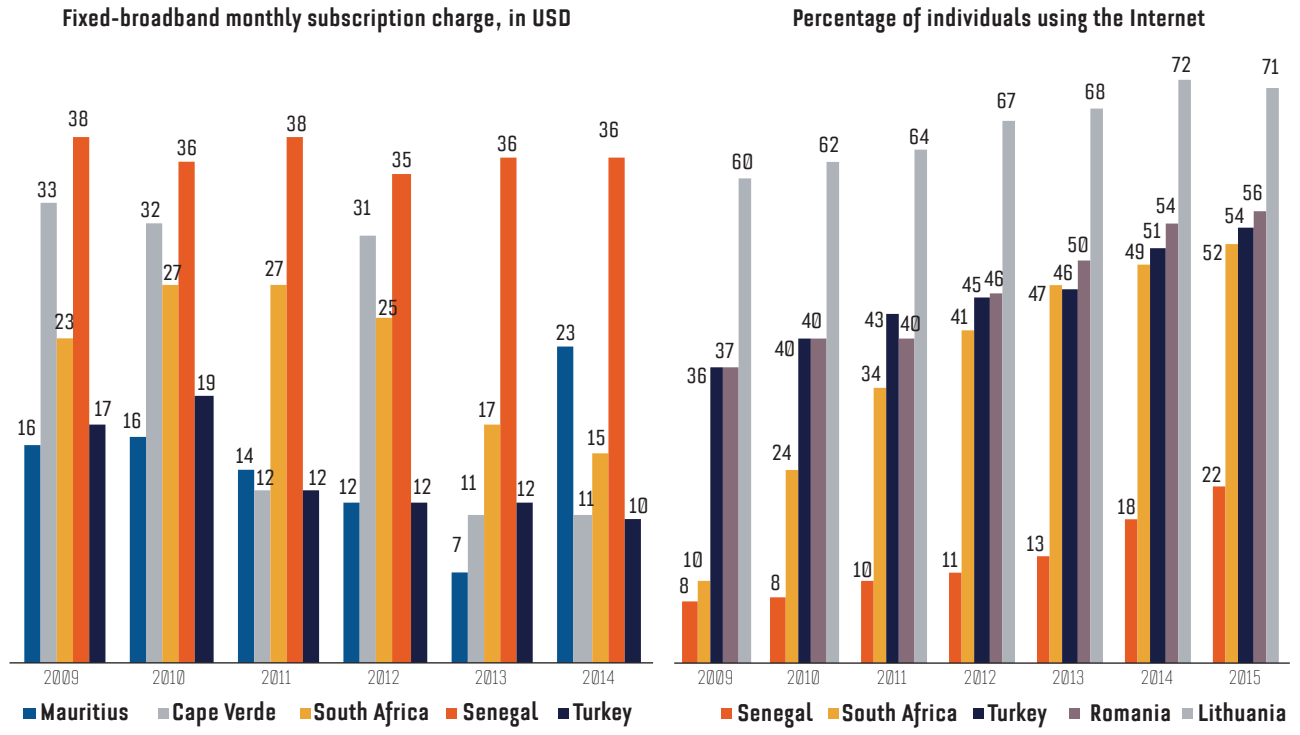
The high cost of mobile broadband services in Senegal is a significant obstacle to their development, although recent dynamics has been positive. Despite their decline, mobile broadband prices remain too high for most Senegalese, accounting for 12 percent of average monthly incomes, and too elevated compared to other countries (Figure 11). A rapid take-off of high-speed Internet is possible only when this proportion is equal to or less than 5 percent. Indeed, while in South Africa the price of a monthly fixed broadband subscription decreased from US$23 to $15 between 2009 and 2014, in Senegal, largely due to the monopolistic market structure, the price decrease was marginal – from US$38 to $36 (Figure 12, left panel). Consequently, although in 2009 Senegal and South Africa recorded equivalent levels of Internet use (nearly 10 percent), thereafter a significant gap has emerged and widened, with South African use rate in 2015 being the double of that in Senegal (54 percent versus 22 percent, respectively, as per Figure 12, right panel). Fortunately, since the recent entry of the three ISPs on the market, Internet retail prices have fallen by more than 50 percent – the average price per megabit for the private (individual) offer dropped from 12,500 FCFA to 5,000 FCFA for ADSL, while the corporate (company) offers fell from 250,000 FCFA to 100,000 FCFA. Moreover, the ISPs entry has triggered the market launch of FTTx offers (most importantly, by Sonatel) currently priced at 1,000 FCFA and the improvement of ADSL offer speeds. For example, the 2Mbps ADSL offer was migrated to 4Mbps with a price reduction from 29,900 FCFA to 19,900 FCFA. Another positive impact on the market has been the reduction of the waiting

Figure 11. Mobile Broadband Prices, 2018



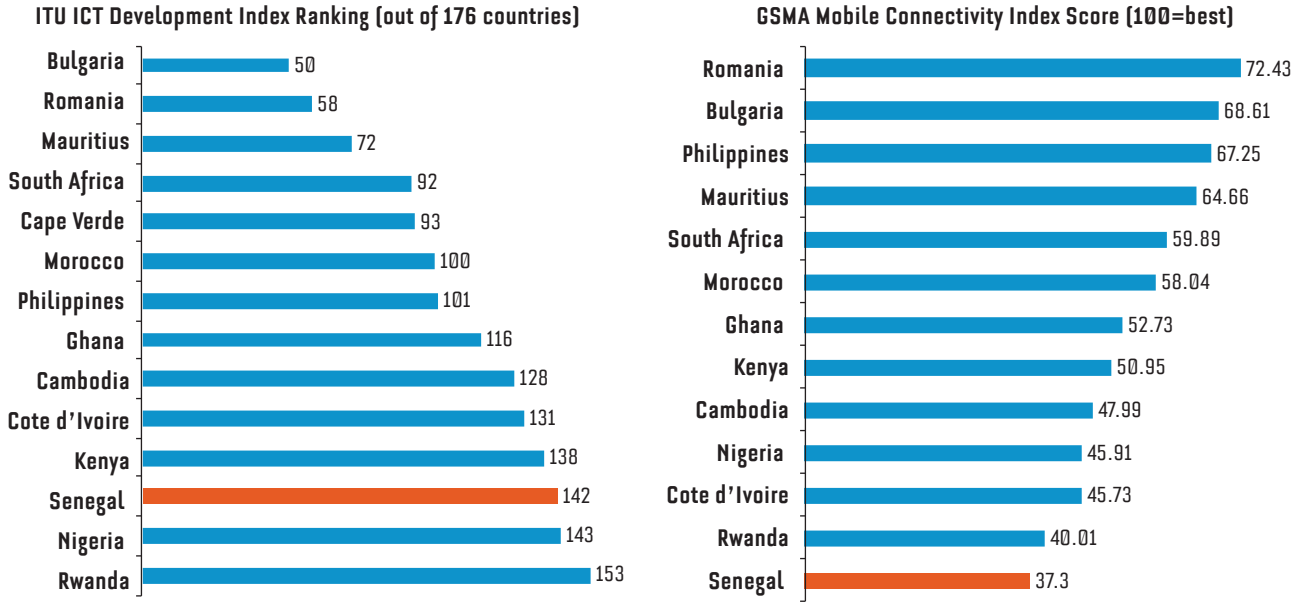
Source: World Bank analysis based on ITU data.

Figure 12. Fixed Broadband Prices (left panel) and Usage (right panel), 2009-2015



Source: ITU 2015.

Figure 13. ITU ICT Development Index (left) and GSMA Mobile Connectivity Index (right), 2017



Sources: UN ITU 2017 (available here) and GSMA 2017 (available here)

time for the ADSL installation that has fallen from an average of one month to approximately five days.

Despite these positive developments, international benchmarking demonstrates that Senegal is yet far from catching up with leading regional and global economies. As demonstrated in Figure 13, Senegal is closer to the bottom of the list of countries in both the International Telecommunications Union (ITU) ICT Development Index[48], where it ranks 142nd out of 176 analyzed counties, and the GSMA Mobile Connectivity Index[49]. This is corroborated by the various World Economic Forum (WEF) indicators, which if combined with the ITU data, clearly evidence Senegal's deteriorating position in the ECOWAS region (Figure 14).

Figure 14. Key ICT Indicators Comparison Across ECOWAS, 2017

	Number of mobile operators*	Number of ISPs*	Mobile Teledensly**	Broadband teledensity**	Internet bandwidth per user**	Prices for international capacities***	Usage level (domestic)**	Usage level (international)**	Retail price data****	Retail price voice & data****	Network readiness index*****	Regularity tracker******
Benin	5	9	80%	8%	2	136	30	4	38	184	2,9	61
Burkina Faso	3	3	84%	20%	6	96	32	3	50	221	NA	81
Cape Verde	2	3	113%	68%	21	5	127	15	NA	NA	3,8	83
Côte d'Ivoire	3	4	113%	43%	6	60	70	3	28	159	3,4	62
Gambia	4	3	138%	21%	13	55	NA	7	85	NA	3,3	76
Ghana	6	52	139%	71%	10	45	153	4	31	60	3,5	88
Guinea	3	4	85%	15%	1	NA	55	3	12	88	2,6	70
Guinea-Bissau	2	0	77%	8%	5	NA	38	5	50	424	NA	48
Liberia	2	1	71%	NA	3	552	37	6	45	325	2,8	57
Mali	3	3	111%	23%	1	300	31	5	45	115	2,9	70
Niger	4	0	48%	2%	6	580	17	3	47	151	NA	23
Nigeria	4	99	84%	54%	11	7	93	2	16	31	3,2	78
Senegal	3	3	97%	26%	5	50	115	5	18	238	3,4	78
Sierra Leone	3	10	98%	23%	NA	NA	NA	NA	130	395	NA	49
Togo	2	3	73%	15%	4	130	23	3	27	185	NA	72

Sources: * = ITU Database 2017; ** = WEF 2017.

48 The ITU ICT Development Index is a composite index, combining 11 indicators to monitor and compare developments in the ICT sectors across countries. The three-stage model measures a country's ICT readiness, usage intensity, and impact. Senegal's IDI score highlighted its low number of broadband subscriptions (fixed and mobile), which revealed the limited use of the broadband infrastructure and the Internet.

49 The GSMA Mobile Connectivity Index measures the performance of 150 countries based on key mobile Internet connectivity factors: infrastructure, affordability, users' preparedness, and content relevance.

Table 2. Key Statistics on ICT Access in Senegal, 2013 versus 2016

Usage	2013	2016	CAGR 3 years	Africa	OECD	"Rank in ECOWAS"
Mobile teledensity *	92%	97%	2	87%	121%	7
Broadband mobile teledensity	14%	26%	22%	31%	89%	5
Infrastructure Index	2,9	2,5	-4%	2,6	6,0	6
Usage	**2013**	**2016**	**CAGR 3 years**	**Africa**	**OECD**	**"Rank in ECOWAS"**
Internet bandwidth per user	12	5	-25%	12	421	8
Voice traffic density - Domestic *	72	115	17%	74	192	3
Voice traffic density - Intl outgoing "	2,3	1,6	-11%	3,4	7,7	8
Voice traffic density - Intl incoming *	5,9	3,1	-19%	2,4	12,0	4
Individual usage Index "*	2,1	2,6	8%	2,6	5,8	3
Business usage Index **	3,5	3,8	3%	3,3	4,8	1
Government usage Index *"	3,9	3,8	-1%	3,4	4,7	1
Price	**2015**	**2016**	**CAGR 1 years**	**Africa**	**OECD**	**"Rank in ECOWAS"**
Price of 1 GB in USD PPP *	18	12	-11%	34	15	2

Sources: * = ITU Database 2017; ** = WEF 2017.

The lag becomes even more evident, when compared to the broader Africa region and OECD countries (Table 2), both in terms of coverage (mobile broadband teledensity at 26 percent in Senegal against 31 percent in Africa and 89 percent in OECD) and quality (Internet bandwidth per user at 5 in Senegal against 12 in Africa and 421 in OECD).

2. Digital Infrastructure Value Chain

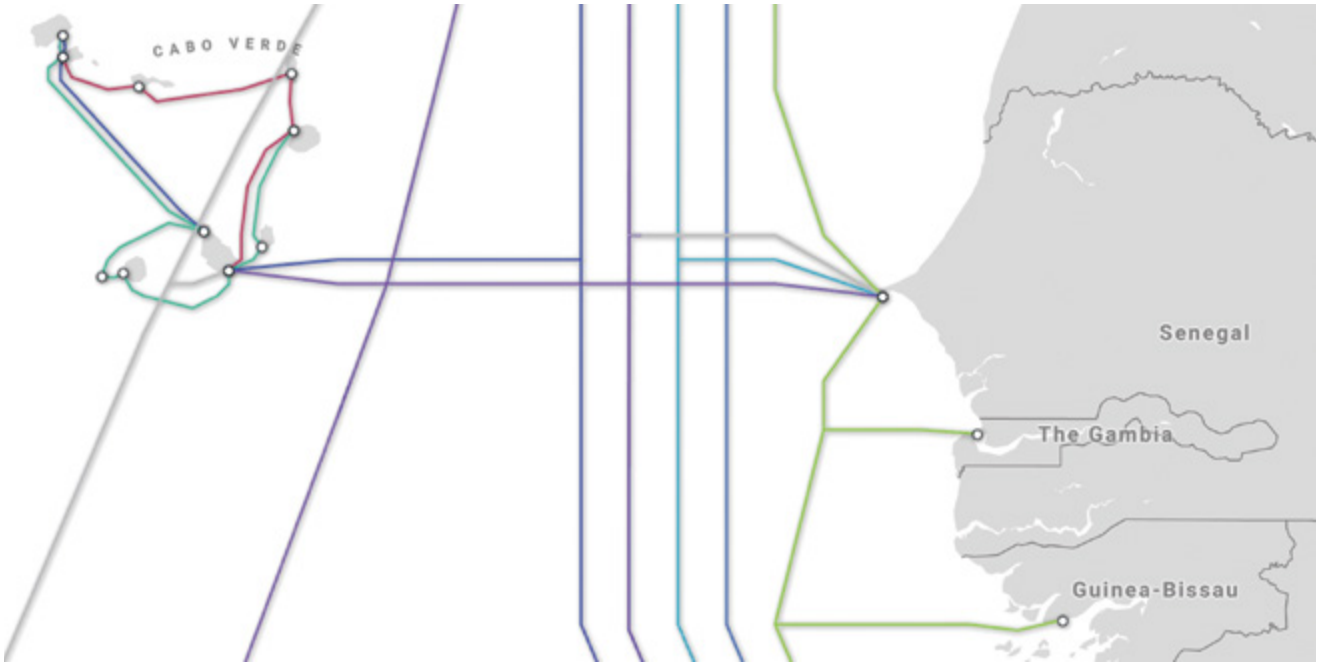
A comprehensive way to analyze key digital infrastructure bottlenecks is to consider the entire value chain – from the Internet's point of entry in a country (first mile) to its stretching across the country (intermediate mile), until it reaches the final user (last mile), without ruling out hidden elements of the chain (the invisible mile).

First Mile: Access to International Capacity

Taking advantage of its favorable geographic location on the West African coast, Senegal was one of the first countries in the region to connect to a submarine fiber optic network. This happened in 2000, when the country connected to the Atlantis-2 cable. Since then, two other cables along the West African coast have reached Dakar: SAT-3/WASC in 2002 and African Coast to Europe (ACE) in 2012. Each new cable connection has dramatically increased the international bandwidth – from 36 Mb/s in 2000 to 310 Mb/s in 2003, to 5,200 Mb/s in 2011, and to 25,000 Mb/s in mid-2016. This has positioned Senegal as a major transit point in supplying international connectivity to neighboring countries, as its national backbone stretches all the way to the borders with Mauritania, The Gambia, Mali, and Guinea, enabling these countries to avail themselves of an international bandwidth through submarine cables reaching Senegal. This favorable for Senegal situation has been somewhat mitigated by the launch of the ACE cable, which provides the first direct access to connectivity via submarine fiber optic to The Gambia, Guinea Conakry, and Mauritania.

However, the country faces serious imbalances in the distribution of its international connectivity infrastructure among the three main telecom operators, constraining the quality of available Internet services. The nonexistence of a wholesale market regulation of the Open Access to the international capacity hinders investment in broadband infrastructure and services. In this context, Sonatel is a shareholder in all three of the above-mentioned submarine cables and operates all landing stations in the country. Nevertheless, Expresso has direct access to the ACE cable that arrived in Dakar in 2012. Under their global licenses, the two operators that can deploy national and international infrastructure have co-invested and share the landing station. In this respect, they have the right to conduct international transit activity. Tigo is the only global operator that does not have a direct access to any of

Map 3. Landing Submarine Fiber Optic Cables in Senegal, 2018



Source: TeleGeography, Submarine Cable Map (available here).

the submarine cables. Against this background, despite the landing of three submarine cables in Senegal and relatively low wholesale prices, since none of them is Open Access, the quality of Internet services remains low. The reason is that the international Internet capacity purchased by operators is not keeping pace with the significant growth in the number of mobile broadband subscribers. In a recent positive development, in November 2018, candidates for general authorizations expressed their interest to the regulator to operate submarine cables and terrestrial fiber optic networks as wholesale operators. It remains to be seen how these developments will evolve.

Intermediate Mile: National Transmission Network

a. Operational Interurban Cables

In addition to proper international connectivity, Senegal, has a solid national transmission network. As indicated in the SSN2025, "the main fiber optic infrastructure in Senegal is held by five major stakeholders: three telecom operators (Sonatel, Tigo and Expresso), ADIE and the National Electricity Company (SENELEC). Approximately 9,000 km of interurban cables are currently operational, and investments continue every year" (Map 4).[50] This positions Senegal among the group of leading West African countries, such as Côte d'Ivoire, Ghana, and Nigeria, with the most developed telecommunication infrastructure.

Nevertheless, considerable imbalances also permeate through the national connectivity infrastructure endowment. As mentioned above, Sonatel has a stronger optic fiber network than the other two operators, and access to its network is not sufficiently regulated to ensure open and nondiscriminatory access, which acts a major obstacle to broadband development and the sustainability of the business models of ISPs that have recently entered the market. Sonatel currently leases access to its backbone at prices published in an interconnection catalogue approved by ARTP and dependent on the bandwidth and the distance[51].

Keeping ISPs in the market is a critical condition to improve network coverage and the quality of Internet services through the use of new technologies and higher Internet speeds. The regulatory specifications of the three ISPs provide for the coverage obligations targeting 80 percent of the population by 2021. To cover remote areas, applications have been made to ARTP to use modern, low-cost technologies, such as very small aperture terminals (VSAT)[52] to address the low-creditworthiness demand in these areas. Although other countries in the region have

50 Ministry of Communications, Telecommunications, Postal Services and the Digital Economy of Senegal. 2016. *Stratégie Sénégal Numérique 2016-2015*. October 2016. Available here.

51 Sonatel currently offers 3 speeds: 2 Mb/s, 34/45 Mb/s, and 155 Mb/s; for 3 distances: <10km, >10 and <50km, and >50km.

52 VSAT is a two-way satellite ground station with a dish antenna that is smaller than 3.8 meters; they are usually used to transmit narrowband data (such as point-of-sale transactions using credit cards), or broadband data (for the provision of satellite Internet access to remote locations, VoIP or video), but can be also used for transportable, on-the-move (utilizing phased array antennas) or mobile maritime communications.

already launched this type of technology, the provisions on frequency fees are hindering their launch in Senegal. In addition, and in more profitable areas, ISPs have introduced unlimited Fixed Long-Term Evolution (LTE) technology, differentiating themselves from operators who continue to offer limited volume offers.

b. Digital Terrestrial Television (DTT) Network

Senegal has not yet completed the process of the digital switch-over from the analogue to the digital system, by means of which liberated spectrum could help improve access to wireless broadband Internet services and expand coverage in rural and remote areas. The impacts of technological transformation deriving from digitization have incited ITU member-states to switch to digital radio broadcasting as part of an international treaty, Regional Agreement (GE06)[53], which provides the legal basis for the switchover to digital terrestrial television (DTT) in Senegal. In 2014, the GoS set the terms for a convention to guide the operation of two multiplexers (MUX) against the construction of the DTT infrastructure for a renewable period of five years with the EXCAF Company. This DTT project (2014-2020) has encountered technical and, more importantly, financial difficulties, keeping the frequencies of the digital dividend continuously occupied by content-producing channels - some parts of the 700 and 800 bands are still used for broadcasting, while parts of the 800 band have been assigned to Code Division Multiple Access (CDMA). As an encouraging recent development, a significant part of the 700 band (initially 2x40 MHz, revised to 2x30 MHz) is expected to be available as part of a request for 4G offers and spectrum auctions, even though the authorization and availability thereof are not completely certain. In this context, the functions of multiplexing, transportation, and broadcasting programs continue to be handled by the Tele-Diffusion Senegal (TDS SA)[54], which is a neutral stakeholder, offering the same services and under the same conditions to all TV channels operating in the audiovisual landscape.

c. Pooling State Infrastructure in Senegal: Access to Unlicensed Operators' Fiber Optic

The usage of the extensive ADIE's fiber optic network, which constitutes a significant comparative advantage and a strategic asset for Senegal's DE, is hampered by the Agency's legal, technical and financial limitations. After considerable public investments, ADIE now possesses a network of nearly 4,045 km of fiber optic, covering 14 regions and 31 departments. However, the Agency cannot provide access to its fiber-optic backbone, as it does not have a telecom operator license[55]. Nor does it have the commercial, technical and financial capacity to operate and market its network effectively. By way of illustration, only one of the twelve pairs of installed fibers is used and, despite this under-utilization, significant problems of maintenance and service quality are still recorded on this pair. The level of public administration satisfaction with services provided by ADIE is relatively low, with a rate varying between 37 percent and 41 percent. Thus, even if it were authorized to do so, ADIE would not be in a position to develop on its own catalog of services that effectively meets the needs of the market players and to market the excess capacity of its fiber optic network in a satisfactory manner.

This situation raises the need for pooling to ensure efficient technical and commercial operation of the state-owned physical infrastructure (active, passive, and frequencies). The GoS is strengthening these assets by pooling the active and passive infrastructure throughout the national territory. The primary purpose of pooling is to interconnect local administrations with the central government through the transport network of ADIE. Pooling the fiber backbone calls for a new mechanism to outsource the management of the excess capacity of the state-owned fiber networks, while ensuring the State's continued ownership of these facilities. Thanks to the provision of the excess capacity at attractive costs to operators and, more specifically to ISPs, this arrangement could contribute to the financial autonomy of ADIE and TDS. The interconnection of fiber optic networks at the regional and district points of presence (POPs) could also play a major role in optimizing the national backbone and transporting the telecommunications and data flows inside the country at low cost. Finally, pooling is a precondition for the entry of new infrastructure operators.

Marketing excess capacity has become a vital necessity for successful sector development in Senegal. Since the state-owned fiber-optic infrastructure is heterogeneous, it would be warranted to reorganize these assets within the same entity, while organizing their commercial and technical operation with a private partner, who would ensure adequate availability, high quality service, and security of the network.

53 Adopted during the Regional Radio Communication Conference 2006 and ratified by Law n°42/2016, the treaty has marked the beginning of the digital broadcasting era by making major changes in the broadcasting value chain by separating the function of TV channel publishing and the functions of program multiplexing, transmission, and diffusion.

54 TDS SA is a limited company, with majority State-owned shareholding. TDS SA operates in accordance with the provisions of Law n°90-07 of 26 June 1990 relating to the organization and control of companies in the quasi-public sector and the control of private corporate bodies that receive financial support from the public authority.

55 Likewise, SENELEC cannot provide access to its fiber optic assets. However, it is envisaged that public electricity services, including SENELEC, will lease their excess fiber optic capabilities to public telecommunications operators.

Box 3. ADIE Infrastructure

ADIE's national backbone includes:

- National fiber optic infrastructure of 4,045 km;
- 10 Gbps transmission capacity (STM-16) to carry flows nationwide;
- IT cloud platform of 150 for data-hosting, backup, and storage;
- Coverage and points of presence in the country's main localities;
- Internet protocol/multiprotocol label switching (IP/MPLS) network to collect flows, manage quality of service (QoS), and create level 3 virtual private network (VPN).

Nationwide network of over 4,000 km of fiber optics includes:

- Backbone of 24 fiber-optic cables
- DWDM technology with a capacity of:
  - 40 wave-length
  - 10 Gbits/s per wavelength
- Other available capabilities:
  - Fast Ethernet (100 Mbits/s)
  - STM-1 (155 Mbits/s)
  - STM-4 (622 Mbits/s)
  - Gigabit Ethernet (1 Gbits/s)
  - STM-16 (2.5 Gbits/s)
- Passive structures:
  - Sites
  - Poles
  - Technical rooms
  - Server hosting

Source: ADIE 2018.

In this context, a reform process has been recently initiated with the objective to delegate the exploitation of surplus ADIE fiber optic network to a private operator under a public-private partnership contract. The private operator would be selected on the basis of an open tender and would be subject to sector regulation. This reform is in line with international and African experiences, where networks have been financed by public funds and put into private use in the context of various contractual arrangements depending on the context. In Senegal, the government's choice was for a concession contract, formalized by an inter-ministerial decree between MEFP and MPIPDTE adopted in July 2018. In addition to legal and contractual advantages of this model as well as its previous successful application examples in Senegal, this type of contract has been widely practiced in the field of fiber optic infrastructures in Europe and elsewhere. The effective implementation of the concession model by signing of a concession contract with a private partner selected on a transparent and competitive basis is envisaged in 2019.

d. Internet Exchange Point (IXP)

Senegal's IXP is a highly valuable digital infrastructure, the utilization of which needs to be closely monitored to evaluate its utility and monetization potential. A local IXP[56], SENIX, inaugurated in August 2017 and managed by an association of main sector stakeholders (public authorities, operators, and ISPs), offers an opportunity for key operators to exchange their local traffic (as per Figure 15, left panel). SENIX has recently launched a procedure with the Internet Corporation for Assigned Names and Numbers (ICANN) to host a domain name root server (DNS) to enable all its participants to benefit from a more efficient domain name resolution with highly reduced latency. This platform has the additional advantage of maintaining the local traffic in Senegal, while immediately generating substantial savings on the international traffic. Moreover, to improve the Internet quality SENIX can also offer critical basic services, such as a Network Time Protocol (NTP) time server, a root server mirror, a routing server, hosting content, unicast and multicast services, and cache servers, which make it a highly valuable infrastructure for Senegal's DE, requiring high-performing Internet. However, in the first eight months of the IXP operation, the project team noted a slow growth in the internal traffic exchange among the connected stakeholders (Figure 15, right panel). In the coming months, the usage is expected to scale up, yet continuous monitoring is judicious to assess future trends and evaluate opportunities of successful business models around this infrastructure.

56 Internet exchange point refers to the physical infrastructure in the form of a junction point, through which network operators and content suppliers exchange Internet traffic between their networks.

Box 4. Capitalizing on Excess Public Fiber Optic: Case of the Democratic Republic of Congo

With WB technical support and funding, the national electricity company *(Société Nationale d'électricité – SNEL)* of the Democratic Republic of Congo (DRC) has rehabilitated and strengthened its existing high and very high voltage power lines running from the hydropower stations of Inga to Kasumbalesa by installing a telecom optical ground wire system. Since the number of fiber optic lines installed exceeded SNEL's needs, the company decided to launch an international call for tenders to allow third parties to use part of its excess capacity.

More specifically, in 2014 SNEL launched a call for prequalification submissions from private investors interested in operating part of these excess fiber optic lines, as the first step of a two-stage call for proposals. As a regulated telecommunications activity, the project was conducted in full agreement with the Post and Telecommunications Regulation Agency of Congo and in compliance with the Ministerial Order of December 21, 2012*, which set the conditions and modalities of establishing and operating the fiber optic network. At the end of this call for proposals, three investors – Airtel DRC, Vodacom DRC, and Liquid Telecommunications Operations – signed contracts of indefeasible rights of use (IRUs) for a duration of 15 years and an amount of US$7,633,800.

To ensure a suitable sizing of the shelters expected to host the active facilities of all contractors for each site, a call for proposals for the shelter construction is to be launched after SNEL awards the fiber optic pairs in collaboration with winning bidders. After the shelters are built, SNEL will rent them to successful tenderers.

Financial Gains for SNEL:

- Apart from an immediate revenue of approximately US$23 million, the maintenance costs of the entire network will be borne by the IRU contractors.
- Additional annual income (rentals of shelter space and an annual bonus on maintenance) for the duration of the contract is estimated at $300,000.
- SNEL is expecting two other tenders to exceed an additional US $15 million.

Additional Benefits:

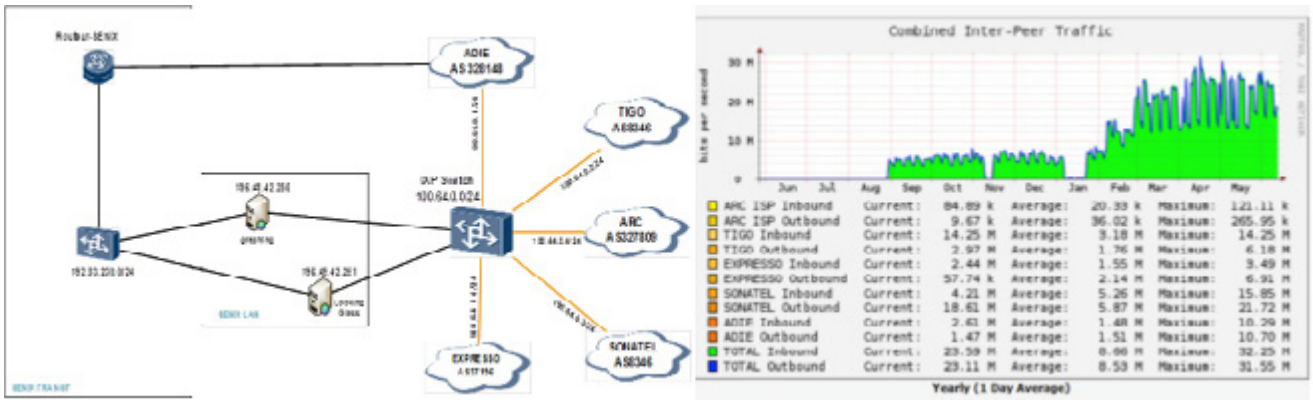
Marketing dark fibers† (US $2,605 per pair and per km) enables SNEL to generate additional income, critical in the context of difficulties in making necessary investments in generating and distributing electricity to maintain its affordable "political" price. Moreover, marketing dark fibers also enables SNEL to move towards new business activities (such as capacity sales, for example) by providing some of its staff with preliminary experience-based training. This progressive learning procedure has been followed by many telecom operators as well as actors in other sectors (notably railways) in Europe and other emerging economies.

* Ministerial Order n°CAB/MIN/PTNTIC/TKKM/PKM/SAP/21/012.

† A dark, or unlit, fiber, that originally referred to the potential network capacity of telecommunication infrastructure, is an unused optical fiber available for use in fiber-optic communication and leased from a network service provider.

Source: Report Authors.

Figure 15. SENIX Overview (Left) and Traffic Exchanged in the First Eight Months, 2017-18 (Right)



Source: SENIX website.

e. Data Centers

Senegal has been witnessing an unregulated proliferation of public data centers, rendering the whole system inefficient with suboptimal investments and elevated operating costs. The State data and IT applications are currently hosted in several server rooms scattered among several ministries[57] with financial means and human resources to ensure their daily operation. Apart from the main data center at DTAI, MEFP has four additional data centers, hosted by the following entities: General Directorate of Taxes and Domains *(Direction Générale des Impôts et des Domaines – DGID)*; General Directorate of Customs *(Direction G*énérale des Douanes – DGD); Treasury; and National Agency of Statistics and Demography *(Agence Nationale de la Statistique et de la Démographie – ANSD)*. On top of this, ADIE has another data center, hosting IT systems of some ministries as well as the common data and applications of the State Intranet (messaging, telecom services, video conferences, government websites, and some national data, such as geomatics). Despite the existence of a broadband network interconnecting all buildings of the central administration, due to the lack of integrated and shared vision of the state IT system, these hosting facilities operate in silos, requiring separate organizational structures and human resources.

Cloud computing (public, private or hybrid) and related technologies (concentration, virtualization, and simplification of the servers' administration tasks) could offer an efficient integration solution. Small isolated data centers cannot ensure the requirements of high-speed connectivity, security, and resilience (all of a higher order priority that the equipment geolocation) at a reasonable cost. The advent of cloud computing offers a solution and ADIE has recently launched a construction of a government cloud in Diamniadio, a new urban pole under development around 40 kilometers away from Dakar. This cloud is intended to serve as the core of the Government's broadband administrative network by interconnecting all relevant administrative buildings, including local governments and agencies, universities, schools, health centers, etc. This is a timely opportunity to integrate, in size and project structure, all of the state IT storage needs, including those of ministerial data centers. Far from systematically dismantling the existing sites, they will need to be audited. Subsequently, those featuring adequate characteristics and a fair level of compliance can potentially be selected and integrated as components of the government's dedicated cloud. The government entities in charge of data-generating professional applications can then maintain overall control over their IT systems, while granting specific access rights to selected entities and users.

To successfully implement this GoS dedicated cloud, it is imperative to build broad-based consensus and launch wide consultations with all relevant stakeholders, particularly heads of IT centers of ministries and agencies. Apart from political leadership at the highest level, joint engagement and shared responsibility would be required of key public institutions. It is equally warranted to simultaneously integrate the consensus from these joint deliberations into the establishment of an Architecture of Government Enterprise (AGE) with the government's dedicated cloud serving as the essential component of the AGE's digital infrastructure.

Last Mile: Access Networks

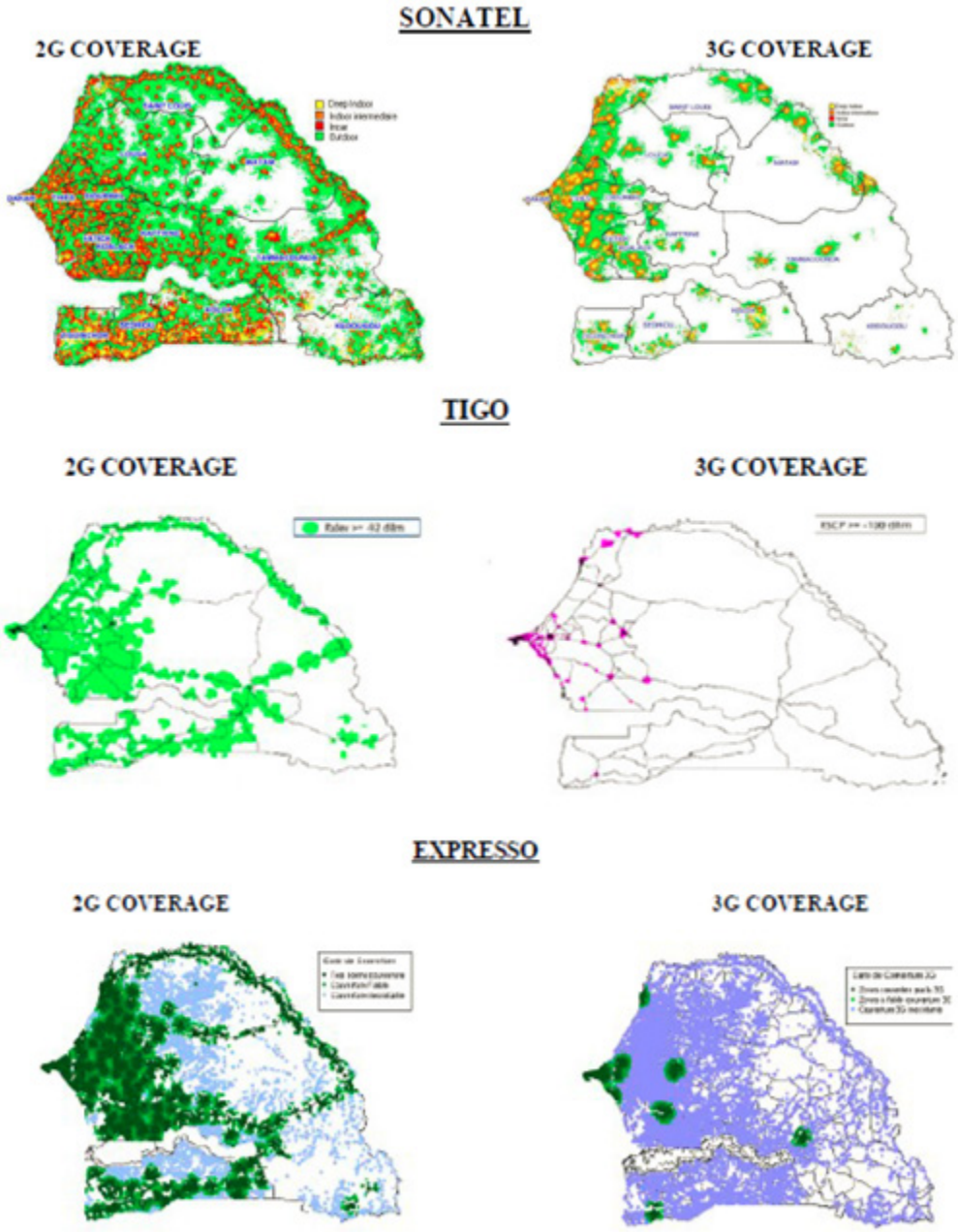
As mentioned above, access to the Internet broadband in Senegal remains quite limited. Against the background of substantive mobile penetration (at 103.3 percent as of 31 December 2017), Internet penetration lags behind, reaching only 62.97 percent[58]. At the same time, the use of wired broadband Internet is weak at 111,795 fixed broadband subscriptions, or 1.2 subscriptions per 100 people. These subscriptions are all ADSL, provided by the historical operator, Sonatel. Although fiber optic connections are available and offered by all operators, they have so far been primarily intended for large companies or government institutions with little effort undertaken to extend connection to the building construction (fiber to the building, or FTTB) market, with leased lines standing at only 21,114. Even mobile broadband subscriptions, although considerably exceeding fixed ones, reach 4.3 million (as reported by GSMA), which is still insufficient for a take-off of large-scale digital services, such as e-commerce or digital finance.

Moreover, broadband coverage remains persistently uneven across the country with three levels of important digital divides. First, rural and urban areas demonstrate a significant gap in 3G coverage (introduced in 2007), which tends to be concentrated around main urban centers, such as Dakar, leaving rural zones and the most vulnerable groups of the population largely disconnected, even in terms of access to 2G (Maps 6). This is corroborated by the data from the 2017 Gallup Survey, evidencing a stronger Internet access deterioration in rural rather than urban areas, with the urban-rural Internet divide widened by 4 p.p. between 2016 and 2017. A second, inter-urban, digital divide is reflected in significant inequalities in connectivity

57 These include datacenters of the Directorate of Automatic Processing of Information *(Direction du Traitement Automatique de l'Information –DTAI)* of the MEFP and of the Directorate of File Automation *(Direction de l'Automatisation des Fichiers –DAF)* of the Ministry of Interior – among others.

58 This rate is based on the Internet subscribers declared by the operators relative to the population, as reported by ARTP. All the following statistics is based on ARTP data as of end 2017, unless stated otherwise.

Map 5. 2G and 3G Network Coverage by Three Main Operators in Senegal, 2017



Source: **Operators and ARTP 2017.**

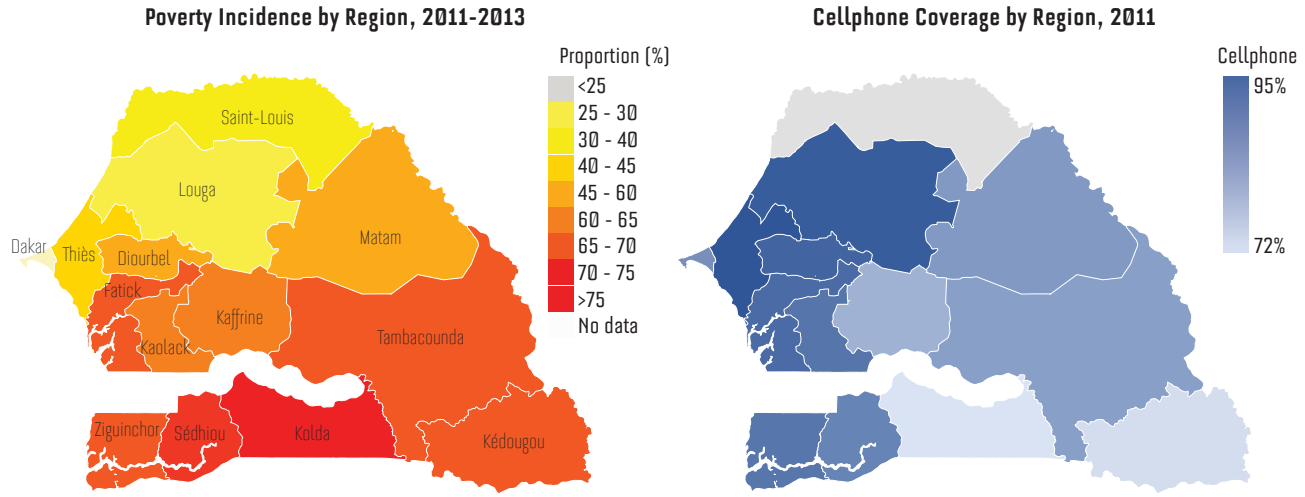
between Dakar and secondary cities (such as Pikine, Touba, Saint Louis, Thiès). Finally, even within Dakar different neighborhoods have different quality of connectivity, signaling an intra-urban digital divide.

Invisible mile: Frequency spectrum

The invisible mile is largely dependent on frequency spectrum, which, as discussed above, is not optimally allocated in Senegal. Spectrum is a scare resource with limited availability, which can be further constrained by authorities in case of inadequate or incomplete regulations[59] or by dominant operators through market foreclosure strategies aimed at limiting access of current or potential competitors to the available spectrum. This has largely been the case in Senegal, where the 2018 Telecom Code was silent with respect to efficient allocation and assignment of the radio spectrum, containing no provisions for a secondary market of wireless mobile radio licenses (such as transfer and lease) or mechanisms to limit incentives for spectrum hoarding (for example, spectrum cap

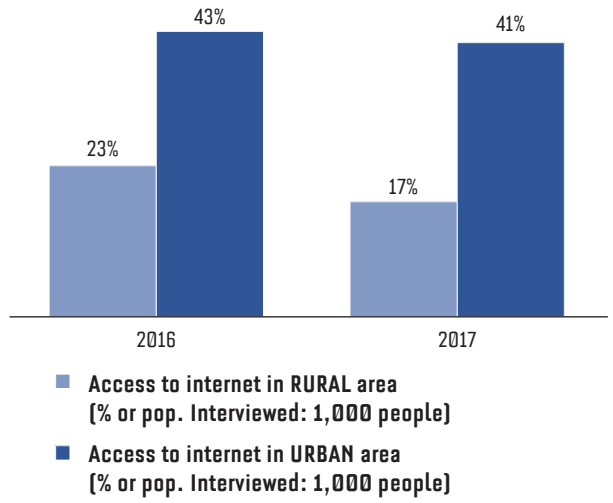
59 In case regulators fail to issue additional spectrum licenses or consider spectrum caps or other mechanisms for future assignments to preserve or encourage market competition.

Map 6. Geographic Distribution of Poverty in Senegal, 2011–13 (%)



Source: World Bank Staff estimates based on small area estimation using the ESPS 2011 and RGP 2013 (ESPS refers to Senegal Poverty Monitoring Survey *(Enquête de Suivi de la Pauvreté au Sénégal)*, while RGP refers to the National Report of Presentation of the General Census of Population *(Rapport National de Présentation du Recensement Général de la Population)*.

Figure 16. Access to the Internet: Rural vs. Urban (% of population interviewed)



Source: Gallup Survey 2017.

and user charge) or administrative procedures to follow in case of spectrum assignment for the right of use[60]. Neither does it include safeguards against concentrating spectrum in the hands of a small number of actors, leaving Sonatel free of any obligation to provide third parties with access to its fixed and mobile infrastructure. Moreover, by unnecessarily allocating low spectrum assignments, as is the case in Senegal (Table 3), where operators have more spectrum than in many other countries in the region, regulations can inadvertently result in low coverage in rural areas, as operators continue to focus on urban markets. Overall, such inefficient regulatory framework restricted market entry, further strengthening Sonatel's dominant position (and its ability to consolidate the 4G network through the bandwidth effects and distorted rules of the game) and contributing to the situation, when despite the existence of an adequate radio spectrum, the 4G network is yet to be fully deployed across the country.

The method of calculating radio spectrum charges should seek to ensure optimal use of this scarce resource and compensate the State for administrative costs arising from management tasks. However, in Senegal, spectrum charges appear to be outdated, too high and misaligned with optimal spectrum pricing mechanisms[61], accounting in some cases for 10 percent of operators' revenues and being generally much higher than in other countries in the region, such as Morocco. Importantly, by treating radio spectrum charges as a taxation mechanism rather than an instrument to ensure the effective use of spectrum, the GoS increases the operators' incentives to pass on associated costs to consumers through higher tariffs.

60 As elaborated above, the new Telecom Code determines the licensing system applicable to telecommunications networks and services that are open to the public based on scarce resources or using the public domain. The Telecom Code states that the use of spectrum frequencies is subject to authorizations (Article 71), implying that the assignment of radio frequencies will not be tendered, even though radio spectrum authorizations are granted under objective, transparent, and nondiscriminatory conditions (Article 72). The code's lack of clarity has persisted because the decree laying down the conditions to apply in the chapter on radio spectrum has not yet been approved.

61 The principles of spectrum pricing that encourage its efficient use include *(i)* separating management costs (based on administrative costs) from user charges (based on the economic value determined by the market or calculated administratively); *(ii)* setting separate royalty amounts to favor new or smaller operators or operators investing in remote areas (to reduce urban-rural digital divide); *(iii)* including the possibility of spectrum trading and secondary markets to enable efficient spectrum use over time.

Table 3. Spectrum Assignment per Operator and Frequency Band, 2017*

	700 Band	800 Band	900 Band	1800	2100	2300
Orange		2x10 (4G)	2x12.4	"2x16 2x10 (4G)"	2x15	
Tigo			2x10	2x9	2x 1 0	
700 Band+A1:H9		2x6.25	2x12	2x16	"2x15 (1,- 5 TDD i"	
CSU SA*						10 TDD
Allocated 4G**	(12x30***]	[2x5]		[2x20]		

* As per Table 3, the mobile operators have been allocated variable amounts of spectrum on three bands: 900, 1800, and 2100. After aggregation, Orange has access to 2x43.4 MHz, Tigo to 2x29 MHz, and Sudatel/Expresso to 2x43 MHz. Sudatel/Expresso has subsequently added an assignment of 5 MHz at 2100 MHz and 2x6.25 MHz at 800 MHz for fixed broadband, while Orange now has 2x10 MHz at 800 and 1800 MHz for 4G use. Overall, Orange, whose subscriber base is much bigger than that of its competitors, is likely to have learned to use its spectrum more effectively by densifying its network in urban areas. At the same time, Tigo, whose level of spectrum use is the lowest, has had to invest disproportionately to continue to increase its market share.
Sources: Kalba International, Inc., 2017 based on ARTP it *Universal service operator * *In addition to 4G assignments to date to Orange *** Available once band is cleared of CDMA and TV use

Box 5. Excessive Spectrum Usage Costs in Senegal

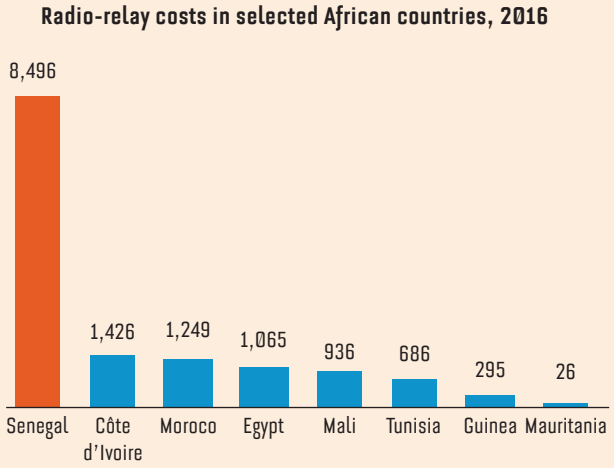
A frequency management and pricing mode in Senegal is much criticized by the operators, who consider prices to be too high vis-à-vis practices across the sub region.

Indeed, compared to other African countries, Senegal demonstrates significantly higher frequency costs as percentage of turnover.

Moreover, radio-relay costs are excessively high in Senegal, largely due to the calculation method used, in which fees are paid on the use, rather than on the allocation, of the band. In other words, the higher the number of transmission links, the higher the fees, resulting in two major negative implications:

- These fees will continue to put pressure on investment capacity and will grow exponentially as the number of transport links increase;
- Such high fees delay expanding broadband coverage across the population.

Country	Freq. Charges / Sub / year (XOF)	Senegal vs. Country	Freq. Charges as % of Revenue
Chad	487	4.5 x	1.6%
DRC	528	4.1 x	2.9%
Ghana	526	4.2 x	2.8%
Rwanda	45	48.2 x	0.3%
Senegal	2,187	n.a.	10.2%
Tanzania	197	11.1 x	1.0%



Source: Orange Sonatel.

While the former legal framework did not contain rules for more efficient allocation and assignment of the radio spectrum, the new code is now directing the frequency fees to the public treasury which removes the conflict interest that affected ARTP who was setting the amount of frequency fees and collecting/perceiving those fees at the same time, with limited incentive to reduce the amount of fees so as to encourage infrastructure investment.

C. Digital Government: Shared Platforms and Services

This section first presents main findings of the Digital Government Readiness Assessment (DGRA), conducted to illustrate the current Digital Government development potential in Senegal, and then proceeds to analyze two specific public platforms – digital identification (e-ID) and digital taxation (e-taxation) – identified by the GoS[62] as foundational digital public services capable to accelerate a broad DE development in the country.

1. Digital Government Readiness Assessment

As outlined in the Introduction, DGRA focuses on eight key foundational elements of the Digital Government to evaluate its potential. These eight dimensions include: *(i)* leadership and governance; *(ii)* user focus; *(iii)* business process change; *(iv)* capabilities, culture and skills; *(v)* shared infrastructure; *(vi)* data-driven management; *(vii)* cybersecurity, privacy and resilience; and *(viii)* enabling national ecosystem. For each dimension, a status-quo assessment as well as an identification of prospective development work have been undertaken, based on information provided by relevant government entities, such as ADIE, Ministry of Interior (MoI), MEFP, and Ministry of Higher Education, Research and Innovation *(Ministère de l'Enseignement Supérieur, de la Recherche et de l'Innovation – MERI)*.

- **ADIE** manages a cross-cutting platform, hosting official messaging, websites of several ministries, and the portal that documents approximately 700 administrative procedures for citizens; it also hosts several public-sector business applications[63]. With the advance of digital technologies, ADIE is planning to set up a new three-tier data center to enhance the country's digital sovereignty.
- The **MoI** offers a platform to manage passports as well as identification and voting cards; this database has opened new services to enhance the authentication of users in applications that require ID control, however more than 30 percent of the population are yet to be covered by this application.
- The **MEFP** operates several platforms that manage Treasury operations, customs, taxes, public property information, and public expenditures. Currently, e-tax is a corporate tax system for the biggest 100 companies in Senegal; extending its services to SMEs and citizens is a priority for the GoS. More importantly, for the last two years, MEFP has been overhauling the entire financial management infrastructure to shift to a new integrated public finance management (PFM) system.
- The **MERI** has developed the CAMPUSEN application, which fully automates (entirely excluding manual or human interventions/manipulations) the placement of high school graduates in national universities by evaluating all the grades of the last three years of secondary school and the grades of the high school diploma; due to its mandatory nature, it is now one of the most used online platforms in Senegal, providing an excellent example of using digital means to increase transparency, equity and efficiency in public services provision.

DGRA's results demonstrate that transformation towards Digital Government in Senegal is proceeding at various speeds across various dimensions, however, several critical reforms are still pending for the country to accelerate its march towards fully digitalized public services and its transformation to become West Africa's DE leader. A summary of main assessment findings is presented below, while more detailed background notes and scoring are available upon request.

Senegal has a secure government-wide digital network. Thanks to funding by the People's Republic of China, Senegal has implemented a major digital infrastructure program with over 6,000 km of fiber optic cable deployed across the country. In addition, with South Korean financing a wireless WiMAX network in Dakar and in 10 regional capitals has been rolled out. As mentioned in the previous section, the GoS is also establishing two data centers (one already operational, and the other under construction). This digital infrastructure has facilitated the interconnection of ministries and other government entities, while enabling the country to ensure its digital sovereignty in national data management and personal data protection.

While ADIE has developed major government platforms and shared services using Senegal's secured digital network, further upgrading the work of the Agency is a prerequisite for establishing an adequate technical platform to support the paperless state service policy. To improve the availability and quality of public network infrastructure services, it would be judicious to integrate in ADIE's performance contract a Service-Level Agreement (SLA) between ADIE and MEFP. The agreement could introduce

62 Prioritization discussion took place in preparation to and during a consultation workshop "*Digital Economy for Inclusive Growth in Senegal*", held in Dakar in March 2018.

63 ADIE's intranet administrative project also offers web-based services for government ministries and entities, based on Microsoft Office 365 platform and providing storage, video conferencing, voice, and a collaboration portal. According to ADIE, 60 percent of the civil service is on the intranet, covering as many as 40,000 civil servants. Important to note, that health and education sectors are not included in ADIE's scope and are hence not covered by this platform.

four standards: *(i)* service standards for supervising and administering the network; *(ii)* levels of required service; *(iii)* sharing roles and responsibilities between the MEFP and ADIE teams; *(iv)* and the tools, periodicity, and methodologies of measurement and reporting. This would ensure higher degree of accountability and increased quality of service provision.

Overall, the project team noted the lack of a whole-of-government approach, which acts as one of the biggest constraints to a conducive environment for the DE growth in Senegal. Across government, multiple public platforms and applications are active (on top of the core ones operated by ADIE, MoI, MEFP, and MERI mentioned above). The Ministry of Justice has its own platform to manage applications for criminal, civil, and commercial procedures. The ANSD hosts an autonomous platform that integrates several databases of statistical surveys that collect demographic, economic, and social data. The Retirement Pension Institution (IPRES) and the Social Security Fund operate separate platforms to manage the retirement pensions and social welfare coverage of public and private sector workers. The GoS also has a portal[64] that hosts information on the administration services, consulates, and foreign-based representations, as well as visa information services for nationals of foreign countries. To harmonize all the government-run websites, ADIE has a project that integrates them by means of unified standards. The difficulties are many, but not insurmountable. To date, the project team has not been able to collect clear information on the number of governmental entities that have completed this standardization. The current websites of certain ministries, such as Health and Finance, do not have the same layout. Meanwhile, others, such as the Ministries of Interior and Foreign Affairs, are often inaccessible due to performance problems caused by heavy traffic. Finally, some of the government portals can be consulted through smartphones, but interfaces are not adaptive, which makes browsing less intuitive.

Despite these standardization efforts, multiple government platforms and shared services remain autonomous and siloed, making integration and interoperability key e-government priorities. To facilitate online administrative services for users, it is essential to be able to share reference data, which is an absolute administrative necessity even for internal purposes. Although they use common personal and merchandise data, multiple GoS platforms are not interlinked to facilitate, or even allow, data-sharing. In fact, the lack of operational reference standards[65] makes sharing impossible. In this context, the government's main objective is to facilitate integration and interoperability among the different platforms that manage public services based on a common reference architecture (also referred to as a government-wide enterprise architecture) and enabling norms and standards. Until there is such a common technology reference created for all government ministries and entities to follow, modernization and automation projects will remain siloed in their individual ministries, blocking Senegal's digital transformation.

DGRA also evaluated three additional dimensions of Digital Government: *(i)* user focus, *(ii)* operational processes, and *(iii)* cybersecurity standards.

- **User focus.** User-centered design of digital services seems to be on the margins in the lifecycle of transforming services. A conceivable reason is the lack of a clear strategy for Digital Government and its implementation. No process or mechanism is in place to aggregate and act upon users' feedback to improve the online user-interface or the online services delivery. The government rarely consults with civil society or the private sector on the matters of digital transformation.
- **Business processes modernization.** The public administration modernization plan (*Programme d'Appui à la Modernisation de l'Administration – PAMA*) was developed in 2017 under the leadership of the Minister of Civil Service, Workforce Rationalization and Public Service Renewal, supported by the United Nations Development Programme (UNDP). The plan requires improving users' access to the civil service; streamlining State entities; promoting a merit-based recruitment system; and modernizing human resource management and capacity building to formulate, implement, evaluate, and monitor public policies. The plan also calls for establishing an efficient administration through automating administrative procedures and internalizing the results-based management culture.
- **Cybersecurity, privacy, and resilience.** Developed by MCTPEN, the National Cybersecurity Strategy for Senegal (SNC2022) supports the third pillar of the SSN2025 – digital trust[66]. To implement this strategy, the GoS is working to achieve five strategic objectives: (i) strengthen the

64 The portal (https://www.sec.gouv.sn/) also contains information on the GoS and its various organs (executive and legislative).

65 Currently, GoS has no cross-country design for an Enterprise Service Bus (ESB), which is a set of rules and principles for integrating numerous applications together over a bus-like infrastructure (in other words, a communication system between mutually interacting software applications in a service-oriented architecture). The lack of ESB in Senegal explains the case-by-case integration of governmental services with no standards or common protocol.

66 Digital trust is mirrored through four key elements: evaluation of the strategic context and future threats; vision of cyber-security and targeted strategic objectives; set of general principles, roles, and responsibilities that can sustain this strategy; and a logical framework for its implementation.

Table 4. Benchmarking Legal and Regulatory Frameworks for Data Protection and e-ID in West African Countries, 2017

	Data Protection Legislation	Data Protection Agency	National ID Legislation	National ID Agency
Cote d'Ivoire	Y	Y	Y	Y
Ghana	Y	Y	Y	Y
Mali	N	N	N	N
Niger	N	N	N	N
Senegal	Y	Y	N	N

Source: World Bank analysis.

legal and institutional cybersecurity framework; (ii) protect critical information infrastructure (CII) and government information systems; (iii) promote a cybersecurity culture; (iv) enhance technical know-how and resources; and (v) engage in regional and international cybersecurity cooperation work. A new national Computer Emergency Response Team (CERT) will also be established.

2. Two Priority Sectors

Digital Identification (e-ID)

The GoS has been a pioneer of digital identification systems in the region. Only Ghana and Senegal have taken initiatives to deploy the ECOWAS National Biometric Identity Card (ENBIC), which was approved by Heads of State in 2014 to be used as a regional travel document. Today, this card covers approximately 70 percent of Senegal's population. Despite its limitations, this system has the major advantage of being fundamental for three reasons: it is mandatory for all citizens; it is used for identification to access several services; and the unique number generated by the Department of Files Automation (DAF) can serve as a basic identifying reference.

The GoS has invested considerably in the system to identify Senegalese citizens through distributing these biometric ID cards compliant with ECOWAS standards. A robust identification system facilitates access to public and private sector services. Establishing a reliable database of the entire population will facilitate better governance of public services and create substantial savings for the GoS by limiting the unnecessary multiplication of ID systems. Finally, adopting this card has greatly enhanced Senegal's integration in the region.

Despite its political will and major investments, Senegal has not achieved universal proof of identification coverage. Approximately 25 percent of Senegal's population (approximately 4 million people) are not registered and do not have any identification document (I4D 2017)[67]. A universal basic identification system makes it possible to obtain ID documents that are recognized by the government and can be used by both the public and private sectors in transactions and service delivery. The basic identification systems can be combined with the State civil registry and are interoperable with sectoral systems (health, education, financial services, subregional movement of people and goods), regardless of an individual's legal status[68]. Reliable basic identification systems consider a set of key features (such as biometric data, which are unique to a given individual) to generate a random unique intelligible number. It is essential for basic identification systems to be founded on a solid legal and institutional framework.

In this context, there is a need for Senegal to bring to the fore the importance of establishing a coherent institutional framework to coordinate digital initiatives under the guidance of MCTPEN. The Ministry can act as an effective coordinator of important digital initiatives, notably digital identification. Other actions and recommendations detailed below can help establish a legal and technical environment conducive to digital identification systems, notably the provisions on personal data protection, and the links between the civil registry and digitized birth certificates. They will help identify and bridge the gaps noted in the existing legal, regulatory, and institutional frameworks for digital identification, notably access to services, and place them on par with international best practices for personal data protection and public key infrastructure (PKI).

67 Global Data Collection. Available here.

68 Some legal identification systems, such as the ID programs in Pakistan, Peru, and many other countries, are related to national status. Programs in some other countries are not. For example, the Indian Aadhaar system has separated the concept of nationality from identification to establish the Unicity of 1.2 billion residents in the country and establish a platform for the secured authentication of third parties providing services.

Box 6. Public Key Infrastructure

A public key infrastructure (PKI) is a formal system that uses public key cryptography (asymmetric) tools to create, store, distribute, and manage digital identities called digital certificates. A digital certificate is a standard identity e-document that electronically identifies the holder, which can be a physical person, a company, a server, a smartphone, or a website.

Digital certificates are issued by a relatively limited number of trusted third parties called Certification Authorities (CA). The CA and the PKI associate, or collectively link, an electronic certificate to its owner. The CA must ensure an appropriate level of due diligence to verify the identity of the electronic certificate's owner (identification and authentication). The use of public key cryptography and PKI makes it possible to secure electronic exchanges and transactions among third parties by ensuring several basic functions. These are:

- Confidentiality: A message encrypted with a public key of a sender and transmitted via Internet cannot be read by an intruder in the transmission tunnel. The message can be decrypted only by the addressee through the corresponding private key (even the sender cannot decrypt it).
- Integrity of underlying data: A message can be signed digitally by its sender. By e-signing, some information derived from the message is encrypted with the sender's private key. The addressee can check this digital signature by decrypting it with the sender's public key. Any modification or alteration of the message along the way thus will be known immediately by the addressee.
- Authentication: The sender's electronic signature can be generated only with his or her private key. Since the private key will be known only to the sender, this electronic signature enables the addressee to precisely authenticate the sender.
- Nonrepudiation: The digital signature proves that the sender has carried out the specific operation (transmitted an email, purchased, signed a mortgage document). As a result, the sender can not deny (or repudiate) the transaction thereafter.

Source: Report Authors.

E-Taxation

Following major political reforms in 2012–13, Senegal has consistently strengthened its revenue mobilization capacity. Reforms have improved the clarity and simplicity of rules and procedures, personal income tax adjustments, the institutional reorganization of the administration of social contributions, and the adoption of measures to streamline tax expenditures. Nevertheless, tax administration and rates are still widely perceived as major obstacles to the development of a vibrant private sector in Senegal[69]. In fact, paying taxes emerges as a top constraint in the analysis of the average scores of Senegal over the past five years in the World Bank Doing Business (DB) reports (Figure 17). On top of high rates and inefficient administration, the sheer number of taxes can be overwhelming – 58 taxes currently existing in Senegal for an average company, substantially exceed the regional and the global averages of 37 and 25, respectively[70]. Various digital solutions exist to simplify the obligations of taxpayers and to reduce, as much as possible, the number of low-yield minor taxes as well as the obligations of tax declarations and related payments.

The informal sector in Senegal is very heterogeneous – although it is composed primarily of micro and small enterprises, it also includes major competitive companies. Several factors are decisive in determining the informal economic activity. However, the fiscal policy and resulting administrative procedures are often considered as essential levers of action. The weakness of Senegal's business environment and regulatory framework are de facto incentives for companies to opt for the informal sector. Thus, it is important for the micro and small businesses to reduce compliance costs as well as the direct interactions with tax authorities. At the same time, the administrative data suggest that a sizeable part of the Senegalese informal sector comprises major enterprises that resemble formal businesses in sales volume and other measures of activity[71].

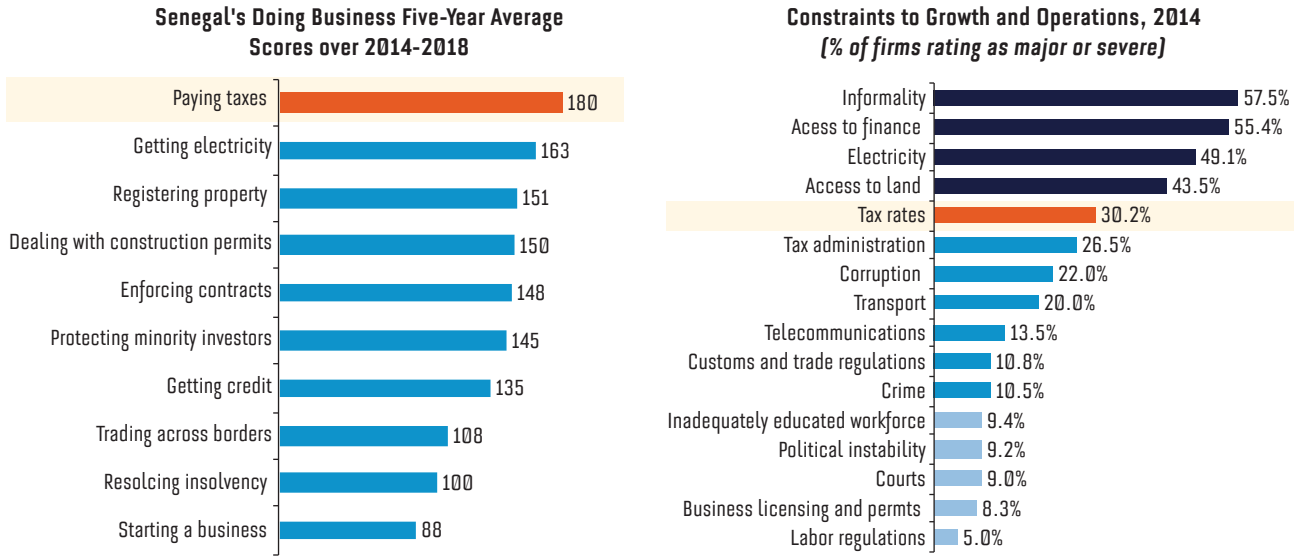
Taxes represent one of the main regular interactions between citizens and the State and are a key element defining the social contract. One of the main objectives of the digital transformation of public services is to make the regular interactions between taxpayers and the tax authority paperless by switching to a more transparent and more efficient online filing and payment approach. Leveraging digital technologies can accelerate ongoing reforms and broad transformation of public administration. Targeted initiatives could also strengthen governance of revenue administration to properly monitor taxpayers' observance of the law. This observation applies to both the increased probability of voluntary compliance, by reducing

69 From 2007 to 2014, the proportion of companies perceiving tax rates and the tax administration as hindering economic activity decreased. However, the total number of companies indicating that taxation is a moderate to serious obstacle has risen, as reported in the World Bank. 2007 & 2014. Senegal Enterprise Surveys. Available here.

70 World Bank. 2016. *Doing Business 2017: Equal Opportunity for All*. Available here.

71 According to a recent World Bank review based on tax administration data and customs statistics, many Senegalese companies under-declare their turnover. Notably, in 2016 approximately 10 percent of companies chosen from a representative sample (of more than 5,000 enterprises) declared to tax authorities a turnover of less than half the value of imported volumes and the registered payroll – as reported in Cantens, T., Ireland, R., Raballand, G., 2013. "*Reform by Numbers: Measurement Applied to Customs and Tax Administrations in Developing Countries*". Washington, DC: World Bank. Available here.

Figure 17. Key Business Environment Constraints in Senegal



Source: World Bank, Doing Business 2014-2018; World Bank, 2014 Senegal Enterprise Survey.

compliance obstacles and costs, and to the use of data analyses to improve the efficiency of administrative application efforts.

One of the major recent achievements in improving the efficiency of revenue administration include the launch of an online filing module – e-Tax. Launched by the DGID, this application is currently limited to major enterprises. To extend the advantages of online filing and e-payment[72] to all taxpayers, in the short term, the coverage of the e-Tax module for all corporate bodies could be envisaged. In the medium term, a bespoke (custom-made) mobile solution (m-Tax) intended for individuals and micro and small enterprises could be developed, and work in ongoing to advance this. The starting point for a mobile solution for individuals is the implementation of a project that will facilitate online interactions between taxpayers and administration, and the management of taxpayers' specific accounts ("Mon Espace Perso," or My Personal Space). Funding for this project has been mobilized through the State budget. However, the integration of payment options in the module calls for the adoption of a decree regulating online payment options for all individual taxpayers.

In the short term, the formalization of major informal economic activities should be pursued through a revamped legislation and tax administration based on digital technologies. DGID operates an integrated tax management software (SIGTAS), but has not yet explored the full potential of the regular and automatic reconciliation of the data with information collected from third parties. DGID has also recently launched the development of a standard risk management tool. Concerning the availability of customs information for DGID inspection services, the technical development of the TANDEM platform has progressed, but there is need to invest in acquiring the host infrastructure and extending the sources of integrated information to the common data center. In the medium term, the program seeks to fully implement the selection of tax verifications based on a transparent and automated risk analysis. In addition, the integration of an algorithm to identify the risks and the application of an automated risk selection module should facilitate steady monitoring of SIGTAS verification performance within DGID.

Overall, the short-term needs include *(i)* establishing a more robust load-balancing solution to support online procedures in the context of higher data flow; *(ii)* implementing the m-Tax solution; *(iii)* digitizing by batches for more data availability as part of the tax base extension strategy at DGID; *(iv)* establishing a Tele-service center (call center); and *(v)* ensuring the establishment of the one-stop-shop for filing financial statements.

Extending digital processing to State payments is envisaged by the Treasury Department. Fulfilling Treasury's vision to connect to the electronic banking network through GIM (Electronic Money Interbank Group) depends on several technical and regulatory requirements. However,

72 In South Africa, on average, using electronic filing reduces the costs of tax compliance by 22.4 percent. However, the efficacy of the implementation of the policy plays a key role in the potential efficiency of e-filing to reduce compliance costs.

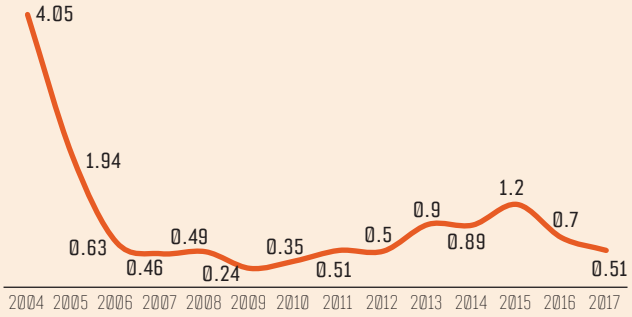
Box 7. ORBUS Single Window: Establishing a One-Stop-Shop

The computerized customs service, ORBUS Single Window, is a joint initiative by the customs authorities and port operators. Its management committee is a public-private partnership (PPP) formed to upgrade customs formalities. The economic interest group GAINDE 2000 was set up to design and run the ORBUS Single Window and to interconnect it with the customs' IT system. Single Window was intended to modernize preclearance formalities in Senegal and reduce the associated costs and delays. In July 2004, the ORBUS Single Window was launched to automate data collection and submit customs declarations through a network. The Window enabled the main foreign trade operators to electronically process applications for mandatory import, export, or transit authorizations and certificates. Following the 2008 adoption and enactment of laws on the information society, in 2011 the Single Window formalities became paperless.

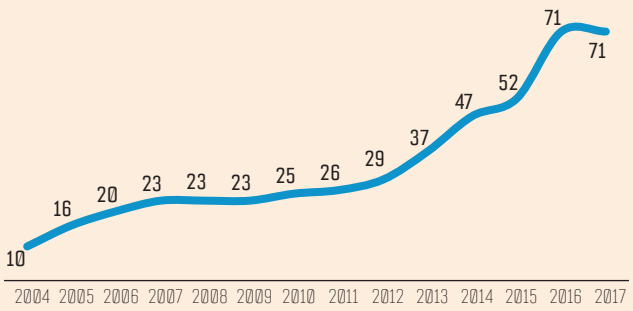
ORBUS covers the following four areas of the logistics value chain:

- *(1) Vessel Arrival*. Paperless formalities of the summary declaration with the loading and sharing of the electronic manifest in CUSCAR or XML format is shared in real time with customs, Port Authority, and handling companies (by 30 shipping agents registered on the platform).
- *(2) Preclearance*. Paperless formalities of the collection of preclearance documents with the interconnection of 71 public and private bodies involved in processing them. These were *(i)* 9 public bodies with access points at the head office, at the Port, and the airport; *(ii)* 23 commercial banks; *(iii)* 38 insurance companies and brokers; and *(iv)* the inspection body licensed under the import verification program.
- *(3) Clearance*. Paperless customs declaration formalities with the interconnection between ORBUS and the customs management system, enabling the online processing of customs declarations and issuing the release order.
- *(4) Goods Release*. Finalizing the paperless goods release process with the integration of shipping agents, the Port, handling companies, and road transporters. The system has been technically finalized, but it has yet to become operational due to the reluctance of some stakeholders of the Port community. Actions are planned to facilitate its appropriation by all stakeholders of the goods release process.

Evolution of average processing duration, 2004–17



Number of connected and active bodies, 2004–17



The poles connected to ORBUS have increased regularly over the period, to progressively integrate all the administrative entities involved in processing pre-clearance formalities in Senegal (as per Figure on the right).

As a result, ORBUS has made it possible to drastically reduce the time spent on the collection of preclearance documents in Senegal: from 4 days in 2004 to 1 day in 2017 (as per Figure on the left).

The performance of Senegal's facilitation solutions has attracted the attention of other countries, some of which have subsequently adopted them – Burkina Faso (SYLVIE) and Kenya (SIMBA).

Source: GAINDE 2000.

in the interim, it is important that actions are taken to manage pensions and collect taxes hitherto collected in cash. Implementing this recommendation will require a secure digital ID framework using a PKI, a specific regulatory framework for public e-payments. A PKI would fix the e-transaction costs and the modalities of contracting with the private sector by considering the need to refrain from skewing the market structure towards a monopoly. This measure could fit into a two-year roadmap, after which 100 percent of public payments would be digitized.

D. Digital Finance

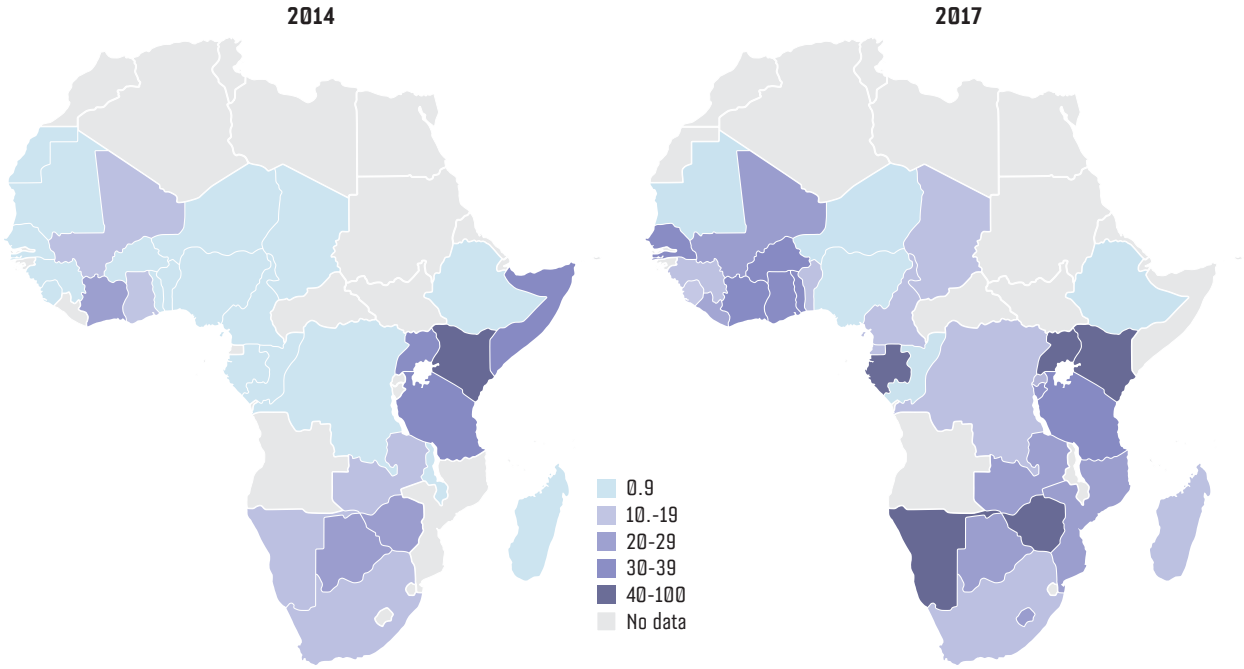
1. Context

Rapid advances in digital technology are transforming the economic and financial landscapes around the world. Financial technology, or fintech, digitize paper-based transactional data to identify potential demand for financial services, such as credit, savings, and insurance, thus creating new opportunities and challenges for the financial sector: from consumers, to financial institutions and regulators. Digital financial services (DFS)[73] can offer great potential to meet the financial needs of poor and unbanked consumers by providing them with convenient and affordable channels to make and receive payments, as well as to save and borrow. Firms can leverage DFS to more easily transact with their customers and suppliers, as well as to build digital credit histories and seek financing, while governments can use DFS to increase efficiency and accountability in various payment streams, including for disbursement of social transfers, and receipt of tax payments. However, apart from opportunities, fintech can also pose potential risks to consumers and investors and, more broadly, to financial stability and integrity, which is important to consider when developing appropriate sector regulations.

The power of financial technology to expand access to and use of accounts is demonstrated most persuasively in SSA, where digital technologies have helped to significantly boost financial inclusion in recent years. The percentage of adults (15 years and older) with an account at a financial institution in SSA, albeit still behind the global average of 68.5 percent, rose from 34 percent in 2011 to 43 percent in 2017[74]. Mobile money services provided by fintechs and telecom operators are increasingly filling the gaps left by traditional banks. Indeed, 21 percent of adults in SSA now have a mobile money account – nearly twice the share in 2014 and easily the highest of any region in the world. And while mobile money has been traditionally centered in East Africa, the 2017 data reveal that it has spread to West Africa and beyond. At the same time, half of unbanked adults in SSA (representing around 160 million people) own a mobile phone, signaling considerable potential for further growth of mobile accounts and financial inclusion.

Senegal has witnessed a significant diversification in the supply of financial services over the past decade, but access to and use of financial services remain low. With the recent entry into force of laws relating to microfinance and

Map 7. Adults with Mobile Money Account Across SSA, 2014-2017



Source: World Bank 2018. Global Findex Database.

73 As defined by the G-20 High-Level Principles for Digital Financial Inclusion, the term "digital financial services" (DFS) covers financial products and services, including payments, transfers, savings, credit, insurance, securities, financial planning, and account statements.

74 Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S. and Hess, J. 2018. *Global Findex Database 2017: Measuring Financial Inclusion and the Fintech Revolution*. Washington, DC: World Bank. Available here. All the following data quoted in the section is from Global Findex Database 2017, unless otherwise stated.

Table 5. Financial Landscape in Senegal, 2017

Mobile money active users	Active mobile money agents	Access to bank accounts	Providers	Mobile penetration
2,240,315 or 18% adult population	30,787	20.4%	448 formal financial institutions	110%

Source: WB analysis based on BCEAO and ARTP data.

electronic money (e-money), which allow non-bank players to offer financial services, the sector has expanded to serve about 5.3 million people, who hold an account with an electronic money institution. However, more than 50 percent of the population is still excluded from financial services, and only 42.3 percent of adults report having an account at a financial institution. More importantly, the actual use of digital means of payment is still low, as mere 10.4 percent of adults admit having effectuated a payment online over the past 12 months at end 2017.

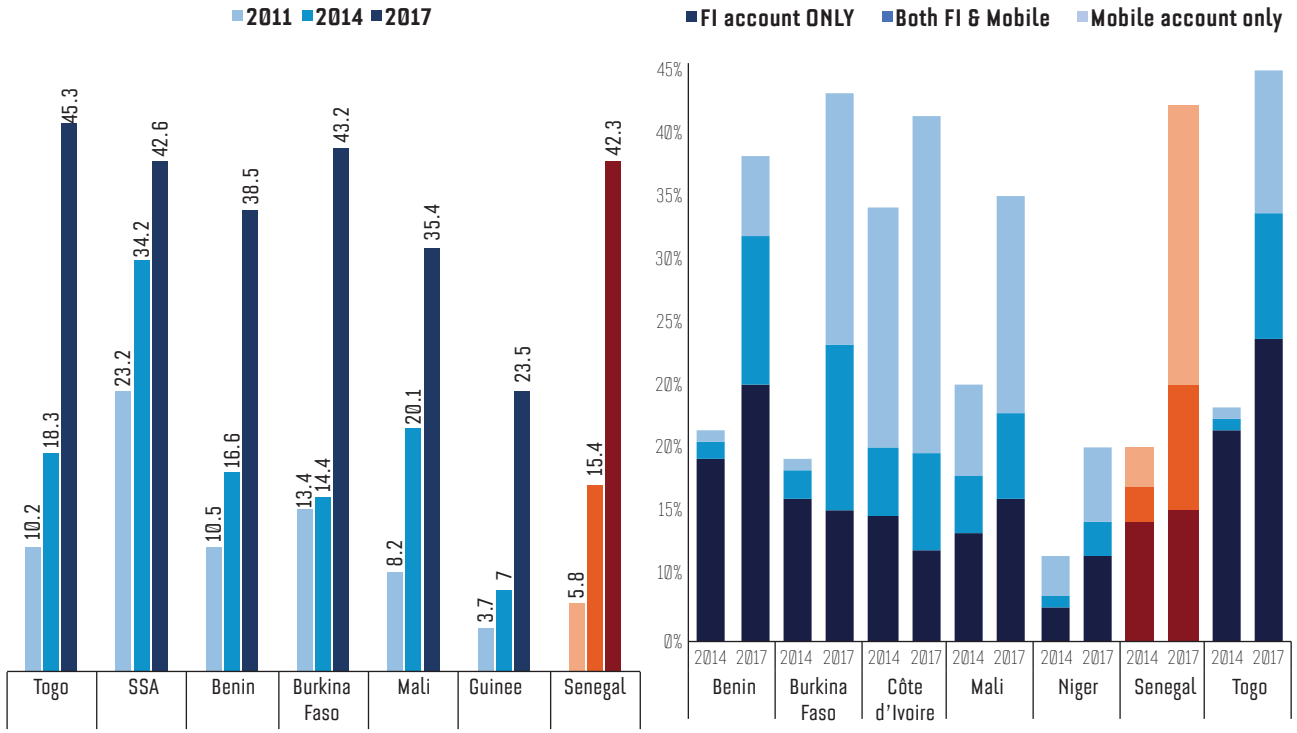
In this context, building on the DE4A assessment tool, this section of the report will focus on an overview of the DFS market development in Senegal as well as a description of its regulatory and policy framework. Specific recommendations to improve the usage of DFS in a broader context of the country's DE are provided in Section 3.B.

2. Digital Financial Services (DFS) Development in Senegal

Senegal's financial landscape is quite diverse. A total of 448 active formal institutions include 24 banks, 3 financial institutions, 387 microfinance institutions that are also referred to decentralized financial systems (systèmes financiers décentralisés – SFD), 29 insurance companies, two electronic money institutions (EMI) and the National Post Corporation. Two major money transfer operators are also present in the market, essentially offering OTC services. Moreover, several fintech companies have recently appeared in Senegal.

Mobile money drives financial inclusion in Senegal, as elsewhere in SSA. Recent Findex data indicates that account ownership in Senegal almost tripled between 2011

Figure 18. Adults with One or More Financial Accounts, 2011–17



Source: WB Global Findex Database 2017.

Table 6. Reasons for Not Having an Account in a Financial Institution, 2017 (% of respondents)

Reasons for not having an account	Senegal	Burkina Faso	Cote d'Ivoire	Mali	Niger	Togo
Insufficient funds	55	56	64	64	69	50
Lack of necessary documentation	13	14	24	22	30	30
Financial institutions too far away	19	20	18	18	28	17
Financial services too expensive	27	18	32	20	28	17
Lack of trust in financial institutions	13	10	18	15	10	
Family member has an account	8	6	9	7	3	7
Religious reasons	5	1	3	10	20	10

Source: WB Global Findex Database 2017.

and 2017, increasing by 27 p.p. from 15.4 to 42.3 percent (Figure 18, left panel). As is the case in most SSA countries, the increase was driven by mobile money accounts. In absolute terms, account holders at e-money institutions reached 5.3 million, up from approximately 2.0 million in 2011. Meanwhile, the banking sector accounts for only 1.62 million account holders and microfinance institutions represent 2.6 million adherents.

One of the main reasons for having no account in any financial institution, which affects five million adults, is insufficient financial capacity. The lack of sufficient funds and the elevated cost of financial services were the two reasons for not having an account most frequently cited by Senegalese adults. Indeed, 55 percent of Senegal's adults cited insufficient funds as the reason for not having an account, the most frequently cited reason in most developing countries (Table 5).

Although 45 percent of adults in Senegal report having a loan, only 7.8 percent declared borrowing through a formal financial institution. Access to credit and savings is dominated by informal methods (Table 6) – more people report having recoursed to saving and borrowing outside of the formal financial system. Nonetheless, Senegal ranks slightly better than the SSA average in informal savings (23.8 percent versus 25.8 percent) and informal borrowing (29.9 percent versus 31 percent).

Holding the highest number of microfinance accounts within the region does not propel Senegal to the ranks of countries that have the highest financial inclusion rates. According to the latest report of the Central Bank of West African States *(Banque Centrale des États de l'Afrique de l'Ouest* – BCEAO), the Senegalese microfinance industry is the most dynamic in the WAEMU region. In 2018, 210 SFD

Table 7. Formal vs. Informal Savings and Borrowing, 2017 (% of adults)

Indicator	Senegal	SSA	Benin
Adults saved formally	7.3	14.9	10.0
Adults saved informally	23.8	25.8	28.2
Adults borrowed formally	7.8	8.4	11.4
Adults borrowed informally	29.9	31.0	24.0

Source: WB Global Findex Database 2017.

were serving 2.6 million adults with deposits amounting to 310 billion FCFA (or US $536.53 million) and loans reaching 337 billion FCFA (or US $582 million). This share of deposits represents 26 percent of the regional value and 29 percent of regional loans. Nevertheless, other countries in the region, including Burkina Faso, Côte d'Ivoire, and Togo rank higher than Senegal in formal account ownership (Figure 18, right panel).

The GoS has been quite proactive in fostering an inclusive and decentralized financial sector. The first microfinance institutions emerged in Senegal around the late 1980s thanks to the support of the international donor community and technical partners. The GoS aims to create an environment conducive to the sector by establishing accreditation, monitoring, and control structures as well as structures that support institutional and professional providers. Companies, such as Microcred Sénégal[75], ventured into digital transformation and now offer digital savings and digital credit products. This microfinance institution (MFI) intends to set up a network of agents to service rural areas. Despite the high number of service points in urban and rural regions (Table 8), approximately half of the financial sector's activity is concentrated in the greater Dakar area (Figure 19).

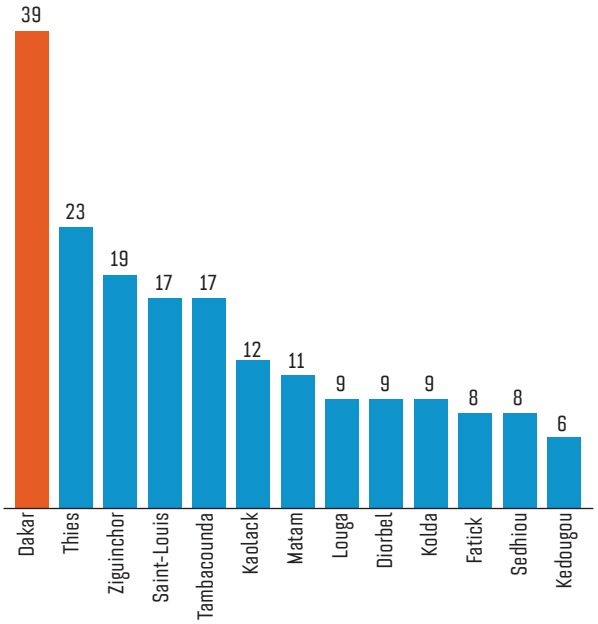
75 Known as BAOBAB, a new entity offering financial digital services. For further information, refer to the Microcred website.

Table 8. Financial Services Distribution Network in Senegal, 2016

ATM	Bank branches	MFI Service Points	Mobile Money	POS
600	900	902	67,315	1,700

Source: BCEAO 2016.

Figure 19. Financial Services Distribution Network in Senegal (%), 2016

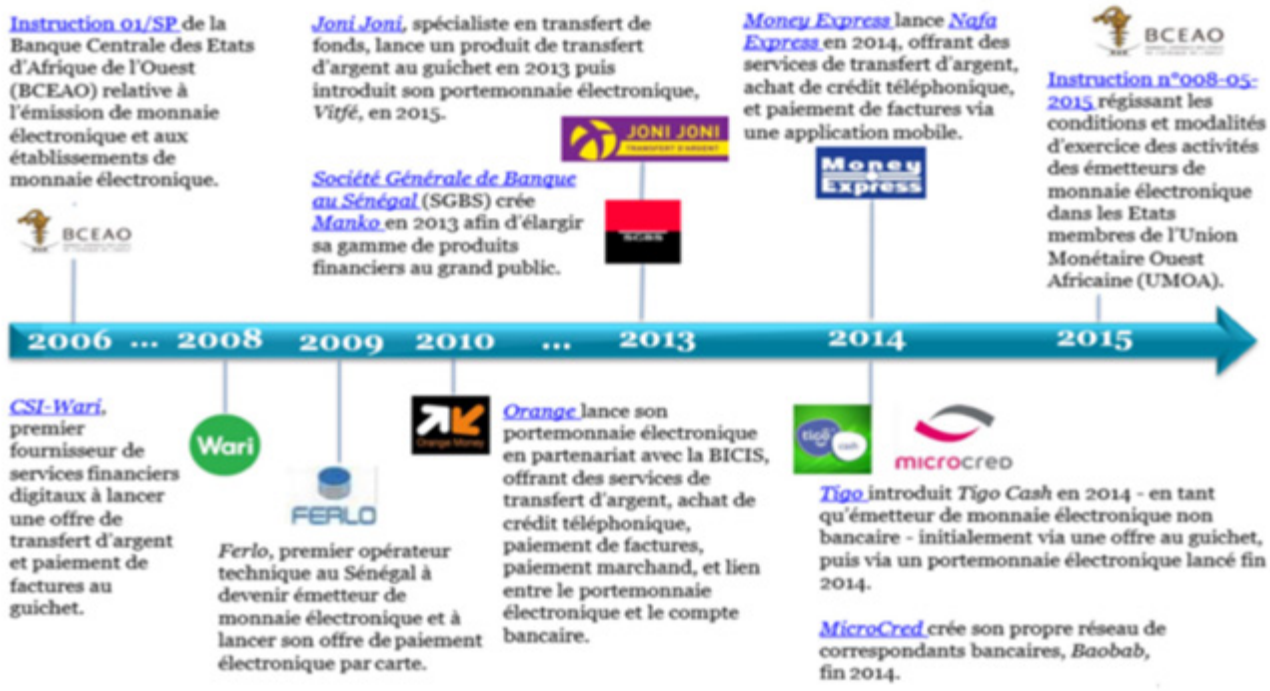


Source: BCEAO 2016.

Cash remains the most common form of payment in Senegal, with transactions through financial and electronic money institutions playing, albeit an increasingly more important, still a secondary role. Cash remains a popular means of paying electricity bills, wages, and agricultural transactions, of which close 60 percent are reported as cash-only (Table 9). However, the use of scriptural and electronic instruments, such as bank wires or mobile payments, have expanded in recent years. The majority of recipients of government payments report receiving these funds through a financial institution (41 percent) or a mobile phone (20 percent), while 19 percent report receiving cash payments.

Senegal follows the mobile money adoption trend in West Africa, in which the number of deployments exploded to 57, surpassing that of East Africa for the first time in 2017. Tremendous growth is tied generally to broader digital inclusion trend in West Africa, now registered at 21 percent (as measured by the spread of mobile money and e-wallet accounts), with Senegal being a leading market with 42 percent[76].

Figure 20. Key Players in Digital Financial Services Ecosystem in Senegal, 2006–15



Source: WB analysis.

76 GSMA data for 2017.

Table 9. Payments in Senegal (%), 2017

Indicator	Senegal	Togo	Burkina Faso	Cote d'Ivoire	Mali	Niger	SSA
Paid utility bills in past year	23	30	17	23	18	15	28
Using a financial institution account (% paying utility bills)	15	10	7	7	15	4	16
Using an account (% paying utility bills)	38	24	22	44	29	16	31
Using a mobile phone (% paying utility bills)	34	17	20	42	23	13	23
Using cash only (% paying utility bills)	39	58	59	48	50	64	59
Received wages in past year	15	16	18	15	17	10	20
Into a financial institution account (% wage recipients)	23	25	30	20	20	24	36
Into an account (% wage recipients)	39	36	51	39	36	37	45
Through a mobile phone (% wage recipients)	21	20	28	24	22	17	19
In cash only (% wage recipients)	39	47	43	55	53	52	49
Received government payments in past year	13	11	16	6	13	10	13
Into a financial institution account (% payment recipients)	41	49	37	n/a	27	n/a	50
Through a mobile phone (% payment recipients)	20	22	18	n/a	23	n/a	16
In cash only (% payment recipients)	19	25	24	n/a	33	n/a	29
First account opened to receive government payments (% receiving payments into an account)	7	17	13	n/a	15	n/a	19
Received payments for agricultural products in past year	19	21	38	21	29	32	n/a
Into a financial institution account (% payment recipients)	9	8	6	5	8	4	n/a
Into an account (% payment recipients)	27	22	19	9	17	14	n/a
Through a mobile phone (% payment recipients)	21	14	15	6	12	10	n/a
In cash only (% payment recipients)	58	67	73	83	72	73	n/a

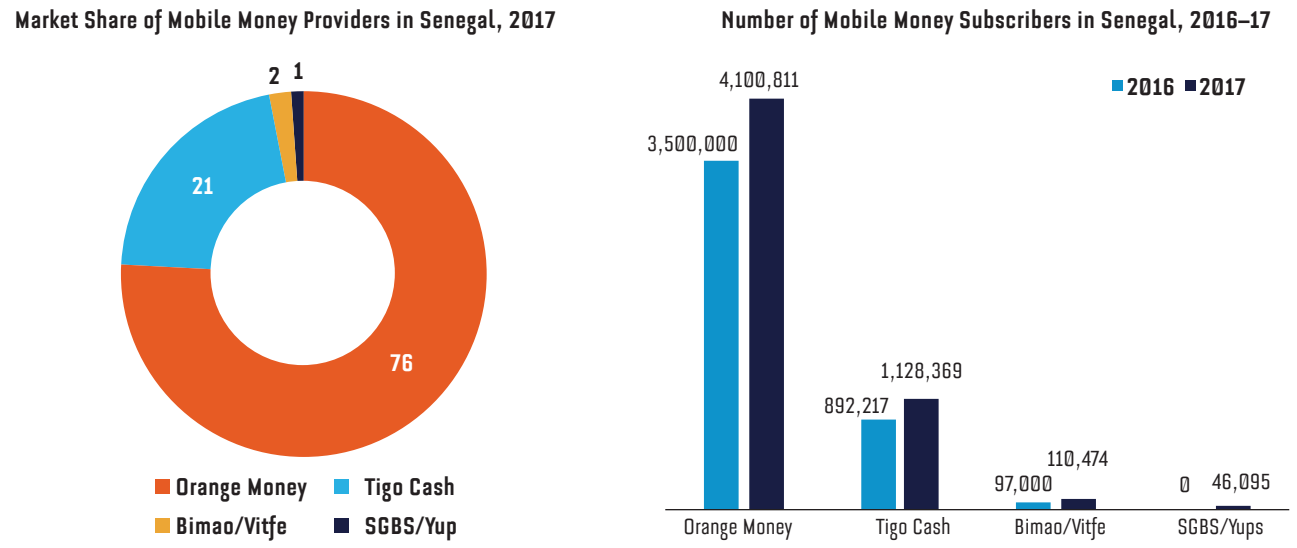
Source: Global Findex 2017.

Mobile money adoption in Senegal jumped from 6 percent in 2014 to 31.8 percent in 2017 with the licensing of 4 institutions competing in a monopolistic market led by Orange Mobile Finances Senegal (OMFS), a subsidiary of Orange licensed as an e-money institution. According to BCEAO, OMFS dominates the market with more than 4.1 million subscribers of the total 5.3 million. The rest subscribe to Tigo Cash, Yup, and VITFE (Figure 21, left panel). Overall, the market continues to rapidly expand – in one year (2016–17), more than 1 million adults subscribed to e-money services (Figure 21, right panel).

In Senegal, despite a spurt in mobile money account ownership, the effective use of DFS is still limited. In usage, airtime purchase represents 40 percent of the annual volume of transactions, while cashing in accounts for 30 percent. The rest is allocated mainly between person-to-person (P2P) transfers (12 percent) and cash withdrawals (12 percent). Slow growth in P2P transactions is due to the prevalence of OTC, cash-to-cash services, such as Wari and Joni Joni, which have stifled the mobile money industry for several years. To date, mobile payments at the merchant level are still scarce (6 percent) with only 1,338 service points of which only half are active (Figure 22, left panel). At the same time, recent trends are encouraging, as during the past five years, usage patterns have evolved towards progressively cashless transactions. For example, the share of merchant payments and bulk disbursements have grown in volume and the share of both cash out and cash in have decreased, signaling that the average consumer uses less cash.

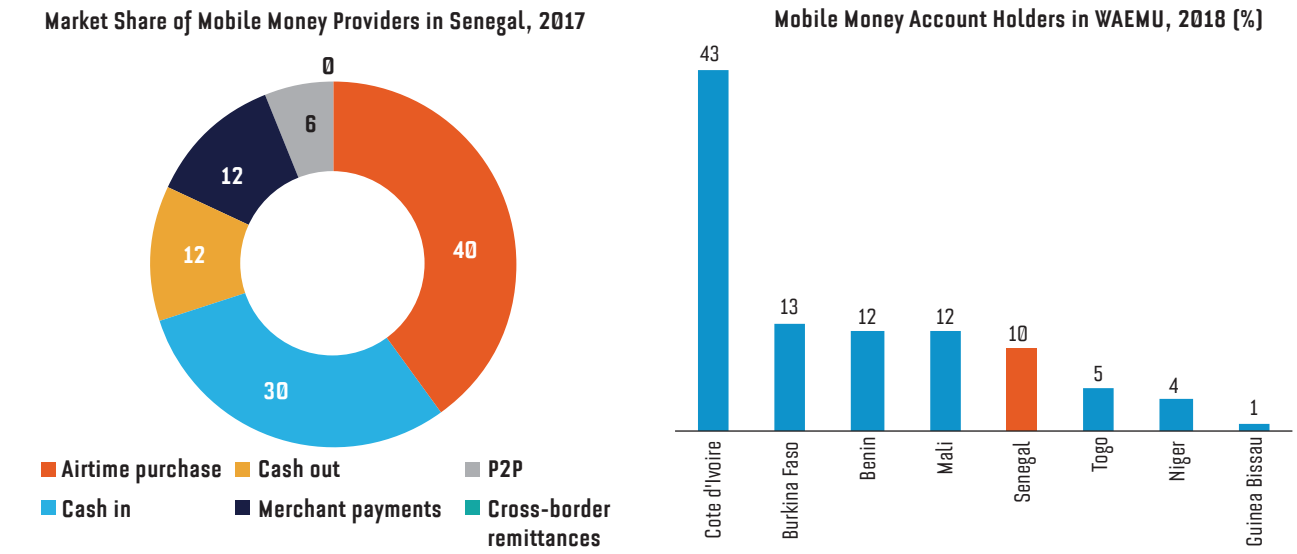
Data show approximately 150 million mobile money transactions valued at 1,261 billion FCFA (US $2.2 billion). Each Senegalese active account holder processed on average 67 transactions in 2017. The number of mobile money agents is close to 67,315, or 22 percent of the total number of agents in WAEMU, placing Senegal just behind Côte d'Ivoire (30 percent), the largest and most decentralized mobile money market in WAEMU. There are approximately

Figure 21. E-Money Market in Senegal: Market Shares 2017 (left) & Subscribers 2016-17 (right)



Source: BCEAO 2017.

Figure 22. Mobile Money Use in Senegal, 2017 (%) and Account Holders in WAEMU, 2018 (%)



Source: BCEAO 2017.

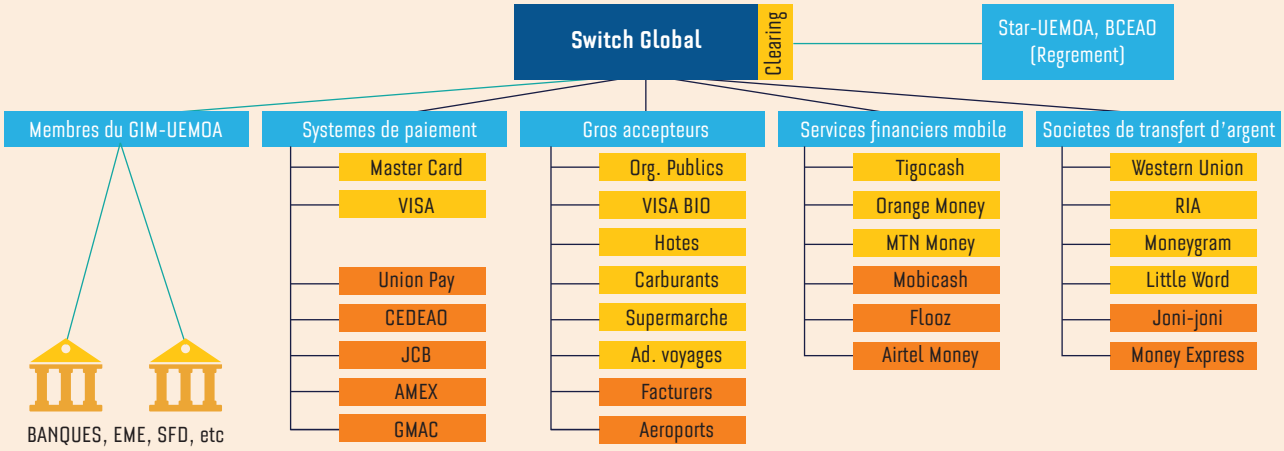
40 subscribers for 1 mobile money agent in Senegal and only half of these agents are active. Overall, Senegal accounts for a mere 10 percent of regional account holders behind Côte d'Ivoire, Burkina Faso, Benin and Mali (Figure 22, right panel). Annual volume of transactions reached 150 million FCFA at end December 2017 for an estimated value of 1262 billion FCFA (US $2.1 million).

The interbank card system has been operational in Senegal for approximately 15 years, but mainly targets already banked population. Only 22 percent of those who own a bank account have a bank card (360,042). The regional switch, operated by the GIM-UEMOA[77], provides card services in an interbank and interoperable network. The switch enables the issuance, acceptance, and acquisition of national, regional, and international payment cards, including VISA and MasterCard. The banks share a common network of ATM machines and point of sale (POS) devices, numbering 600 and 1700, respectively at end-2017. All banks in Senegal are connected to the GIM platform. Some microfinance institutions, also called decentralized financial systems (SFD), participate in an indirect mode, as

77 GIM-UEMOA refers to WAEMU Monetary Interbank Grouping *(Groupement Interbancaire Monetique de l'UEMOA)*.

Box 8. GIM-UEMOA and Interoperability

The Inter-banks monetary group (GIM-UEMOA) was established in 2003 to address the interoperability of digital payments It is legally consbtuled as an electronic money agency with a capital of more than 9 Nihon FCFA, some 53% of which is held by the BCEAO and the 135 credit institutions of UEMOA including about 24 in Senegal. The network has a total of 3000 ATMs. of which around 600 in Senegal and 4000 Electronic Payment Terminals (EPT), including 1700 in Senegal Any institution that is authorized by the EICEAO and can issue digital means of payment can be a member of GI M.-UE11,10A and connect to this regional inter-banking platform The Group's policy allow various structures to connect to the GIM-UEMOA platform including entities such as the Treasury, the Post Office and microfinance institutions. In Senegal. all banks are members of GIM-UEMOA at this point. The Network of ATMs and EPTs are interoperatde. which allowed in 2008, a reduction of withdrawal fees per card from 3500 FCFA to 500 FCFA throughout the Union In 2016, the BCEAO launched with GIM-UEMOA, a project to extend interoperability to mobile payments to promote integration between all types of digital payments in UEMOA West African region



Source: BCEAO and ARTP.

they are not authorized by the regulations to directly issue means of payment. The most important payment acceptors are in the gas and tourism industries.

A growing number of fintechs recently emerged in Senegal and are stimulating investors' interest. After the 2013 McKinsey study[78] revealed that Internet-based companies accounted for 3.3 percent of Senegal's GDP, investors have increasingly shown interest in Senegal's ecosystem of "start-ups". For example, in 2017 off-grid solar start-up *Oolu-solar* mobilized funding of over US $3.2 million. In 2018 it raised an additional undisclosed amount from the Gaia Impact Fund. The small advertisement platform, *CoinAfrique*, also mobilized funding of up to US $3.5 million in 2018. As if to give more credibility to the fintech ecosystem, in January 2018 the investment firm, *Partech Ventures*, opened its Africa Office in Dakar and announced a fund of US $122 million for African fintech start-ups.

Many innovative fintech start-ups in Senegal have demonstrated a relatively strong technical and commercial viability. *Intouch*, which manages the payment system attached to the TOTAL Company's service stations[79], *SENTOOL* Company of BBS Invest, and *ATPS* are enterprises that provide smart, multifunctional platforms, integrating money transfer and electronic money services in a single interface. Using a variety of payment terminals and interfaces, users can perform usual transactions, such as paying water and electricity bills, buying telephone credit, paying TV subscriptions, and transferring money. *MaTontine* is another mobile "peer-to-peer" savings platform with an integrated credit scoring system. To access loans and other financial services in Senegal, users can resort to their credit rating. Within less than one year of its launch, the start-up had 475 active users and had made loans totaling US $12,000 with a 0 percent default rate. *PayDunya* is an online payment solution that enables individuals and businesses to collect and make payments, regardless of whether they have a bank account. Merchants receive a commission of 4 percent on every 18 US cents paid (100 FCFA). After two years since its launch, PayDunya has secured some 30 merchants in Senegal.

78 McKinsey Global Institute (MGI). 2013. "Lions Go Digital: The Internet's Transformative Potential in Africa". Mickinsey & Company 2013. Available here.

79 InTouch is a fintech start-up that provides traders and consumers with payment options. In its initial year, it generated $1.2 million in turnover. In 2017 it reached monthly transactions of $17.6 million with 30,000 daily transactions.

Additional fintechs are on a growth path. *SudPay* focuses on digital bank notes and tax collection solutions. *VoLo* provides a credit information platform to financial institutions through its product, VTIP Finance. It has received a grant of US $284,500 from the African Development Bank (AfDB) to facilitate entrepreneurs' access to loans. There are also *LemonWay* (mobile money provider) and *Weebi* (POS, solutions for SME). Moreover, more data-driven disruptive technologies, including Internet of Things (IoT) and Artificial Intelligence (AI), have recently fueled several nascent start-ups, such as *Seedstars-dakar-2018* and *Big Booster*.

3. Policy and Regulation

Overarching policy and strategy directions for financial inclusion across WAEMU countries, including Senegal, are set by BCEAO through a framework document adopted in June 2016 by its Council of Ministers. This strategy defines the vision and the main axes for financial inclusion in member-countries. For BCEAO, the overarching goal is to achieve a financial inclusion rate of 75 percent by 2025 with the following five sub-objectives:

- Promoting an effective legal, regulatory, and supervisory framework;
- Consolidating and strengthening the microfinance sector;
- Improving financial education and consumer protection;
- Promoting innovations that permit the inclusion of excluded populations (youth, women, SMEs, rural populations, people with low literacy);
- Establishing a financial framework and policies that are conducive to inclusion.

Market Entry

Access to the DFS market is supported by an enabling regulatory framework, also established by BCEAO. This framework is essentially grounded in *(i)* Regulation 15, dated 19 September 2002, covering payment systems and instruments; and *(ii)* more recent Directive on e-money activity and e-money issuers, dated May 2015[80]. Both legal texts aim to provide conditions, under which non-bank entities can provide financial services to the unbanked and underbanked. The Banking Law of 2010 also allows credit institutions to hire third-party agents to conduct selected banking services under specific conditions, setting the stage for more delegated, branchless financial services through banks. Microfinance and telecom operators are provided with clear requirements on how to provide DFS under the purview of credit institutions, who act as partners and guarantors.

However, fintech start-ups involved in the provision of financial services suffer from the lack of a clear legal category. In fact, the regulator classifies some fintechs as "technical operator", which so far are not regulated by BCEAO. The only existing option is for fintechs to change their status to electronic money institutions (EMIs). However, the high entry fee and capital requirement for EMIs (of US $550,000) disincentives fintechs from adjusting their status. Hence, many such entities are faced with the obligation to give up the majority of their shareholding to investors in exchange for receiving cash injections required to raise sufficient capital to meet the requirement of a financial institution.

At the national level, Senegalese authorities are in favor of enhancing access to financial services, as evidenced by the Government's commitment to the Maya Declaration in 2012, in which Senegal vowed to increase financial inclusion. In this regard, the Alliance for Financial Inclusion (AFI) and MEFP have carried out a national survey to establish a diagnostic of financial inclusion in Senegal, with the goal of developing a national strategy. Other concrete commitments are embedded in PSE and a new national strategy to develop an inclusive finance sector. This strategy, coupled with SSN2025, sets the scene for an increasingly digitized financial sector in Senegal, in particular through digitizing payments of public administrations, which is an essential part of the vision for a cashless government.

In 2008, Senegal adopted the Law on Electronic Transactions[81] to enhance the use of digital technology in financial transactions, particularly by public entities. The Law built on the 2002 WAEMU Directive[82] that encourages digitization of all government expenses and receipts above the threshold of 100,000 FCFA (US$180) and was accompanied by the application decree on e-commerce[83]. Recently (in November 2018), Senegal signed a new Decree to digitize all government transactions processed by its public administrations[84]. This innovative legal framework clarifies the

80 Directive N° 008-05-2015 Governing the Conditions and Procedures for the Activities of Electronic Money Issuers in WAEMU Member States (*Instruction N°008-05-2015 Regissant les Conditions et Modalites d'exercice des Activités des Emetteurs de Monnaie Electronique dans les Etats Membres de l'union Monetaire Ouest Africaine*) available here.

81 The Law on Electronic Transactions (*Loi n° 2008-08 sur les Transactions Electroniques*) adopted on 25 January 2008 and available here.

82 WAEMU Directive on the Measures to Promote the Banking System and the Use of Non-Cash Means of Payment (*Directive n°08/2002/CM/UEMOA du 19 septembre 2002 sur les Mesures de promotion de la Bancarisation et de l'Utilisation des Moyens de Paiement Scripturaux*) available here.

83 The Presidential Decree (*Decret n° 2008-718 Relatif au Commerce Electronique*) adopted on 30 June 2008 and available here.

84 Decree of MEFP regulating payments by electronic means of public expenses and receipts (*L'arrêté portant règlement par voie électronique des depenses et recettes de l'administration publique*) adopted on 6 November 2018.

conditions under which payment service providers can bid and win a digitization contract with the GoS. It is expected to open the financial industry to more digitization.

Delivery Channels

Despite the presence of GIM-UEMOA, Senegal has limited interoperability of digital financial services. The various payment points are interoperable only through the card payment network, whether transactions are processed via the regional label (GIM-UEMOA) or international (VISA and MasterCard). BCEAO has taken steps to establish full account-to-account interoperability by 2020 through the GIM-UEMOA platform. The objectives are to (i) enable transactions between any digital devices (such as mobile wallets, online accounts, bank and prepaid cards) to be interoperable; and (ii) enhance mobile-to-mobile interoperability within the region and across borders.

The playing field is not leveled with respect to the use of agents. Senegal's legal framework for contracting agents is slated per category of financial services for the poor (FSPs). In the microfinance sector, rules for contracting agents/retailers are lacking. In contrast, EMIs got clear conditions for the distribution of services, pursuant May 2015 e-money regulation, which was one of the key additions to the prior version of 2006. As a result, the mobile agent network skyrocketed to somewhat 67,315 agents, whereas MFIs are required to establish branches to be allowed to deliver services. As for banks, even though the 2010 Banking Law permits agent banking, the conditions set forth are deemed too stringent; hence in the past eight years, only one agent (MANKO) has been licensed in Senegal.

Overall, DFS spread and innovation are significantly stifled by current regulation. Although MFIs can provide credit and saving services, they are not yet permitted to contract agents, hence the slow uptake of second generation DFS (such as loans and savings). Mobile money agents are only allowed to open accounts and process payments, cash-in and cash-out transactions, on behalf of their issuer. MFIs fall under the responsibility and control of their issuer and are permitted neither to provide credit services nor to pay interest to the benefit of clients. In addition, exclusivity clauses are banned for all FSPs, even those that provide non-digital financial services.

The AML/KYC framework[85] is set per level of risk but excludes thousands of rural farmers. The legal framework for DFS, adopted by most FSPs, allows for simplified know-your-customer (KYC) rules for a wallet size smaller than 200,000 FCFA. Orange, for instance, offers a "light" type of wallet available for those who lack appropriate documentation to open an account. To a certain degree, the limit of US $3,000 as a AML/CFT rule for mobile money wallet size is an impediment to financial inclusion with respect to specific rural farmers who carry large amounts of cash after crop sales. Mobile money wallets are convenient due to the lack of bank branches in rural areas. However, the low limit of the wallet prevents these categories of customers to open accounts and fully participate in the financial system.

The GoS makes little use of digital payments to process its retail expenditures and small tax collection. In 2017, only 13 percent of adults received an electronic payment from the state (Findex 2017). The Treasury has embarked on modernizing its internal information system and is now connected to the BCEAO's two regional payment systems: Real Time Gross Settlement System (STAR-UEMOA) and an Automated Clearing house (SICA-WAEMU). The challenge for the GoS today is to digitize payments for its unbanked counterparts (G2P) and automate the collection of small taxes (P2G).

Managing Risks of Digital Finance

Senegal has been very proactive in addressing risks posed by cyber-crime and the challenges of cybersecurity in general. As early as 2008, the country had an almost complete legal framework for cyber-criminality that covered not only cybercrime, but all other digital dimensions of security. As referenced earlier, in January 2008, Senegal adopted a package of five laws that included laws on (i) the information society[86]; (ii) electronic transactions, covering security of transactions among other provisions[87]; (iii) the protection of personal data[88]; (iv) copyright[89]; and (v) cybercrime[90] that provides for the incrimination of all cyber-criminal acts. This package was completed six months later by the adoption of a separate law on cryptology in August 2008[91].

Based on a National Cybersecurity Strategy of 2022[92], the GoS proceeded to evaluate the strategic context of cybersecurity, including current and future threats. The

85 Regional anti-money-laundering/countering the financing of terrorism framework used by WAEMU member states.
86 Law n° 2008-10 of 25 January 2008 on the Information Society, available here.
87 Law n° 2008-08 of 25 January 2008 on Electronic Transactions, available here.
88 Law n° 2008-12 of 25 January 2008 on Personal Data Protection, available here.
89 Law n° 2008-09 of 20 August 2008 on Copyright, available here.
90 Law n° 2008-11 of 25 January 2008 on Cybersecurity available here.
91 Law n° 2008-41 of 20 August 2008 on Cryptology, available here.
92 The National Cybersecurity Strategy is available here.

GoS recognizes the roles and responsibilities of various stakeholders in the protection of Senegalese interests in cyberspace and is committed to broad collaboration with the internal cybersecurity ecosystem (including public administration, businesses and other organizations and individuals) as well as with external organizations. Financial firms are under the obligation to report to the regulator all cybersecurity incidents and carry out regular tests and simulations. Firms must monitor, analyze, and continuously manage threats and risks as well as mitigate, prepare for, intervene during incidents. The strategy aims to design and implement cybersecurity incident simulation scenarios for the use in national exercises.

The financial consumer protection framework on DFS contains several guidelines to protect customers' funds. The 2015 e-money Directive requires customers' funds to be safeguarded in at least one escrow account. However, the funds should not be placed in risky assets, but rather liquid ones. The regulation clearly forbids payment of interest on e-money accounts but is silent on the possibility of sharing profits with e-money account holders. Disclosures on funds reimbursement, transparency of fees, and customer claim support numbers must be provided by the e-money issuers on the contract agreement with the consumer. Moreover, the GoS has established an Observatory on the Quality of Financial Services (OQSF), tasked to mediate between FSPs and consumers and to ensure that price transparency rules are complied with. With the support of WB, the OQSF mandate is being revised to include digital innovation.

Absence of a digital contract system is another important issue requiring policy action. The 2008 Law on Electronic Transactions is silent on the process leading to digitization. Many payment service providers need a digital signature, but the electronic certification framework is still not operational. Electronic money institutions are obliged to store physical versions of contracts signed with customers. This requirement generates real challenges, particularly in rural areas. Digital contracts, secured by PKI, would alleviate this process, warranting ADIE to finalize establishing the PKI infrastructure to facilitate the issuance of digital certificates in Senegal.

Financial infrastructure

a. Retail Payments Infrastructure

The GoS participates in BCEAO's two regional payment systems. They comprise, as mentioned above, a Real Time Gross Settlement System (STAR-UEMOA) and an Automated Clearing house (SICA-UEMOA) for checks. The systems comply with international standards and best practices. They are run by the BCEAO, which is an ISO-certified institution. GIM-UEMOA (as elaborated in Box 8) is the retail payment switch platform, which also abides by EMV[93] and Payment Card Industry Data Security Standard (PCI DSS). Non-bank service providers, such as MFIs and EMIs, can have indirect access to STAR-UEMOA and GIM-UEMOA, whereas only check-issuing institutions can participate in SICA-UEMOA. In future, all mobile money providers are expected to join the GIM-UEMOA platform directly to access interoperability.

At the telecom level, operations are stifled by high unstructured supplementary service data (USSD) access cost. Recently liberalized by ARTP, USSD is an innovation that is expected to be a game-changer in the payment industry by enabling more financial and fintech providers to reach new customers. However, the cost of access to USSD in Senegal is estimated at 20 FCFA per session, which could increase the final cost of services. For Safaricom in Kenya and MTN in South Africa, the cost of access to a USSD transaction is 5 FCFA and 8 FCFA, respectively. It would be extremely useful for ARTP to launch a comparative study of costs charged for USSD throughout the world. The findings could lead to a reduction in the bill for financial transactions via USSD.

b. Credit Infrastructure

Creditinfo Volo (CIV), the regional credit bureau, was approved in 2015 by BCEAO on behalf of the 8 WAEMU member countries. The credit bureau's activities are regulated by the law adopted and ratified by each member country. It is clear from this legal and regulatory framework that the Bureau can coherently gather and share information on lenders based in eight member-countries, an indispensable condition given the level of cross-border economic activities and regional integration. All financial intermediaries (FIs) regulated by the BCEAO are required to exchange information with the credit bureau and to coordinate closely with it.

DFS providers in Senegal are not able to offer credit services. However, scoring models have been individually developed by providers, such as Microcred, that do leverage some digital data rather than solely traditional methods, such as repayment history. For instance, it has launched a nano credit product and does participate in the credit bureau, even though for now this credit bureau does not build on alternative sources of credit information, such as utilities and mobile airtime purchases.

93 "EMV is a global standard for credit and debit payment cards based on chip card technology". It takes its name from the card schemes Europay, MasterCard, and Visa, which developed EMV.

E. Digital Skills and Capabilities

1. Context and Key Challenges

Despite recent progress and improved access, Senegal still displays underwhelming results in key education indicators and the overall level of skills of the workforce is low. Both gross (GER) and net enrollment rates (NER) in Senegal remain low, with GER standing at 84 percent for primary education, 45 percent for secondary education, and a mere 11 percent for the tertiary level (against 106, 70 and 24 percent in LMIC, respectively)[94]. As much as one third of school-aged children is out of the formal education system with the ratio increasing to two thirds for the poorest quintile (many attending traditional Koranic schools – "Daaras"). Overall learning outcomes remain poor, even by SSA standards, as barely one third of children complete primary school with sufficient competencies (only 20 percent of sixth graders meet the desired proficiency in French and mere 10 percent in mathematics[95]). A Senegalese four-year-old can expect to complete 7.2 years of school by his 18th birthday against 8.1 in SSA and 10.2 in LMIC, however, when years of schooling are adjusted for the quality of learning, this drops further to 4.8 years, as reported by the World Bank Human Capital Index[96]. As a result, both adult and youth literacy rates in Senegal are well below SSA and LMIC averages with only half of Senegalese adults (15 years old and above) considered literate vis-à-vis 64 and 76 percent in SSA and LMIC, respectively[97].

More specifically, the current technical and vocational education and training (TVET) system in Senegal serves only a small portion of the eligible cohort and is plagued with numerous deficiencies, including a low supply of training and some obsolete courses. Despite some important recent progress, still only 7 percent of students completing basic education are enrolled in TVET in 2016, with the system continued to be stifled by multiple shortcomings. The development of new, demand-driven programs is rare. Tertiary level training has expanded at the expense of lower skill levels and is characterized by an upsurge of private institutions in Dakar and Thies and a focus on lower-cost training in business and administration. The lack of equipment for training poses a significant challenge to quality TVET, as does the decline of training centers for TVET teachers. Failure rates in certification exams are high, pointing to low internal efficiency, notably for senior technician certificate *(brevet de technicien supérieur – BTS)*. Finally, the sector is underscored by missing mechanisms for setting and complying with standards, assessing quality indicators, delivering training, and conducting transparent accreditation and certification[98]. In the context, in which Senegal spends only 0.5 percent of its GDP on research and development (R&D)[99] versus 0.7 in Morocco, 0.8 in Kenya and South Africa and more than 2 percent in advanced countries, such as France, Singapore, and Israel, such limitations of technical and scientific education act as a serious brake on the development of sophisticated and technologies-enabled sectors of the economy.

Consequently, Senegal scores low in all major international rankings that reflect the country's lack of qualified, competent, and sufficient human resources. This conclusion is corroborated by the country's rather modest positions in the 2018 UNDP Human Development Index, 2017 WEF[100] and 2018 WB's Human Capitax Indices (Figure 23) that measure various aspects of human capital development, including economic, health, and education indicators as well as more specific components focused on employement shares, skills diversity and staff training. Such low rankings are indicative of why enterprises in Senegal, particularly those operating in the digital sector, face difficulties in recruiting local talent and why foreign investors wishing to develop off-shore activities do not find diversified skills. As reflected in WB Enterprise Surveys, limited education of the workforce is a serious constraint for some of the most productive firms of the country[101]. In fact, weak

94 World Development Indicators (WDI), 2017. Available here.

95 World Bank. 2016. *SABER Country Report: Engaging Private Sector in Education*. Washington, DC: WB. Available here.

96 HCI measures the amount of human capital that a child born today can expect to attain by age 18, given the risks of poor health and poor education prevailing in a country (i.e. reflecting the productivity of the next generation of workers relative to the benchmark of complete education and full health). The Index ranges between 0 and 1 and is made up of five indicators: the probability of survival to age five, a child's expected years of schooling, harmonized test scores as a measure of quality of learning, adult survival rate (fraction of 15-year olds that will survive to age 60), and the proportion of children who are not stunted. Overall, an economy in which the average worker achieves both full health and full education potential will score a value of 1 on the index. For further details refer to World Bank (2018). *Human Capital Index*. Washington, DC: WB. Available here.

97 The adult literacy rate for Senegal is reported for 2017, while for SSA and LMIC it is based on 2016 data, as reported by WDI.

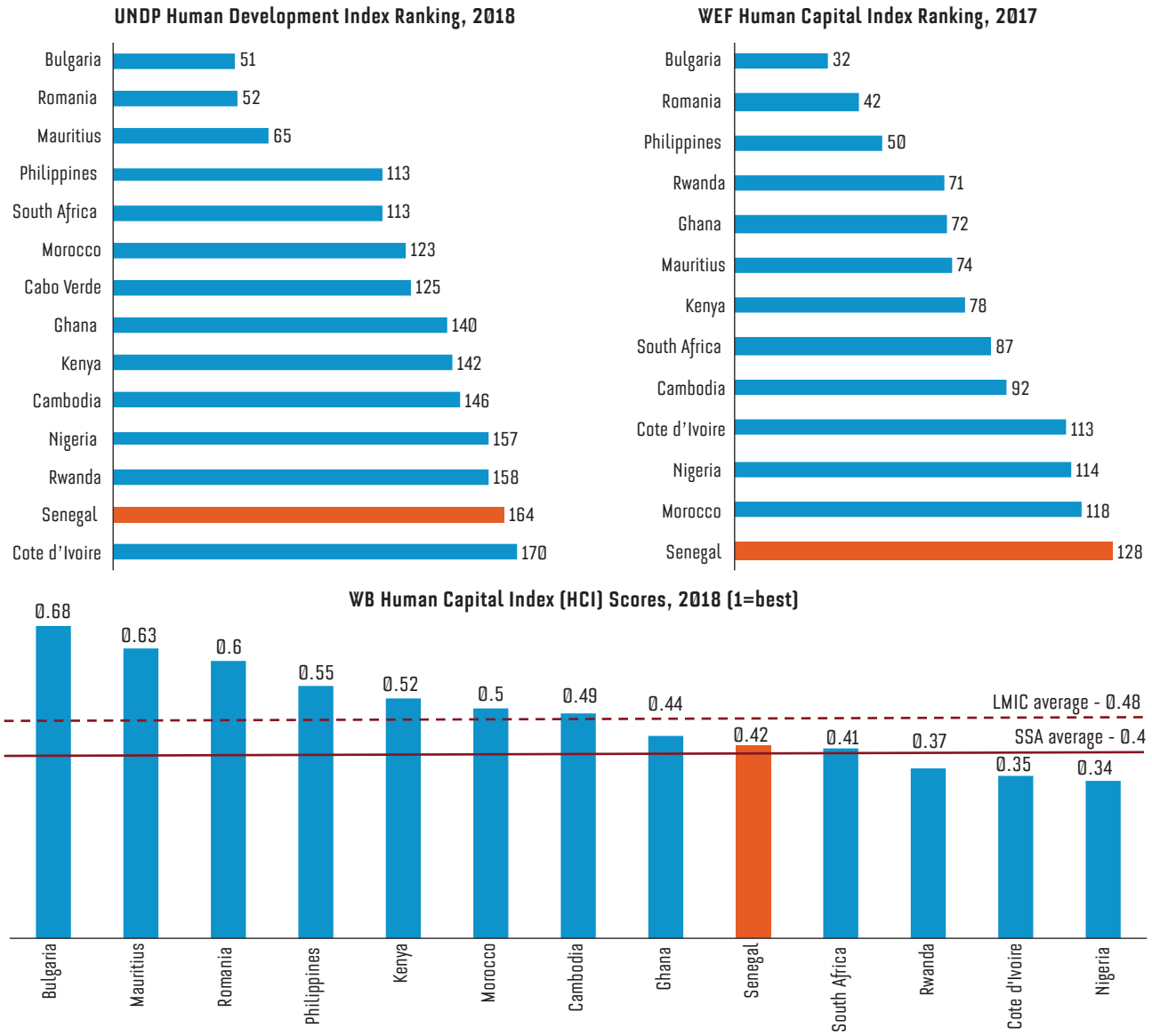
98 World Bank. 2018. *Systematic Country Diagnostic of Senegal*. World Bank, Dakar. © World Bank. Available here.

99 UNESCO Institute for Statistics. Available here.

100 The WEF Global Human Capital Index 2017 ranks 130 countries on how well they are developing their human capital on a scale from 0 (worst) to 100 (best) across four thematic dimensions — capacity, deployment, development and know-how— and five distinct age groups or generations — 0–14 years; 15–24 years; 25–54 years; 55–64 years; and 65 years and over — to capture the full human capital potential profile of a country. For further details refer to World Economic Forum. 2017. *The Global Human Capital Report: Preparing People for the Future of Work*. Available here.

101 According to the latest Enterprise Survey of 2016, 24 percent of exporting firms and 16 percent of mid-sized manufacturing firms perceive significant hurdles in finding adequate skills. World Bank. 2016. Enterprise Surveys – Senegal dataset.

Figure 23. Senegal Positioning in Global Human Capital Rankings



Sources: UNDP Human Development Report: 2018 Statistical Update (available here), WEF Global Human Capital Report 2017 (available here), World Bank Human Capital Index Database (available here).

employability of young graduates from technical and digital fields has been systematically highlighted by all surveys conducted among digitally-specialized companies and ICT professional organizations *(Organisation des Professionnels des TIC - OPTIC)*, which underscore that students' profiles are not adapted to the actual needs in the digital market. To make the new recruits employable, these companies are systematically obliged to complete graduates' skills by offering specialized training lasting as long as six months to one year[102]. This issue is further compounded by the fact that the public administration does not have the required digitally-skilled human resources in all the ministries to efficiently accomplish the country's digital transformation ambition and propel Senegal into the next stage of its development amidst global trends of the fourth industrial revolution.

2. Digital Training in the Senegalese Education System

Modern education must prepare students for a labor market that requires cognitive skills (such as problem-solving and creativity), sociobehavioural skills (such as teamwork) and adaptability (reflected in self-efficacy and reasoning). As evidenced by the WDR 2019 on the Changing Nature of Work, in the context of rapid technological progress and new production patterns, digitalization

102 Based on the interviews conducted by the Performances Group for this study.

and automation raise the premium on high-order cognitive skills in advanced and emerging economies alike[103]. Investing in human capital has thuswise become a priority to make the most of these evolving economic opportunities and governments are undertaking measures in this direction. For example, Singapore is working to transform its education system from an efficiency model, which seeks to maximize the benefits of its inputs (teachers and financial resources), into a skills-based model, which emphasizes project-based work and reduces the frequency of evaluations. Finland, one of the most digitally interconnected countries in the world that displays some of the best results in learning outcomes, banks on continuously improving the quality of teachers. Taking another route, the United States, France, and many other countries with advanced digital economies, introduced the generalized learning of computer coding from an early age on top of activities stimulating cognitive and creative skills to adequately prepare its workforce for the forth industrial revolution.

Even though digital technology should be introduced from the earliest school years in its primary and secondary schools, Senegal's public education system is confronted by a significant lack of resources and infrastructure. The Ministry of national education has achieved significant progress in using digital technologies to improve management and quality through better statistical data, stronger monitoring and evaluation as well as more appropriate tools for communication, collaboration and information sharing. For example, National Education Information and Management System project (*Système d'Information et de Management de l'Education Nationale - SIMEN*) launched by the Ministry in July 2016 in close partnership with Google and Microsoft has integrated all previously siloed and disconnected educational applications on one platform that has allowed for simplification and dematerialization of processes, increased transparency and traceability (rendering relevant information available live to students, teachers and parents)[104], enhanced monitoring and evaluation of teaching practices. At the same time, despite this progress, the national education system is still unable to include digital learning among its priorities, mainstreaming it throughout primary and secondary levels, which is largely due to the lack of resources. Against this background, Senegal's private schools have been filling the gap and have launched many initiatives of various degrees of quality, effectiveness and equity (with some of their digital courses and practical activities becoming an easy marketing element to attract students from affluent families).

At the tertiary level, the Ministry of Higher Education and Research (MESR) is leading an ambitious reform program to promote the digital agenda. Since 2012, a reform process has been unfolding within public and private universities to prioritize digital technologies. MESR has geared this reform to achieve an ambitious national vision of making higher education the key driver of the country's economic and cultural development. Various advances have included adopting a decentralization plan for higher education; opening 14 specialized universities and graduate schools throughout the country[105]; and launching the Virtual University of Senegal (UVS), which represents a digital educational infrastructure open to more than 20,000 students. Senegal's labor market registers a very low inflow of technicians and engineers every year. Hence, the strategic options adopted also include reorienting the education system to science, technology, engineering and mathematics (STEM) and short vocational training (TVET). To harmonize quality of programs and diplomas, in August 2012 the State also established the National Quality Assurance Authority for Higher Education *(Autorité Nationale d'Assurance Qualité de l'enseignement Supérieur – ANAQSUP)* to evaluate and accredit public and private higher education institutions. Four additional ambitious initiatives to improve the quality and level of expertise of trained students have also been launched:

- Creation of fields of excellence including the Africa Center of Excellence in mathematics, informatics, and ICT;
- Launch in late 2018, in cooperation with the ATOS Group, of the project High Performance Computing for Research;
- Inauguration of three new bachelor of science degrees in robotics, molecular genetics, and digital simulation and modeling;
- Initiation of master's degrees in big data, cybersecurity, robotics, molecular genetics, bioinformatics, and digital simulation and modeling.

3. Private Sector Initiatives for Digital Skills Development

To cope with the qualitative and quantitative shortage of digital training in the Senegalese ecosystem, private digital training providers also are stepping up to complement programs offered by public education institutions. These new private actors sometimes partner with major

103 World Bank. 2019. *World Development Report 2019: The Changing Nature of Work*. Washington, DC: World Bank.

104 Under the SIMEN project, every student is assigned a unique identification number associated with an automatically created email address that allows students to access all relevant information aggregated on an integrated portal.

105 Senegal has nine universities and three schools of engineering that offer digital training from higher technician to doctoral levels.

technological firms, such as Atos, Facebook or Orange, that are already active in upgrading digital skills in Senegal. One of such examples is the network of Simplon international code schools that partnered with Sonatel (Orange) to open the Sonatel Academy in 2017, drawing 12,000 applicants for 50 available places and evidencing strong interest of the Senegalese young people in digital technologies. Different models have been adopted by other private providers, such as Edacy, which collaborates with existing higher education institutions, including Higher Polytechnic School *(École Supérieure Polytechnique, ESP)* on the one hand, and with future employers, on the other hand, to provide customized programs focused on market skills and geared towards practical applications.

While the programs of these private sector actors tend to yield good results, their impact remains limited to training a few hundred people per year. Providers interviewed in Senegal underline that the rate of integrating their young graduates in the labor market (including through the creation of new enterprises) ranges from 80 to 100 percent after six months of training, largely thanks to a strong emphasis placed on market-relevant skills and professional integration throughout their courses[106]. However, these structures still do not have a viable economic and financial model. With limited student and institutional financing facilities, private providers have achieved relative success in the premium market, but only at a smaller scale (3,000 students at most) and are unlikely to expand into the mid-range market without incentives. In light of them performing a mission of general interest – complementing public services that are not necessarily able to efficiently meet the expectations of technology companies – it might be warranted for the government to consider supporting them (through financial incentives, such as risk sharing or guarantees, for example).

The rest of the private training market in Senegal is not performing satisfactorily. As evidenced by the interviews conducted for this study, the private training market offers programs that, on the one hand, are too general, compelling companies to take responsibility to provide the needed specialized training to new recruits; and, on the other hand, are limited to content that does not keep pace with technological advances[107]. To meet the requirement of satisfying companies' needs, established training providers must learn to draw inspiration from newcomers in the digital sector and envisage new training modalities that would effectively address the shortcomings of the current higher education system. This vision calls for creating an ecosystem capable of introducing new forms of teaching and learning that would target both young graduates, who are not directly employable and young people with neither skills nor diploma, who form the bulk of the potential workforce.

Regarding on-the-job training in the private sector, the GoS has not undertaken any initiatives to encourage or oversee such programs. This requirement is left to the discretion of companies or to both companies and new workers (for self-learning). Employees, especially technological companies, are not encouraged to provide more advanced and specialized training, even though the evolution of the digital sector makes it imperative for workers to seek continuous training throughout their careers.

F. Entrepreneurship and Digital Innovation

1. Context and Key Challenges

Senegal is witnessing the rise of a small but vibrant digital entrepreneurship ecosystem[108], widely considered to be one of the most dynamic in francophone West Africa. The Senegalese environment is relatively favorable to entrepreneurship and is characterized by a young (62 percent of the population is under 25 years old) and growing urban population (+3.6 percent per annum) as well as a large and active diaspora that provides skills, networks in developed markets, and financial support. These favorable conditions are amplified by three important factors. First is a widespread use of technologies – at 35.6 percent, Senegal's smartphone adoption rate is among the highest in West Africa (with the regional average standing at 28 percent)[109]. Second is a high entrepreneurial activity rate - 39 percent of the Senegalese population aged 18 to 64 is either setting up or heading a new company (Figure 24). The third factor is a recently accelerated speed of the innovation ecosystem development, as it now comprises more than 15 incubators, accelerators, and co-working spaces that serve the needs of a community of over 2,500 start-ups and entrepreneurs. In 2015, Senegal

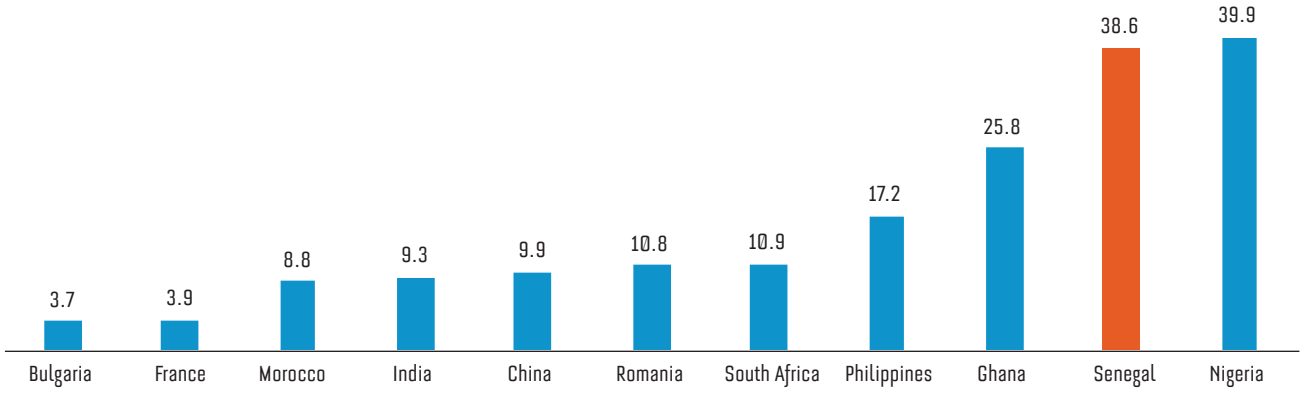
106 Based on the interviews conducted by the Performances Group for this study.

107 Ibid.

108 The country's 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 entrepreneurial environment, as defined by OECD (2013) *Entrepreneurial Ecosystems and Growth Oriented Entrepreneurship: Background paper prepared for the workshop organized by the OECD LEED Programme and the Dutch Ministry of Economic Affairs* (available here). This ecosystem is one of the foundational pillars of a dynamic digital economy. It enables ideas and innovation to materialize into start-ups, which in turn mature into businesses, while creating jobs, facilitating access to goods and services, and fostering the development of other economic sectors.

109 Jumia Senegal. 2018. *Mobile Report 2018: Trends of the Mobile Market and Their Impact on the Senegalese Economy*. Available here.

Figure 24. Early-Stage Entrepreneurial Activity Index by Country, 2017-18 (or latest available year)



Source: World Bank (2018). Global Entrepreneurship Monitor. Youth Business International.
Note: No data is available on Cambodia, Cote d'Ivoire, Mauritius.

counted 63 start-ups per million inhabitants, ranking 13th of 107 classified countries versus 43 in France and 7 in India. Over the past two years, this number in Senegal has been steadily increasing further, largely coming on the back of recent significant business climate improvements. Indeed, the country moved up seven places in the 2018 Doing Business Index (DB) and is currently ranked among the top five SSA reformers, having implemented 19 reforms in the last four years[110]. The reforms that particularly eased doing business for start-ups range from reducing the fees to start a business and expediting electricity connection to shortening deadlines for the tax credit refund on the VAT.

Nevertheless, the Senegalese start-up ecosystem remains fragile and embryonic and its further development is inhibited by several critical constraints, particularly by insufficient support at the regulatory level.[111] Despite important incipient progress, Senegal still ranks 140th of 190 economies in DB 2018 and 103rd of 137 countries in the 2018 Global Entrepreneurship Index (Error! Reference source not found., left panel), suggesting that deeper reforms and additional investments are warranted to fully transform the country's business environment and entrepreneurship ecosystem. Specific measures are necessary to support start-ups that face significant and, in many ways, unique challenges that limit scale-up opportunities. These challenges include high initial investments, long development periods to break even, the necessity to protect intellectual property, insufficient material assets, impediments to access finance, and weak access to markets.

Although this field remains relatively new, good international practices suggest that a dedicated legal and regulatory framework tailored to the needs and challenges of entrepreneurs plays a foundational role for the digital economy. Countries as diverse as Brazil, India, Israel, Italy, India, and the United States are widely recognized as having environments conducive to developing start-ups. All these countries have adopted if not specific legislation, then at least dedicated programs and institutions to support the development of innovative entrepreneurs. In Senegal, such a regulatory framework is under development and will require concerted efforts to facilitate effective and efficient implementation and impactful results on the ground. Additional and complementary initiatives are necessary to ensure the government acts as an anchor client and stimulator of the digital economy, through the widespread use of government e-payments and facilitated access of startups to public procurement that is currently very limited.

Moreover, ensuring that entrepreneurs have better access to finance as well as to adequate and competent support from accompanying structures, such as incubators and accelerators, is critical to boost start-ups' survival rates and address the classical "valley of death" problem.[112] In fact, almost 40 percent of Senegalese entrepreneurs consider lack of access to finance as the main factor limiting their growth[113]. The availability of risk capital is one of the lowest scored components of GEI for Senegal (Figure 25, right panel). This lack of financing is starkly reflected in the fact that only US$10.7 million was mobilized by Senegalese

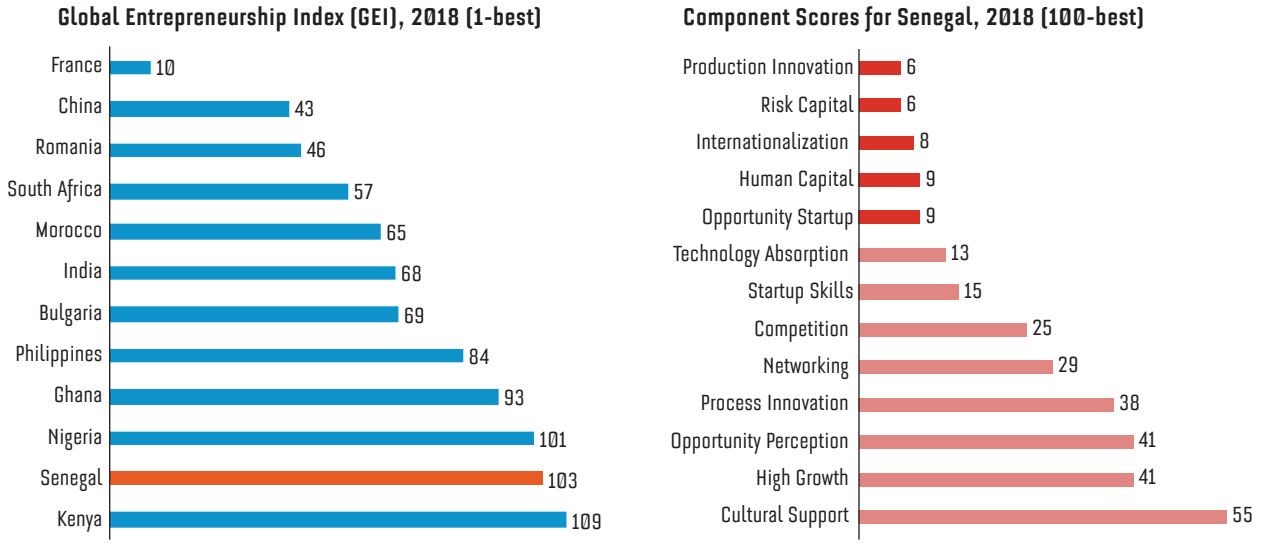
110 World Bank. 2018. *Doing Business in Senegal*. Washington, DC: WB. Available here.

111 The insufficient regulatory support comes on top of the other constraints related to digital infrastructure, public digital platforms, personal data protection, and digital skills that are elaborated in other sections of this report.

112 The term describes the time lapse between the initial pre-seed phase, when a start-up typically is using its own resources or "love money" from family and friends and the period of relative maturity and viability to attract investment and financing available on the market. The funding shortage on the market typically starts at the seed stage (in the range of 10 million FCFA) and ends at the Series A stage (US$1 million).

113 World Bank. 2014. *Senegal Enterprise Survey*. World Bank, Washington DC.

Figure 25. Total Early-Stage Entrepreneurial Activity Index, 2017–18 (or latest available year)



Source: World Bank 2018.

start-ups in 2017 versus US$147 million by Kenya (14 times more for a population only 3 times larger) and US$247 million in Malaysia (23 times more for a population only twice Senegal's size)[114].

2. Government Priorities and Policies

Legal and Regulatory Environment for Start-ups

Cognizant of these constraints and opportunities, the government has demonstrated strong commitment to make Senegal an emerging start-up nation and has recently launched several critical initiatives to create an enabling regulatory and policy framework for start-ups. Seizing the momentum and capitalizing on support from relevant public institutions, in July 2018 key ecosystem players including start-ups, hubs, and investors launched a Policy Hackathon[115] to draft in a participatory, bottom-up-driven manner a Senegal Start-up Act, which covers areas, such as financing mechanisms, fiscality, access to digital infrastructure, and skills and training opportunities. The draft was submitted to the authorities, who are strongly committed to follow the examples of other economies, notably Israel (1991), United States (2011), France (2013), India (2016), and Tunisia (2018), in adopting specific start-up-focused regulations. Subsequently, key public institutions, including DER, MCTPEN, MEFP, and DGID, with the help of development partners, such as the World Bank, and legal consultants have formed a task force to assess the feasibility of proposed measures and identify appropriate vehicles to integrate them in existing legal and regulatory frameworks.

Market for Innovation in Government Services (GovTech)

Due to a small market size, which limits the demand for start-ups' solutions, and insufficient financing options to sustain start-ups outside the protected incubators' environment, government action to more proactively open up public procurement systems is important to make the start-up ecosystem more resilient. One effective approach to engage with start-ups through adjusting public procurement regulations is letting them develop solutions to specific public services challenges through business reverse pitches or hackathons. International examples include the 2011 United Nations Commission on International Trade Law (UNCITRAL) Model Law on Public Procurement[116], which provides for new procurement procedures to facilitate dialogue between procuring entities and suppliers to enable procuring innovative products. Another example is the 2014 EU public procurement directives[117], which make

114 Partech Ventures. 2018. *Annual Funding Report* - as quoted by Quartz Africa. 2018. *Startup Venture Funding Jumped More than 50 Percent in Africa Last Year to a Record High* by Yomi Kazeem. Available here.

115 Policy hackathons borrow from the hacker and start-up community's proven dynamic and collaborative problem-solving format, which uses the brain power of an invested group of people over limited time (typically 1 day) to collectively and creatively tackle issues of common interest or concern. The participants normally adopt the format of interactive policy workshops, which requires them to become policy-makers for a day with a mandate to create legislation that can break through the barriers to innovative entrepreneurship. Dakar Policy Hackathon united 60 players of the start-up ecosystem to develop a Start-up Act. The hackathon was followed by a week-long online consultation (facilitated by social media and dedicated web portal) that reached nearly 500 entrepreneurs and collected more than 100 comments on specific legal provisions.

116 UNCITRAL. 2011. *Model Law on Public Procurement*. @United Nations, January 2014. Available here.

117 These Directives are EU Procurement Directive 2014/24/EU on Public Contracts; EU Procurement Directive 2014/23/EU on the Award of Concession Contracts; and EU Procurement Directive 2014/25/EU on Procurement by Entities Operating in the Water, Energy, Transport and Postal Services Sectors.

Table 10. Types of Services Offered by Different Support Structures

	"Couveuse"	Incubator	Accelerator	"Nursery"	Co-working	Enterprises Hotel	FabLab	Start-up Studio
Space rental		✓	✓	✓	✓	✓	✓	✓
Advisory	✓	✓	✓	✓			✓	✓
Trainings	✓	✓	✓	✓			✓	✓
Prototyping	✓	✓	✓				✓	✓
Events	✓	✓	✓	✓	✓	✓	✓	✓
Networking	✓	✓	✓	✓	✓		✓	✓
Financial support	✓	✓	✓					✓

Source: Afric'Innov (available here).
Notes: ü - core services; ü- optional services.

extensive provisions for procuring innovation and establish an online platform to facilitate this method[118]. To develop the market for competitive and innovative start-ups, the GoS is considering to adopt regulatory measures requesting key ministries to hold annual Business Reverse Pitches or Hackathons to leverage digital solutions to improve service delivery. These measures build on Senegal's prior experience in partnering with the private sector through Business Reverse Pitches (2016 and 2018) and a number of hackathons held by various departments (most recently, DGID in 2016).

Support Programs and Structures

In line with global trends, Africa is experiencing rapid growth in start-up support structures. In 2018 more than 440 structures emerged on the continent, showing an exceptional growth of 40 percent compared to 2016. The most dynamic African economies also are the most favorable to the emergence of such structures. These trends apply to West Africa, which has over 100 support structures dedicated to growth entrepreneurs, whereas 15 years ago, none could be found.

Senegal follows the same trend with more than 15 start-up support structures (technology hubs, co-working spaces, or incubators) currently operating here. Apart from physical space, they usually offer programs to strengthen entrepreneurs' technical and managerial skills, provide mentorship and networking opportunities, and organize advocacy events to attract other stakeholders and investors[119]. The recent events dedicated to digital entrepreneurship in these hubs drew in thousands of young, passionate Senegalese to participate. The following are illustrative examples of some of these hubs in Senegal[120].

- **CTIC (Center for Technology, Innovation and Competition): First digital business incubator of francophone Africa; established in Dakar in 2011 under the joint leadership of the Senegalese private sector (such as Organization of Information Technologies Professionals, or OPTIC), multinationals (Orange/Sonatel), government (such as MCPTEN, ADIE), and development partners (World Bank, German Development Agency, or GIZ).** Since its establishment, CTIC has trained over 1,300 entrepreneurs, supported over 64 companies that have a cumulated turnover of US$5 million and 34 percent average annual revenue growth.
- **Jokkolabs Dakar:** Shared professional work space operating in 9 other countries and established in Dakar in 2010 for entrepreneurs, start-ups, self-employed, digital economy workers, and other new media or digital arts professionals. Jokkolabs has developed strong regional and Paris networks through several events dedicated to entrepreneurship and innovation and has an open innovation contract with Société Générale, offering 2-month incubation for selected entrepreneurs.
- **Impact Hub Dakar:** Newly created business hub in partnership with Dalberg Consulting, operating since 2018 and providing high-quality work space, coaching, and mentoring; and organizes advocacy events with a strong international network thanks to its membership in the international Impact Hub network operating in over 90 countries.

118 For further details refer to www.innovation-procurement.org.
119 World Bank. 2016. *How Tech Hubs Are Helping to Drive Economic Growth in Africa*. World Development Report 2016 Background Paper. World Bank, Washington, DC.
120 Based on the Diagnostic work conducted as part of the West Africa Digital Entrepreneurship Program (WADEP) World Bank, 2019 (Program Document forthcoming).

Figure 26. Overview of VC Investment Funds Operating in Senegal

VC		Sectors	Investment Stage	Key characteristics
Terangs Capital	TERANGA CAPITAL	• Startups and SMEs	• Early Stage • Growth	• Local; Based in Dakar • Created by IB,P and the former manager of CTIC Hybrid VC/SME fund of $6m • 3 investments so far Ticket size: $75k-400k
Partech Ventures Africa	PARTECH VENTURES	• No specialization	• Early stage • Growth	• Regional; Based in Dakar • $100m fund dedicated to Africa launched in 2018 • Ticket size: $500k-5m • Supported by IFC, EIB, Averroes Finance III • (Bpifrance-Proparco) and Orange
Orange Digital Ventures Africa	orange Orange Digital Ventures	• Digital ventures	• Early stage • Growth	• Regional; Based in Dakar • $50m fund • Ticket size: $500k-3m
Proparco	PROPARCO	• No specialization	• Seed to Expansion	• Regional: Based in Abidjan • More focused on SMEs (tickets $10M+) but getting interested in startups, ex. invested in Afrimarket
M&A Ventures	M&A VENTURES	• All sectors	• Seed	• Local; Based in Dakar • Ticket size: less than $100k • More focused on SMEs but also getting interested in startups, ex. invested in the startup Paps
Brightmore Capital	Brightmore Capital	• All sectors	• Early-stage	• Regional; Based in Dakar • Ticket size: $500k-3m • More focused on SMEs but also getting interested in startups on an opportunistic basis

Source: World Bank 2019. Africa Digital Entrepreneurship Program.

- **Yeesal AgriHub:** Launched in January 2017 and based in Thies, first agriculture and agribusiness tech hub in Senegal supporting (through coaching, mentoring, training, and networking) famers, local technology innovation community and young entrepreneurs to stimulate innovative projects at the intersection of agriculture and ICT.
- **Jiggen Tech Hub:** First platform supporting female entrepreneurship in Senegal's technological ecosystem through networking, training, mentoring, and knowledge-sharing.
- **Orange Fab:** A 12-week intensive acceleration program offering a workspace, workshops with mentors, and a US$10,000 grant to facilitate contracting with Orange business units.
- **Expresso Innovation Hub:** Hosted and financed by Expresso telecom operator, eight-week pre-incubation program for entrepreneurs aimed at enabling contractualization with Expresso's business units as well as with other corporations and public administrations.
- **Sekou:** Regional platform that provides support to entrepreneurs in rural areas, particularly on behalf of international institutions, with strong media presence to promote innovative entrepreneurship.
- **MakeSense:** Global pre-incubation structure with presence in Dakar (as well as 120 other cities around the world) established in 2010 for students wishing to launch social enterprises and for open innovative programs with international institutions, such as the World Food Program (WFP) and the International Monetary Fund (IMF).

The level of professionalization and specialization of these often-nascent structures varies widely. Only a few of them are yet able to provide real value-adding business services to start-ups, signaling the need for renewed momentum in enhancing their capacity. These organizations often are isolated, lack appropriate and sustainable means to develop, and may face governance challenges. Some of their key constraints are related to identifying and committing a

sufficient pool of quality and experienced mentors (knowledgeable serial entrepreneurs) able to give value/insights to start-ups; limited connections and partnerships with investors; personnel who lack critical corporate finance skills; weak pipeline and selection process; and difficulties in securing financing. Even CTIC –– often cited as an example of success across West Africa –– has been losing traction over the past years due largely to its outdated, insufficiently inclusive, and non-transparent governance structure, which is biased toward the public sector and lacks representation from start-ups themselves. Overall, even when taken together, these support structures and hubs still face difficulties in providing access to the skills, tools, trainings, and contacts necessary for the growth and maturation of entrepreneurial projects. These structures also have yet to find an economic model that will guarantee the projects' viability beyond the grants.

Access to Early Stage Financing

Senegalese entrepreneurs lack financing options tailored to their specific circumstances, particularly during their pre-seed and seed phases. The traditional financiers often are not equipped to meet entrepreneurs' short- and long-term investment needs. Commercial bank financing is almost entirely inaccessible to start-ups and digital SMEs, given their characteristics elaborated earlier, including the lack of tangible assets and different cost structures. Consequently, due to high real and perceived risks and substantial transaction costs, commercial banks impose very strict and almost insurmountable conditions on start-ups. Examples of these conditions are physical and cash collateral higher than the credit amount, substantial equity funds, high interest rates, and tight credit conditions. On the other hand, the microfinance sector rarely fills the gap because it, too, has standardized procedures: high interest rates, short-term maturities, small loans rarely exceeding hundreds or thousands of dollars; and fails to fully meet the needs of innovative start-ups or to enable them to make long-term investments.

In this context, to address the shortage of capital required by start-ups, for Senegal to develop a new category of financial instruments is essential.

- **Funds from loans** for example, can be a solution to the provision of pre-seed capital in two ways: (i) by granting non collateral, interest-free loans of US$15,000 to $20,000 to entrepreneurs at the ideation stage; and (ii) by facilitating contact between entrepreneurs and potential investors. However, for this type of funding to exist, there must be grants to cover processing and support costs and to disburse the funds.
- **Crowdfunding**[121] takes the form of grants and can cover the need for working capital and pre-seed funds for Senegalese start-ups. This type of participatory financing, often referred to as "crowd-equity", also can cover more substantial capital requirements –– from $US200,000 to $1 million – if it is in the form of equity participation. In Europe, crowdfunding generated € 5.3 billion in 2015 and has doubled every year since. However, the emergence of such platforms in Senegal[122] is hampered by the nonexistence of a legal and regulatory framework.
- **Business angels** have the potential to meet seed funding needs as well as to provide precious mentoring. Recent research shows that start-ups supported by business angels are at least 14 percent more likely to survive for 18 months or more after funding and to hire 40 percent more employees than those without support[123]. However, in Senegal, although informal deals have been made, no network has been formally structured among local individuals who possess the capacity to invest up to tens of US$ thousands in start-ups. The one exception is the Women Investment Club, created in 2018 to structure a business angels' network dedicated to support female entrepreneurship. Facilitating the long-lasting emergence of such clubs would require technical assistance comprising awareness-raising and training programs, such as through exchanges with peer countries in similar contexts.

Seed and venture capital (VC). Funds that usually take start-ups' minority shares in the range of US$100,000 to $500,000 have been few in Africa and to date have focused on only a handful of countries[124]. Even though some capital-risk investment funds have begun to emerge in Senegal, none yet has been able to finance a significant number of start-ups at the seeding stage. The key obstacle is the inadequate incentives (such as management fee subsidies or subscription to capital) to attract these funds to this type of very risky tickets. The only existing investment fund likely to take investment tickets that are low enough to meet the expectations of start-ups is Teranga Capital, which is more oriented towards SMEs in traditional sectors and digital finance. International funds, such as Partech Ventures and Orange Digital Ventures, have started investing at the Series A level, but remain focused on Anglophone countries

121 Crowdfunding is the use of online platforms to collect funds from many persons.

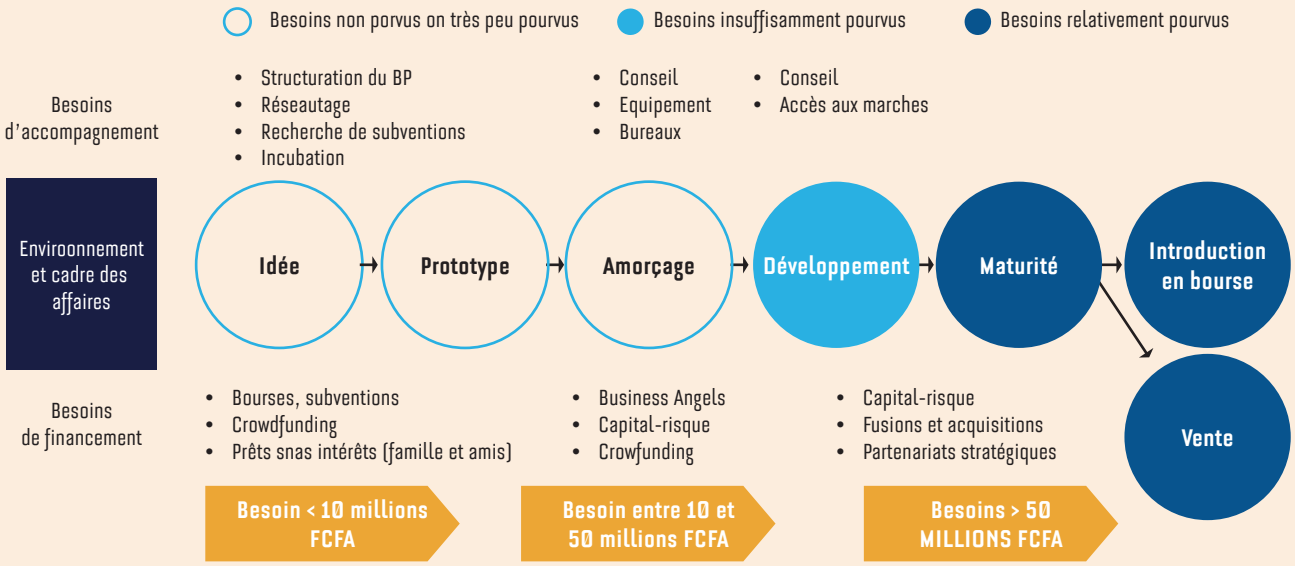
122 COFINA and Kisskiss bankbank. 2017. *Bilan et recommandations pour le développement du financement participatif en Afrique de l'Ouest.*

123 Third Way. 2017. *The Rise of the Angel Investor: A Challenge to Public Policy*.

124 Partech Ventures. 2018. *Annual Funding Report* –as quoted by Quartz Africa. 2018. *Startup Venture Funding Jumped More than 50 Percent in Africa Last Year to a Record High* by Yomi Kazeem. Available here.

Box 9. Senegal's Digital Development Fund: Vision, Strategy, and Expected Results

In line with the Emerging Senegal Plan (PSE) and its second implementation plan (PAP2), the Government of Senegal intends to promote an innovative and value-creating digital industry by establishing a Digital Development Fund (*Fonds de Développement Numérique, or FDN*).



Benchmarking six funds in other countries generated several lessons for the FDN:

- Interest in covering all stages of digital SMEs' development;
- Possibility of expressing strong ambitions, if the anticipated public investments are substantial;
- Importance of choosing the fund governance method.

Key FDN objectives are:

- Promote the development of a culture of innovation and entrepreneurship;
- Facilitate the creation and development of innovative enterprises;
- Strengthen the technical and managerial capabilities of digital SMEs;
- Strengthen the digital SME financing ecosystem;
- Promote an incentive environment for digital SMEs and for investments in the digital sector.

This strategic framework establishing FDN makes it possible to address the needs of digital SMEs at different stages of their existence, from ideation to maturity.

The FDN funding strategy based on a combination of institutional funding sources and an implementation roadmap already have been developed. An assessment of expected impacts also has been conducted, showing that, for an envelope of 100 billion FCFA over 5 years (investment and operating costs), the FDN would:

- Attract up to 47.5 billion FCFA from the private sector in the digital ecosystem;
- Generate a turnover of 166 billion FCFA from the companies benefiting from the funds;
- Generate a turnover of 59 billion FCFA in the national economy;
- Create 5,400 jobs throughout the country;
- Generate 58.1 billion FCFA in tax revenues for the State. Source: Performances Group, 2018.

Source: Performances Group, 2018.

(Kenya, Nigeria, and South Africa, all of which have a proven track record of successful digital transformation). Other capital investment funds in Senegal are more focused on mature companies in traditional sectors.

Overall, to promote the rise of such alternative financing mechanisms, some degree of public intervention is essential. Recognizing this challenge, GoS has already taken important catalytic steps in this direction. Public instruments dedicated to seed financing, under which the State does not substitute for private capital but paves the way

for it, have been recognized as one keystone of the economies that have been able to foster the emergence of a critical number of successful start-ups. Such was the case in Israel and its Yozma Fund, and France and its Public Investment Bank. In the case of Senegal, in 2016, through the Sovereign Fund of Strategic Investment *(Fonds Souverain d'Investissements Stratégiques,* or *FONSIS),* GoS provided significant support to the emergence of the country's first seed fund, Teranga Capital, by becoming one of its first shareholders. In early 2018, a new strategic initiative to enhance entrepreneurs' access to financing was launched though a special Entrepreneurship Fund, *Délégation Générale à l'Entreprenariat Rapide pour les Femmes et les Jeunes (DER),* which reported directly to the Presidency. In less than 1 year, DER already has invested 17 billion FCFA (approximately US$29 million), reaching nearly 22,000 beneficiaries and impacting more than 500 communes. One of its key priority areas is digital entrepreneurship. Its annual financing envelope was recently announced to increase from 1 billion FCFA to 3 billion FCFA. or approximately US$5 million. Moreover, Digital Senegal Strategy 2025 provides for the creation of a Digital Development Fund *(Fonds de Développement Numérique,* or *FDN)* to be "the catalyst of a high value-added digital ecosystem in Senegal" by providing early stage financing (from the ideation to maturity phase). However, the operating and financial models for FDN are yet to be implemented.

3. TOWARDS A THRIVING DIGITAL ECONOMY IN SENEGAL

A. Enhancing Digital Economy Governance and Regulatory Framework

The focus of this section is on how to reinforce the foundations of a vibrant and successful digital economy in Senegal through improved governance and strengthened regulation and competition.

1. Governance Framework

It is necessary to stimulate the right conditions to strengthen the institutional framework that enables effective coordination and strategic steering of the government's policy on the digital economy. The multiple delays in implementing the recommendations of the Digital Strategy SSN2025 can be partly explained by the complexity of Senegal's institutional architecture and governance of its digital sector. As elaborated in Section 2.A and as diagnosed by the SSN2025 itself (Articles 55 and 57), the sector is burdened by a multiplicity of entities, each with specific, and sometimes competing, prerogatives and a lack of leadership in strategic management. These obstacles are primarily political and appear to seek to consolidate the Internet market around existing operators by slowing and complicating the entry of new players. While some of these difficulties have been partially overcome, most persist and are a matter of great concern for the sector's future.

It is imperative for MCTPEN to take a more proactive role in driving broad digital transformation of the government by (a) effectively taking charge of the government policy in the digital arena; (b) closely coordinating with key implicated line ministries and agencies; and (c) taking proactive steps to address the institutional fragmentation and lack of a clear regulatory framework for steering and coordination as well as capacity shortage within the Ministry itself.

Two initiatives are recommended to address the lack of sectoral coordination and steering and to strengthen the institutional and governance framework of the digital economy in Senegal:

- **Approve a decree establishing an improved strategic and institutional framework for the sector** aimed at enhancing coordination, monitoring and synergies of public digital development projects and at strengthening the role MCTPEN plays in promoting and implementing this coherent digital vision of the government. More specifically, the GoS should consider implementing the SSN2025 recommendation (Articles 189-196) to establish an Interministerial Committee presided by the Prime Minister or the President to provide strategic direction to government's digital initiatives (similar to the institutional models adopted by some advanced countries, such as Estonia[125], France[126] or Singapore[127]). As per SSN2025 Article 193, this high-level interministerial entity could be supported by a Technical Committee (and/or its Permanent Secretariat) anchored at MCTPEN to offer technical and operational support to the implementation of key projects and initiatives (as is the case in Israel[128] or Singapore).
- **Stimulate the effective functioning of the National Digital Council** (CNN) that has de jure been established, but de facto is yet to start operating; CNN comprises private sector and civil society actors, whose advisory role will facilitate national consensus and mobilization of all to give the digital sector a driving role in the transformation of other socioeconomic sectors.

2. Regulation and Competition

Since the broadband infrastructure is the foundational element of the digital economy and will remain a critical driver of its growth in the coming years due to the saturation of mobile telephony, it is paramount to further strengthen the broadband regulatory framework in Senegal. Within the context of the SSN 2025, the GoS has initiated strategic legal and regulatory projects to open up the broadband sector, boost competition and attract private investment, adopting an action plan and an implementation

125 Strategic steering of digital initiatives and e-governance agenda in Estonia as well as implementation coordination of the National Digital Agenda 2020 is led by a strong and technocratic E-Estonia Council chaired by the Prime Minister and comprising three ministers (Minister of Entrepreneurship, Minister of Education and Research, and Minister of Public Administration) and five independent experts and private sector representatives. Other public institutions and experts get involved in the work upon need. The Council can also set up expert committees and task-based working groups (such as expert group on interoperability or records management, etc.) or commission specific studies.

126 In France, the DE governance model is anchored in the Prime Minister's Office with close support from the Secretary/Minister of State for the Digital Sector, charged with coordinating all work on the modernization and simplification of the State. Following 2017 institutional reorganization, strategic and operational cross-sectoral coordination of public digital initiatives is led by two inter-ministerial entities: Interministerial Directorate of Public Transformation (DITP) charged with strategic coordination and Interministerial Directorate for Digital Affairs and State Information and Communication System (DINSIC), responsible largely for implementation steering and support.

127 In Singapore, state digital agenda is also overseen by an Interministerial committee placed under the Prime Minister Office and comprising Minister in charge of the Smart Nation, Minister in charge of GovTech, Minister of Communications and Information and Minister of Trade and Industry. This committee oversees the work of the Smart Nation and Digital Government Group that is charged with implementing a recently (June 2018) adopted Digital Government Blueprint.

128 In Israel's model, strategic coordination and effective integration of various digital transformation activities under the 2013 Digital Israel National Initiative and its 2017 National Digital Program is led by the Digital Israel Bureau, a central coordination unit with a strong mandate, agile and technocratic workforce (team of 40) and a sizeable budget. Further details can be found in the National Digital Program of the Government of Israel, June 2017 (available here).

Table 11. Agenda to Promote the Digital Economy: Eleven Projects for 2018–19

Activities	Objectives	Expected Results
1. **Campaign to promote Digital Senegal Strategy 2025**	• Promote SSN 2025 among stakeholders, decision-makers, and technical and financial partners	• All actors, decision-makers, and partners of the sector have taken ownership of SSN 2025 and pledged to implement it
2. **Launch and publish Information and Digital Economy Promotion Bulletin (BIPEN)**	• Provide actors with timely information and communication on activities, achievements, and major projects of MCTPEN and the entire digital economy sector	• Visibility of MCTPEN activities, achievements, and projects improved • Attractiveness and influence of the digital economy sector increased • Communication between the Ministry and other sectoral actors enhanced
3. **Update and share project portfolio of Digital Senegal Strategy 2025**	• Ensure the steering, implementation and monitoring/evaluation of SSN2025 projects	• SSN2025 project portfolio updated • Dashboard to pilot SSN2025 set up • Mechanisms to implement and monitor/evaluate SSN2025 defined
4. **Organize digital promotion caravans**	• Overcome isolation and digital exclusion of the remote populations and socio-professional categories of target areas by promoting digital access and distribution everywhere and for all, building capacity, and promoting uses	• Digital isolation of remote rural areas mitigated • Remote and disadvantaged populations digitally included • Digital culture more effectively popularized
5. **Establish an overarching coordination structure, such as Digital Economy Permanent Secretariat, to ensure effective coordination and strategic steering of the government's digital initiatives**	• Overcome duplication, silos and mismanagement of strategic digital initiatives of the government, while maximizing synergies in pursuing comprehensive and cohesive joint digital economy agenda	• New lean and effective institutional framework created based on best international practices • Coordination, alignment and strong ownership of programs, projects and activities reinforced • Clarity of public initiatives for private sector and international partners/donors achieved • Ease in securing funding established
6. **Ensure the adoption of digital strategies in priority sectors based on strong cross-sectoral coordination and alignment of these initiatives**	• Promote economic and social transformation through digital distribution in the priority sectors identified in the PSE second implementation plan, such as Agriculture, Education, Health, Transport and Infrastructure, Security & Governance, etc.	• Strong synergies created among digital ecosystem actors, decision-makers, and stakeholders in sectors concerned • Penetration of digital solutions and services increased in targeted sector activities • Volume of digital contributions to productivity and growth of national economy strengthened
7. **Establish framework for synergy and development of digital promotion initiatives**	• Synergize different digital promotion initiatives • Establish a platform for consultations and dialogue among stakeholders • Set up institutional, technical, and financial support mechanism for these initiatives	• Draft order validated and signed • Project portfolio updated • Support program shared and validated
8. **Organize national forum on employment and digital entrepreneurship**	• Identify and synergize all digital entrepreneurship promotion initiatives • Set up system of institutional, technical, and financial support for these initiatives	• Good digital entrepreneurship employment practices identified and shared • Digital entrepreneurship training program defined and validated • Mechanisms to set up and operationalize entrepreneurship and digital promotion support fund shared
9. **Launch President's Award for Digital Innovation**	• Stimulate creativity and innovation in the digital economy sector • Support and promote digital innovation activities	• Senegalese digital know-how promoted • Innovation support fund operationalized

Activities	Objectives	Expected Results
10. **Establish a Permanent Consultation Framework between State and actors in the digital ecosystem**	• Establish climate of exchange and constructive dialogue between decision-makers and actors in the digital economy sector	• Hold two biannual meetings between ministry and ecosystem actors • Hold annual meeting between the government and ecosystem actors
11. **Evaluate and reactivate international cooperation and partnerships in digital economy**	• Create new momentum for partnerships and fruitful, sustainable cooperation in the digital economy sector	• Partnership actions assessed, and prospects identified • New partnership framework established • Platform drawn up for consultations, dialogue, and exchanges with partners • Key projects of Digital Senegal 2025 strategy shared
12. **Hold international conference on digital economy taxation**	• Adapt current fiscal framework to the realities of the digital economy to counter erosion of tax bases generated by specificities of digital enterprise business models and tax optimization strategies	• Characteristics and specificities of the digital economy reviewed • Business models of digital enterprises shared • Tax optimization strategies presented • Adapted tax rules proposed

Source: DPENP/MCTPEN.

schedule. The first five projects include *(i)* revision of the Telecom Code (accomplished), *(ii)* elaboration of the text to set up the CNN (accomplished), *(iii)* study evaluating options for a digital development (accomplished), *(iv)* financing start-ups in the digital domain (in process), and *(v)* launching a tender to manage and market the surplus capacity of the state optic network infrastructure currently managed by ADIE (in process). It is necessary to cement early achievements and finalize main implementing decrees of the new Telecom Code, while strengthening the ex-ante asymmetric regulations. Completing the adoption of a new legal framework governing the digital economy sector will expedite the coherent development of broadband Internet.

In this context and in view of the need for asymmetric regulation to address high current concentration of the telecom market and related market segments, this assessment recommends that MCTPEN take the following measures:

- Ensure that sufficient obligations are assigned to actors with significant market power, particularly specify essential facilities, correct the bottlenecks (such as the international gateway), and increase the equity of access conditions, specifically for MVNOs;
- Reduce the regulatory burden for operators that lack significant market power;
- Strengthen regulation and opportunities to share infrastructure and to access alternative infrastructure (such as the ADIE fiber optic network).

It also is essential to restart the process of granting and extending 4G licenses to global operators as well as starting to experiment with 5G. As elaborated earlier, the development of the mobile network in Senegal has experienced a major disruption from the non-transparent and non-competitive process of awarding a 4G license, which has resulted in market distortions and significant delays in 4G deployment across the country. Other operators are still negotiating with the State to obtain their 4G licenses, with this limitation of broadband access being particularly stifling for smaller operators, preventing them from participating in the market. The democratization of the Internet and its increased penetration will be only possible with an appropriate strategy of the acceleration of 4G coverage throughout the country, including the granting of 4G to all operators and the experimentation with 5G. Thus, it is critical for MCTPEN to extend 4G throughout the country, promote universal access and competition, and take measures to reduce mobile broadband prices.

To achieve these objectives, key recommendations are as follows:

- Appoint an independent Negotiations Committee to extend 4G licenses to operators that hold a **Global** System for Mobile Communications (GSM) license; launch, conduct, and conclude transactions with them and thus enable access to the spectrum in the bands of 1800, 700, and 800 MHz at transparent and nondiscriminatory prices;
- Consider anchoring this committee in MEFP (presided by the SG MEFP) and including among its members a Technical Advisor (MEFP), Cabinet Director (MCTPEN), ARTP representative, and President's Office (Special Advisor to the President) or Prime Minister's Office representative;
- Ensure that the committee is backed by an independent Board (investment bank or individual transaction advisor supported by a 4G technical expert).

B. Strengthening Five Building Blocks of the Digital Economy

1. Digital infrastructure

Fiber-Optic Network

The main objective is to pool national public alternative infrastructure within a patrimonial company and entrust its management, maintenance, and marketing to a competent private operator. The completion of these reforms is critical to enable Senegal to optimize the use of considerable digital infrastructure assets at its disposal that can only be fully leveraged through real competition resulting in lower prices, improved quality, and diversified innovative offers by new digital actors. To foster this competition, the national broadband network could be completely shared between public and private operators, becoming more dense and capable of accommodating new entrants.

To achieve this, it is recommended to undertake the following measures:

- Effectively implement the new management and public-private partnership (PPP) model to optimize the use of ADIE's public digital network;
- Identify and establish an appropriate governance structure (creation of a patrimonial company mandated to hold the public fiber optic infrastructure on behalf of the State);
- Recruit, through an international tender, a private partner to manage, market, and maintain this infrastructure on transparent, nondiscriminatory, and competitive conditions.

Frequencies

It is important for MCTPEN to launch a reconfiguration of the management and pricing of the frequency spectrum, considered as another major prerequisite of the successful development of the mobile broadband market. The growth of IoT and other advanced digital technologies in Senegal depends on the adequate allocation and pricing rules of the frequency spectrum, both of which are also critical to competitively develop 4G as well as to reduce the digital divide. Since current frequency pricing rules do not encourage an efficient use of the spectrum (due to high fees and not taking into account the type of actors and geographic areas in which these scarce resources are used), it is consequential for MCTPEN to adopt a more liberal regime of spectrum trade and/or refarming. Freer trade would offer greater flexibility in spectrum use (especially for non-dominant operators) and reduce the demand for new frequencies.

The following actions are henceforth recommended on spectrum management and allocation:

- Spectrum management
  - Review the cost calculation structure and adapt the frequency fee calculation method linked to the growth of high-speed data services;
  - Apply a use or sharing policy, under which a licensed spectrum not used by the main spectrum holder is made available (availability could be accomplished through frequency leasing and/or a secondary use policy).
- Spectrum allocation
  - Assign additional spectrum for 4G services, possibly in conjunction with existing license renewals and for fixed wireless broadband (800 bands);
  - Facilitate the reorganization of frequencies, the reallocation of mobile bands among services, and auctioning;
  - Assign unlicensed spectrum for public Wi-Fi use and grant on-demand authorizations to facilitate the experimentation and launch of expected innovations (industrial, scientific, and medical, or ISM through frequencies 868 and 433 MHz used for IoT).

Digital Switch-over (DSO)

To propel Senegal into the era of digital broadcasting, the government should undertake measures to complete the delayed transition to digital terrestrial television. This digital switch-over transition will significantly change the audiovisual value chain, while ensuring the satisfaction of the increasing demands of actors in the audiovisual landscape, whose services are geared towards multimedia and mobile or interactive uses.

In this context, it is recommended to accomplish the following:

- Audit and develop the frequency spectrum of the digital dividend and its use (4G deployment, rural high speed/broadband, or HD) with the operators;
- Conduct an inventory of the national frequency plan; take proactive strategic decisions for its optimal, and long-term management; and prioritize the allocation of spectrum corresponding to the digital dividend, thus deploying an affordable broadband service offer in rural areas;

- Engage a technical working committee to study and oversee the transfer on neutral, transparent, and non-discriminatory conditions of the DTT infrastructure built by Groupe EXCAF TELECOM under its concession contract, but also the transfer of infrastructure and technical personnel in charge of broadcasting, to the national public channel (Radio Television of Senegal).

2. Digital Government

User Focus

The first step in the direction of a secure and efficient digital government is to ensure that, in consultation with various user groups, a user-centric vision is defined in the Government Digital Transformation Plan. The shared infrastructure must be better exploited and secured based on the architecture of a reference enterprise. There is need for a well-designed governmental interoperability framework, activated by a government digital orchestrator or an enterprise service bus (ESB).

Overall, the digital government must be developed based on a user-centric electronic service design –– whether citizen or enterprise. With a clear service transformation plan, user group participation must be a requirement at all stages of the design, implementation, and deployment of all digital government services, as this will guarantee their higher use rate. The government entities should offer then their sectoral services through the digital Government's common portal (gouv.sn) to harmonize the interfaces with a unified and coherent design bearing the trademark of the GoS online sites.

More structured and participatory sessions with representatives of the user categories should be planned with a precise timetable. Various actors including civil society, academia, and the private sector must be consulted to enrich the application-building process with their respective experiences and expertise. Finally, a robust government-wide Omni channel access strategy must be developed with established standards and guidelines to facilitate broad access to all digital services in the public administration.

Business Process Change

The simplification of government procedures should be improved through digitalization, thus contributing to an overall administrative reform program. Building on this reform program and on the current infrastructure of information services developed by ADIE (TeleDAC and others), a service transformation toolkit could be developed. This toolkit could encompass the standards, guidelines, and procedures to simplify, optimize, and redesign services as well as to orchestrate the integration of services on a common or similar government service bus, following the certifications (ISO) and other related standards. Moreover, it is highly recommended to use of a unique national ID identifier based on biometric digital identity cards to facilitate single sign-on during online services transactions. Finally, given the breadth and depth of the work accomplished on the enabling legislation of the digital government, it is warranted to promptly review and update all statutory acts governing the activities on the ground.

To achieve tangible progress in dematerialization, it is essential to complete the government's interoperability framework with a law and/or set of decrees for all digital government services based on a single-point-of-contact concept, which informs a national interoperability aggregator. To operationalize this concept, a government-wide ESB and open application programming interfaces (API) are recommended to ensure seamless integration of services. Extending the secure government network to rural municipalities and other government entities is important and will enable the underserved population to benefit from decentralized government services, possibly through one-stop-shops connected to ministries and central entities in Dakar.

MCTPEN needs to develop a government data management plan. The plan could cover data operations, data management and storage, data governance, enabling architecture, and appropriate technology as well as integration in the GoS interoperability framework. To develop an optimized view of these registers with the interoperability database interface, master data registers should be evaluated to determine how they are structured, developed, and managed to identify overlaps and gaps. This evaluation would result in an incremental improvement in the national public data system, including future links to new data generation nodes and information flows from connected objects (IoT). The use of smart card technology in the e-ID system also would enable government entities to validate the authenticity of the master data. In the era of open and big data, it is in the mutual interest of the State and the users to establish and respect data-sharing protocols.

Related laws governing access to government information must be promulgated and their implementing decrees prepared. With these decrees, associated government open data policies or open government data (OGD) must be developed and published, giving government entities the necessary framework to make data publicly available. The mandate and the associated roles and responsibilities of government entities, such as ANSD, must be subsequently reviewed and to adhere to OGD principles.

Cybersecurity

At this stage, it is essential to accelerate the implementation of the cybersecurity strategy (SNC2022). Numerous actions (49 were planned for implementation only in 2018) and priority projects of the strategy should be reconsidered and streamlined to avoid accumulating delays and backlogs. The prioritization criteria could include the following four axes:

1. Strengthening the legal and institutional framework of information systems security (INFOSEC)[129];
2. Protecting the State's critical information infrastructure (CII);
3. Strengthening cybersecurity capabilities and knowledge, including by the creation of higher education facilities for cybersecurity;
4. Participating in regional and international cybersecurity efforts.

With this new implementation schedule, a more effective monitoring and evaluation (M&E) function needs to be institutionalized to ensure the strategy's completion by target dates, its alignment with international instruments and its adequacy in the face of new technological advancements. It is recommended to establish a national cybersecurity authority as a permanent entity (under the tutelage of the Prime Minister), while also setting up centers for emergency response to computer attacks or incidents. Moreover, regional and international cybersecurity coordinating instruments, such as the Malabo Convention, must be compelled to benefit the national security of Senegal and other member countries. Finally, with the rapid development of new digital technologies, it is recommended that MCTPEN and relevant actors periodically review cybersecurity-related laws and implementing decrees.

Thus, key recommendations on the digital government are as follows:

- Develop a progressive digital government implementation plan with measurable key performance indicators;
- In consultation with user groups, ensure that a user-centric pan-government vision is defined in a Government Digital Transformation Strategy;
- Provide a shared and secure infrastructure based on the architecture of a reference enterprise;
- Adopt a well-designed governmental interoperability framework, activated by a government digital orchestrator or ESB connector;
- Ensure the transformation of the Digital Government by adequate human resources;
- Establish a national cybersecurity authority as a permanent entity to effectively implement the cybersecurity strategy;
- Strengthen the contribution of digital ecosystem actors in Senegal (academia, civil society, private sector) to promote a wide adoption of digital government services by users.

3. Digital Financial Services

The uptake of DFS in Senegal depends highly on regulatory reforms at the national and regional levels. For instance, adopting a regulation for fintechs (regional level) is important in light of the market development dynamics described in Section 2.D. Moreover, given an increasing number of fintech initiatives in Senegal and the WAEMU region and a growing number of e-money users, it is relevant to define the conditions for the exercise of fintech activity.

Another required regulatory measure relates to reducing the threshold amount set by the BCEAO Regulation on the promotion of banking and the use of non-cash payment methods from CFA 100,000 (US$160) to CFA 50,000 (US$80) on the national and regional levels, respectively. This ceiling, introduced by BCEAO in 2002 and derived from the broader 2002 Directive on the same subject, aims to encourage public administrations to further digitize government payments. This measure enabled the digitization of wages of all civil servants in the WAEMU region that are greater than or equal to 100,000 FCFA (US$160). More than 15 years after the adoption of this (once effective) regulation, amid the surge of various digital payment instruments, this threshold should be revised downwards to increase the number of eligible digitized transactions.

Moreover, the "Agent Banking" business model requires a reform at the regional level of the regulatory framework for agents in the banking and microfinance sector. The World Bank has suggested key possible revisions on the regulation of agents, in particular concerning the banking law that would imply simplifying the licensing requirements and setting rules for the microfinance sector. It is proposed to reform the regulation and supervision of intermediaries in banking operations in two phases. The first phase would involve aligning the bank agent regime with that of e-money distributors by integrating the specificity of a complete banking service offering. The second phase would modify the current Banking Law of Senegal[130] (specifically, Articles

129 Based on Presidential Instruction N.003/PR of January 2017, the government wants to define the organizational structure for steering and implementing Senegal's cybersecurity program.

130 Senegal Banking Law N° 2008-26 of 28 July 2008 is available here.

38 and 105) to establish a proportionate regime by creating a model that would allow the existence of "super agents" and "simple agents" with proportionate requirements through a risk-based approach. The requirements for "simple agents" could be consistent with those set out in BCEAO Instruction 008-05-2015 on Electronic Money Issuers[131].

Four additional reforms could be envisaged at the national level in Senegal:

- **Adopting a Digital Payment Interoperability Regulation.** Given the existence of payment initiatives in closed loops (Orange, YUP, TigoCash, Wari), it is advisable for Senegal to promptly join the regional interoperability project led by BCEAO and GIM-UEMOA by adopting a regulation on the interoperability of platforms that could later evolve into a regional regulation. This measure would encourage a better organization of interoperability in Senegal and in the long term would increase the volume of financial transactions.
- **Finalizing and updating the law on electronic transactions to account for digital signature.** It is recommended that the GoS proceed to update the 2008 Law of 25 January 2008 to include a clear and functioning digital signature framework in Senegal. This update would allow electronic certification providers to issue certificates to financial institutions, such as Orange Money Mobile Finance for smart contracts.
- **Setting requirements for the cost of access to the telecom infrastructure through USSD for financial services.** Despite the liberalized access to USSD codes, the cost, as previously indicated, remains largely unaffordable to most providers. The GoS should thus push this USSD reform a little further to ensure that telecom infrastructure access tariffs are reduced or capped, particularly for financial services. This measure could resemble the BCEAO provision on free banking for selected digitalized services adopted in October 2014[132].
- **Enforcing the Ministerial Decree on the Digitization of Public Administration Revenue and Expenditures, supported by the World Bank Second Multi-Sectoral Structural Reform Development Policy Financing[133].** In view of the omnipresent use of cash by the GoS and generally an important role of governments in national financial operations, the Senegalese Treasury would benefit from the application of the Ministerial Decree relative to digitization of the revenue and expenditure of the Public Administration. This text, signed on November 6, 2018, defines the conditions, according to which any provider of financial services authorized according to the regulations can enter a competitive bidding process. This Decree also defines the technical specifications as well as the security, interoperability, and personal data protection requirements necessary to successfully complete digital transactions. It would therefore be important for the GoS to ensure its effective enforcement.

4. Digital Skills

The government needs to adopt a life-cycle approach to the development of digital skills in Senegal, undertaking measures ranging from the development of basic digital competencies and literacy among small children and the out-of-school youth to setting ambitious targets for graduates with advanced technical digital degrees ready to pursue technology-intensive professions. The ambition and the challenge would then consist in ensuring the inclusion of digitally-focused programs and courses throughout the entire school and vocational training system. Digital classes and practical work on computers or tablets should be generalized from the earliest years in primary school, exposing children to basic digital skills. In high schools, the focus would be on developing students' creativity and self-reliance by introducing more sophisticated courses in computer coding and knowledge-seeking techniques on the Internet, while tertiary education would provide programs developing sophisticated professional digital skills, including e-business competencies, and preparing students for technology-intensive occupations. At the same time, the Ministry of Higher Education and Research (MESR) should pursue the reforms planned to improve technical and vocational digital training, including by creating new courses that target both technicians and engineers. Efforts should also focus on an improved professionalization of training in relation to the needs of employers, particularly technology companies.

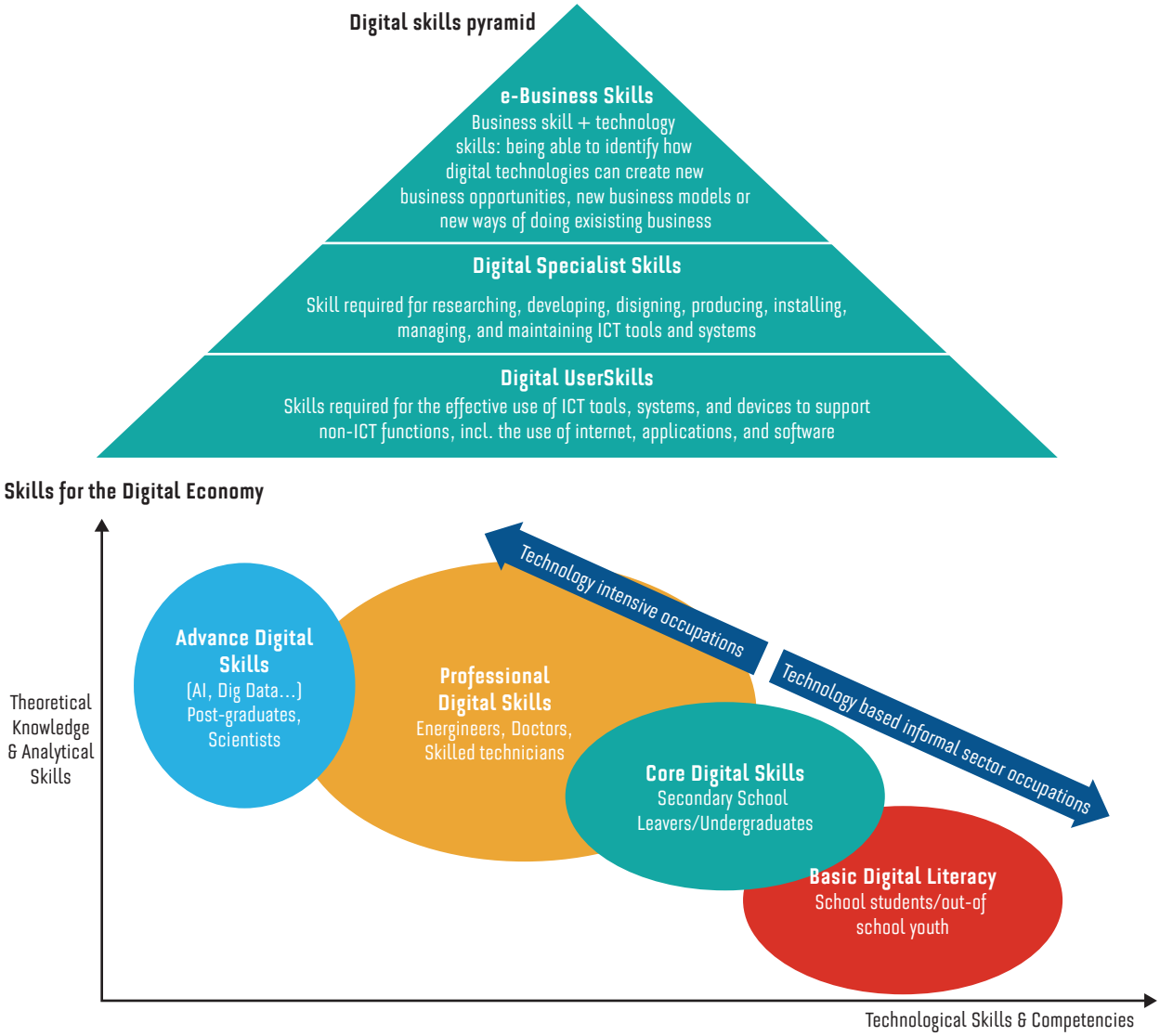
To ensure the relevance of digital knowledge and skills targeted by the education system and the supply-demand confluence, it is essential to involve technology companies in defining the digital training content and in mentoring future graduates. The education system could only be fully successful if all actors involved in the digital domain -- major technological firms, business incubators, and start-ups -- make significant contributions of their respective expertises. The Ministry of Higher Education and Research should regularly update a list of adapted training profiles. It would also be beneficial to address the current (almost complete) absence of M&E mechanisms for trainings and

131 BCEAO Instruction N° 008-05-2015 Governing the Terms and Conditions for the Activities of Electronic Money Transmitters in the Member States of the West African Monetary Union is available here.

132 BCEAO. 2014. *Banking Services to be Offered Free of Charge by WAEMU Credit Institutions*. Press Release of October 1, 2014. Available here.

133 World Bank (2018). *Senegal – Second Multi-Sectoral Structural Reforms Development Policy Financing*. Program Document. World Bank, Washington DC. Available here.

Figure 27. Digital Skills Overview



Source: WB (2017). Entrepreneurship in the Digital Economy Report.

educational programs to ensure they correspond to actual demands of each sector of the economy, including the digital economy. M&E is essential to provide decision-makers with reliable and updated data that would help define the appropriate policies for the development and provision of necessary skills and capabilities to sustainably implement Senegal's digital transformation.

A regular analysis of market demand could provide an opportunity to predict which new digital training courses are required. Such evaluation and planning would increase the chances for fresh graduates to promptly find employment opportunities, when they enter the job market. It would, above all, involve preparing and training technicians to ensure an adequate flow of employees to digital companies, many of which are obliged to recruit engineers, who they subsequently have to reorient and assign to specialized technicians' tasks. Hiring at a higher level than necessary generates costs that could have been avoided. At the same time, however, it is also vital for the Ministry in charge of the state employees *(Ministère de la Fonction Publique, de la Rationalisation des Effectifs et du Renouveau du Service Public)* to strengthen and create new training targeting excellence. Such intense training programs would foster the emergence of talented employees, whom the country needs to contribute to technological innovation and create new products adapted to local needs.

There is also a significant need for relevant ministries[134] to focus on entrepreneurship training. The digital courses

134 Such as the Ministry of Employment, Professional Integration and Workforce Intensification; the Ministry of Vocational Training, Apprenticeship and Craft; the Ministry of Higher Education and Research; and the Ministry of Civil Service, Workforce Rationalization and Public Service Renewal.

should be designed to offer training in the use of software for human resources management, accounting, finance, and project management, especially for young graduates wishing to embark on start-up projects. The higher education and training ecosystem should also be provided with an adequate infrastructure that could (a) host experimentation and incubation activities; (b) foster the emergence of new projects, tools, and technologies; and (c) test emerging concepts and applications. This infrastructure is important in secondary cities and rural areas, where support structures are generally less available or developed than in Dakar. Several universities in Senegal, such as the University of Saint-Louis, are creating their own integrated incubators, while others have expressed their desire to do so, which is a promising development.

It is also judicious for the MESR to consider creating an incentive and dialogue framework to enhance the capacity of private digital training providers to complement training programs offered by public education institutions. The private digital training providers perform a mission of general interest by complementing public services that are not necessarily able to meet the needs and expectations of market players, particularly technology companies. Thus, the government could consider letting these private centers access the same benefits (such as VAT exemption and dedicated lines of subsidies, for example), as classical training structures.

5. Entrepreneurship and Digital Innovation

The GoS should continue to improve the overall business climate and pursue dematerialization initiatives that inevitably facilitate the ease of doing business for all enterprises, including start-ups. Key areas, where continued reform efforts are warranted and the impact on start-ups might be more tangible, include the following:

- Modernizing tax administration by generalizing electronic payments to all users (digitizing tax collection would be particularly beneficial for digital start-ups, whose operations are, by definition, conducted online);
- Strengthening imports control should enhance the formalization of companies in a country, where more than 90 percent of businesses are considered informal and are perceived as unfair competition by young and innovative enterprises;
- Ensuring effective, unbiased, and transparent operations of commercial courts could help the country address persistent governance ineffectiveness, particularly in enforcing contracts, which has consistently been one of the worst sub-indicators in Senegal's DB scores;
- Continuing dematerialization of administrative procedures could greatly benefit start-ups, which continue to waste much time in traditional administrative circuits, for example, to access the Trade and Personal Property Credit Register; obtain authorizations, including building or occupancy permits; or prepare administrative documents, such as police clearance or conformity certificates.

Legal and Regulatory Environment for Start-ups

Finalization and effective implementation of a dedicated regulatory framework conducive to the development of start-ups with the help of participatory consultative approaches is required to increase their success opportunities. Various countries have adopted a broad range of policy models to establish an enabling regulatory environment that promotes start-up entry and growth through direct and indirect support mechanisms. Widespread measures include different forms of tax incentives (including corporate income tax exemptions and tax incentives for start-up investors), public support/sponsorship of incubators, direct financial support (grants, investments, wage reimbursement), and even facilitated access to special visas for entrepreneurs[135]. Despite certain recurring provisions, these and other support mechanisms vary significantly among countries. The diversity of support mechanisms ranges from special access to patents (India) to simplified customs procedures (Tunisia), to innovation-focused tax incentives (Brazil).

In this context, the GoS should maintain the strong momentum to adopt an appropriate legislative and regulatory framework for start-ups in Senegal. The government should carefully analyze the advantages and drawbacks of various options before defining and legislating a model best suited to the local context. Doing so by using innovative consultative approaches can ensure broad-based consensus among relevant stakeholders, thorough and comprehensive quality review of proposed measures, and their subsequent effective implementation. Adopting participatory methods, such as Policy Hackathons, which involve ecosystem actors in jointly formulating regulatory texts, would help ensure that the regulations adequately reflect start-ups' current and projected future needs. In fact, enforcement of start-up laws in many start-up friendly nations, such as France, India, Israel, Tunisia, and the US, has resulted largely from several months of consultations

135 Peter Cook (2019). *Comparative Analysis of Start-up Regulations*. World Bank, Washington DC *(forthcoming)*.

among legislators, entrepreneurs, civil society, and investors.

Market for Innovation in Government Services (GovTech)

In view of the challenges peculiar to digital start-ups, the government could take specific measures to ensure their access to public markets by deploying innovative approaches to public procurement. A traditional challenge with public procurement is that it is based on the premise that the administration, as the client or procuring party, can specify the details of the solution it needs based on terms of reference and technical specifications. However, this ex ante definition of the solution may not be conducive to transformative innovation. An alternate approach consists in the client or procuring party defining its problem or challenge and pitching this challenge to start-ups or innovators for them to conceive a solution through a range of innovative approaches, such as business reverse pitches[136] and hackathons. Such innovation in government procurement can open potential new markets to start-ups, while stimulating the development of efficient solutions tailored to the new needs of public administrations and stimulating domestic innovation by increasing the demand for innovative products and services. Apart from the 2011 UNCITRAL Model Law on Public Procurement and the 2014 European Union public procurement directives mentioned above, other examples of similar regulations include those in the United Kingdom, which has been very proactive in introducing a "start-up mentality" to the government using GovTech accelerators and PPP funds, and in France, which launched the "beta.gouv" initiative[137] to help public administrations become more entrepreneurial and build their own incubators to generate new ideas about public services innovations. The GoS is aware of these developments and has launched its own hackathons. This approach would have to be systematized and institutionalized to bring tangible results and reach its twin objectives of modernizing public administrations and public service delivery, while supporting local entrepreneurs.

Support Programs and Structures

Strengthening entrepreneurship support structures needs to become an area of continuous government focus in Senegal. The role of the State may vary from simply facilitating the creation and operation of such structures and supporting them with in-kind (land and buildings) or financial resources to consulting them on shaping the entrepreneurship policy agenda and partnering with them to innovate in government services provision. More specifically, Senegal can revitalize its support to further strengthen existing structures, such as CTIC Dakar, and invest in new infrastructure, such as the proposed Dakar Innovation Hub and the Digital Technologies Park (*Parc des Technologies Numérique, or PTN*) planned in Diamniadio.

- **Being a critical asset for the country's digital entrepreneurial ecosystem, CTIC Dakar needs to find new dynamism.** CTIC's suboptimal performance is a concern for the State, which has a high stake in this historic incubator via four public entities[138] that sit on the incubator's Board of Governors. For the structure to recover its national and regional leadership in digital entrepreneurship, it would need to streamline its governance framework, invest in the professionalization and skills of its staff, and strengthen reporting mechanisms to ensure more transparency in its use of public resources.
- **Developing a new Dakar Innovation Hub is an important new initiative.** Under the leadership of DER, the Dakar Innovation Hub (currently in the development phase) could play a leading role in creating a successful digital cluster in Dakar. The hub is expected to regroup main ecosystem actors by locating digital start-ups close to major technology companies and offering them quality technical support. The hub also can assist existing hubs and accelerators by providing them with access to well-connected offices and availing financial resources for their professionalization and services diversification.
- **Digital Technologies Park is another project under SSN2025, aimed at ensuring closer linkages among research, industrial development and innovation.** Under the tutelage of MCTPEN, PTN has been conceived as part of the digital city project in new Diamniadio urban pole meant to serve as an innovation and knowledge hub in the West Africa region and boost manufacturing and logistics services development in Senegal. PTN will include an incubation program and will boost the development of the digital activity cluster close to, on the one hand, new scientific and research facilities (such as Amadou-Mahtar-Mbow University specializing in STEM and National Center for Scientific Computing) and, on the other hand, the industrial park and private sector companies.

Generally, for all support structures, a key focus should be their professionalization through strengthening the

136 "A reverse pitch is an event during which organizations pitch a business plan to entrepreneurs. If done right, a reverse pitch is a win-win for both sides. Entrepreneurs get funding and partnership opportunities, while organizations/larger companies get help with creatively and innovatively solving some of their pressing problems". https://quickbooks.intuit.com/ca/resources/pitching/reverse-pitch/.

137 For further details about the UK and French examples refer to http://www.public.io/ and to https://beta.gouv.fr/apropos/, respectively.

138 Ministry of Finance, the Economy and Planning (administrative supervision); Ministry of Communication, Telecommunications, Post and Digital Economy (technical supervision); National Authority for the Regulation of Post and Telecommunications (ARTP); and the government's IT Agency (ADIE).

Box 10. Afric'innov Program to Strengthen Innovative Entrepreneurship in Africa

Afric'innov is a program launched by the French Development Agency *(Agence Française de Développement – AFD)* together with a consortium of African incubators and French structures involved in innovation and supported by WBG. The program came to existence, as a result of a dual observation:

- The development of entrepreneurship requires an ecosystem, in which the structures (incubators, accelerators, fablabs) supporting the entrepreneurs must play a central role;
- The success of supported entrepreneurs depends on the quality of services offered by these structures.

Thus, the mission of Afric'innov is to strengthen and further professionalize innovative entrepreneurship in Africa. To achieve this objective, Afric'innov has developed four main areas of intervention:

1. Training support teams. The professionalization of structures requires training teams who are entrusted with support. The specially designed e-program meets this need by organizing in-person training sessions and/or by providing training contents online.
2. Developing digital tools and a resource center dedicated to entrepreneurship. Several tools will be used to support entrepreneurs. For example, Afric'innov deploys a software dubbed "Software as a Service" (SaaS) with all the features required to monitor an incubate. This software will be accessible through the Africinnov.com platform, which seeks to be the professional network of support structures in Africa.
3. Establishing the innovative mechanism for seed financing. Afric'innov provides entrepreneurs assisted by certain support structures that are members of the network with advances that are refundable without interest. These advances are meant to finance or subscribe to the seed funding mechanism(s) implemented by each Supporting Structure for Innovative Entrepreneurship (SAEI) locally.
4. Providing a labeling mechanism for support structures based on a benchmark. The main objective of the Afric'innov label is to place at the disposal of structures that support entrepreneurship in Africa and to all ecosystem stakeholders a "seal of approval" on their activities. The Afric'innov label will facilitate the identification of the structures that provide quality support.

Source: Afric'innov.

skills of their personnel and their capacity to provide adequate services. As the success of entrepreneurship support structures depends largely on the quality of their human resources and services, it is critical for them to develop ad hoc training curricula for all team-members. A good reference can be the toolbox designed by the World Bank *InfoDev* in the *Afric'Innov* program. Members of the management team should have excellent knowledge of business, finance, and innovations, and be comfortable with economic, financial and marketing modeling as well as with legal aspects and digital communication concepts. Moreover, to enhance and optimize developers' support, it is necessary to improve or design complementary tools and services beyond those already existing in each structure. An example would be to establish contacts with mentors as sources of high value added advice.

To perform effectively, support structures must have sustainable business and financial models and ensure an increasing share of self-financing. Support structures are constantly seeking financial balance to ensure their development, growth, and sustainability. The main challenge is that their direct customers -- start-ups -- are also generally short of financing. As for any business, generating profit takes time. Hence, at least in the initial phases, public or donor funding may be effectual to support the early years of operation of such accelerators and incubators. Whether they benefit from public or philanthropic support in the form of grants, subsidies, or access to free resources (building, office space, connectivity), it is essential for these support structures to establish a sustainable income-generation model going forward. Traditionally, revenues can come from client start-ups and entrepreneurs in the form of *(i)* rental payments for accommodation or use of premises/resources; *(ii)* remuneration for provided services; or *(iii)* sales of other value-added services to third parties (expertise, advice, training, event organization and management). Another form of remuneration that has begun to develop across West Africa is the acquisition of equity in the capital of incubated start-ups, or a success fee as a percentage of an income increase of the supported start-up. These are win-win partnerships. If the start-up company improves its economic performance, the incubator receives part of the growth benefits.

Finally, coordination among actors of the entrepreneurial ecosystem in Senegal will need to be strengthened. Combining energies and mutualizing the costs and accomplishments of existing support structures would provide more comprehensive support to start-ups, when they face serious difficulties. In the Senegalese ecosystem, most support structures are still in their early stages. They are struggling to mobilize sufficient resources to ensure effectiveness by assembling a competent multifield team, equipped and attractive working premises, and a network of committed partners. Such necessary coordination should also

improve the capacity of these support structures to conduct advocacy initiatives by mobilizing and pooling their skills and networks. Incubators and accelerators can champion this action by lobbying or by finding necessary relays with state authorities, technical and financial partners, professional organizations, and civil society. All in all, coordination can be best achieved by establishing a network of entrepreneurship support structures in Senegal, as well as more broadly across West Africa, and internationally.

Access to Early Stage Financing

In attracting private capital, the stumbling block lies in the regulatory framework of capital investment funds. Senegal is one of the few countries in the region that has integrated in its domestic law the provisions of the WAEMU Uniform Act on Investment Companies with Closed-end Capital (Uniform Law n°2007 15: 19/02/2007) and the Directive for Preferential Tax Treatment (New Uniform Act: 05/05/2014). However, the latter never came into force because it is the responsibility of BCEAO to issue instructions to enforce both the Law and the Act. As a result, in the absence of an effectively implemented national legislation on the equity industry, the funds intended to be established in Senegal must be set up under the regional common corporate law but are not subject to the control of any regulation agency. Furthermore, even if the WAEMU Uniform Act were to be applied, it would not provide an appropriate legal framework for the equity industry, as it does not follow best international examples.

In this context, a new legal and regulatory framework at the national level is required to ensure the legal certainty and to properly regulate equity funds in accordance with international best practices. This framework should stipulate clearly the conditions of approval and supervision of equity fund administrators and should be backed by a revised tax regime. For example, going public through initial public offerings (IPOs) should be subject to a more favorable tax regime that would encourage companies to list on the regional stock market. The GoS therefore could take the initiative to propose revisions to the WAEMU Uniform Law.

Equity funds on the seed investment ticket (less than US$500,000) should be offered additional incentives. They could include, for example, subsidizing the management fees of fund administrators, providing support services (through experts) alongside the investment, or subsidizing capital contributions. These incentives could be implemented, for instance, by the FDN based on the model of the publicly-owned BPI-France *(Banque Publique d'Investissement)* Fund[139], which has already facilitated the emergence of 80 seed funds (from 0 active seed funds prior to BPI's intervention). At the same time, FDN's own operationalization and financial model should be established through relevant implementation decrees. One financing option could be to allocate part of the revenue from the government's new Special Contribution of the Telecommunications Sector (CST).

The growing importance of alternative financing mechanisms warrants targeted technical assistance and appropriate regulatory measures. Facilitating the emergence of viable business angels' clubs calls for tax incentives specific to this type of investment as well as thoroughly designed technical assistance to potential angels consisting of awareness and training programs. Peer exchanges for learning purposes could, for example, be based on the Lagos Angel Network model, which was set up thanks to exchanges of good practices with European business angels' clubs. For crowdfunding, the main unblocking factor is establishing a legal and regulatory framework dedicated to this mechanism based on the French and North African models, which were devised in close collaboration with crowdfunding platforms themselves.

C. Projects Proposed to Accelerate Senegal's Digital Economy

Based on the conducted analysis and extended consultations with key stakeholders, primarily MEFP, several strategic projects have emerged as critical in accelerating digital transformation of the entire economy and some selected sectors. They thus require close attention and concerted efforts of public authorities and are described below.

1. Digital Identity

Maximizing e-ID Potential

The digital identity potential of extending access to basic services to vulnerable and excluded population and fostering the development of a broad digital economy is yet to be fully unleashed. As elaborated in Section 2.C, the use of the

139 BPI-France Investissement is a private equity and venture capital firm, owned by the State of France, specializing in fund of funds and direct investments. For direct investments, the firm specializes in seed, startup, growth capital, emerging growth, early to late venture, middle market to mature stage, and buyout transactions in small and medium-sized companies. For fund of fund investments, it seeks to invest in private equity funds, venture capital funds, growth capital funds, mezzanine funds, and turnaround funds, national funds, regional funds of France or in international funds with a link with France.

biometric identifier in Senegal is currently limited. Some public administration gateways use the biometric ID card, but more often many basic data with multiple identifiers end up being created for one individual (tax, medical insurance, family allowance register). In the private sector, while some operators (such as telecom providers) have access to the ID card database to perform verifications, these are not based on the biometric data and overall little use is made of the digital identity for economic and business applications.

In this context, it is important to facilitate establishing an appropriate legal, institutional and technical environment conducive to a unified digital identification system with a focus on personal data protection and linkages with the digitization of civil registry inputs. Preceding in-depth analytical work is warranted to help identify and fill the gaps in the legal, statutory, and institutional frameworks existing in the digital identity field. Following a review of existing texts, the adoption of new laws that accord with key findings and best international practices of personal data protection and database management (including PKI) would create an enhanced legal and regulatory environment. Other recommendations include *(i)* adopting the architecture and governance of operational mechanisms of the biometric identification system as part of services to the population on a par with health, social welfare, and finance; and *(ii)* harmonizing standards and protocols to enable interoperability of the national digital identification systems.

Leveraging E-Signature and PKI

Another important element essential for a variety of digital economy applications in Senegal is commissioning PKI. PKIs ensure security for a wide range of digital applications because they provide a technological layer that confers probative value on data and business transactions. For example:

- **Decentralization:** PKIs ensure that the various levels of the government communicate reliably by eliminating all fraudulent activities due to the traceability of all interventions.
- **Financial inclusion:** Individuals can open a paperless account with a guarantee of uniqueness, thus facilitating secured access for rural populations
- **Confidence and corruption control:** Digitization controls corruption, including among levels of a decentralized government, by creating confidence in the financial messages and instructions for bank transfers.

GoS is working on establishing a national PKI, the absence of which acts as a major impediment for the government and businesses and also explains the delays in generalizing the use of digital signatures in Senegal. Currently, the National Cryptology Commission is licensing some service providers and suppliers of cryptology services (GAINDE 2000, SenTrust, GIM/WAEMU, and others) and coordinating the work of the Steering Committee to establish a PKI. COPIL-PKI was set up under Presidential Decree n°01038 on January 29, 2016 to design and implement a national PKI in Senegal. ADIE has been designated Project Manager. COPIL-PKI is expected to finalize soon a Unified Document defining its work program. The commission's legal subcommittee is working on the outline of the PKI governance and administration – a work that is expected to culminate with the adoption of legislative and statutory instruments necessary to make the system operational. However, it has been noted that COPIL-PKI is facing difficulties in mobilizing the budget required to develop and implement the PKI-related capabilities and skills needed by ADIE, which issues electronic certificates.

To summarize, the critical issues for the generalized use of digital signatures in Senegal are:

- **Address the lack of clarity on PKI governance,** notably, regarding the institutional mandates of stakeholders expected to develop and manage PKI;
- **Ensure further investment in PKI** to take advantage of the first achievements and extend the system;
- **Improve the performance of ADIE,** the legal issuer of electronic certificates;
- **Urgently set up operational bodies by the COPIL-PKI** to deploy PKI among stakeholders and users to facilitate the establishment and popularization of the digital signature.

Proposed Intervention Framework

Several areas of reform could be envisaged by the GoS to improve the coverage of the biometric e-ID, enhance the sustainability and security of the underlying system, and maximize its uses.

- **Extend the e-ID coverage to ensure universal inclusion and improve the robustness and reliability of the system to enable all citizens to access a unique ID number and to create special solutions for those without birth certificates.** It also involves enhancing the sustainability of the system by investing in digitizing the civil registry to capture the population flow, and informing, in real time, the national identification system.
- **Establish the legal and institutional framework to define the architecture and governance of the digital identification system.** This framework would help capitalize on e-ID potential by developing synergies among public services and the private sector. This framework

would also clarify institutional roles and facilitate coordination to achieve the following objectives:

- Properly manage the foundational identity[140] and keep it technologically linked to other functional identity references;
- Initiate the harmonization of standards and protocols to enable interoperability of the national digital identification systems (health, social welfare, finance, others);
- Develop action plans for the private sector to effectively integrate the digital identity system;
- Keep strengthening the legal and regulatory frameworks to ensure the protection of data and privacy.

- **Update the legal and regulatory framework of the PKI system to facilitate establishing a national PKI management policy.** To bolster the use of e-signatures by the private sector, one option could be to integrate electronic certificates in the chip of the national ID card. It would also be judicious to set ambitious objectives in the renewed performance contract for ADIE's issuance of electronic certificates.

2. Digital Taxation

Electronic Taxation (e-Tax) Project

The e-Tax project, which is among the first initiatives of Senegal's public administration for a "cashless" economy, has proven feasible for large businesses and is currently being extended to SMEs and the public. In its current format, this web application was initiated by the DGID as a service to taxpayers to enable them to declare and pay their taxes online. All taxpayers subject to tax under the General Tax Code can use the e-tax system. For taxpayers under the jurisdiction of the Department of Large Businesses *(Direction des Grandes Entreprises – DGE)* of MEFP, the use of e-tax is already mandatory, while the roll out to SMEs, microenterprises and the public is under preparation. To facilitate this process it would be necessary to update the regulatory provisions, adopt a change management plan and a public communication campaign,

A summary of the actions necessary to implement the e-Tax project is presented in Table 12.

3. Digital Port

Located at the westernmost point of Africa, the autonomous Port of Dakar (Port autonome de Dakar – PAD) is perfectly positioned at the crossroads of the major maritime routes of the Atlantic Ocean. Senegal benefits from a strategic coastal location, which places it close to the European and American markets (at the intersection of all main sea-lanes between them) and makes it a gateway for some of the landlocked countries in West Africa sub-region, such as Mali. The PAD is one of the largest deep-water seaports along the West African coast with its deep-draft structure and 200-meter-wide access channel allowing round-the-clock access to the facilities. It is now the third largest port in the region (after Abidjan and Lagos) and the 9 th largest port on the continent. For Senegal, it serves as an economic lifeblood, accounting for 95 percent of the total tonnage of the country's imported and exported goods.

However, the PAD is facing multiple challenges, including congestion, largely related to the lack of coordination

Table 12. E-Tax Project

Description	Objectives	Project Leaders/ Stakeholders	Prerequisites
The e-Tax project has proven its feasibility for large businesses, it can now be extended to all taxpayers. The administration operates several databases on companies and taxpayers. It thus is possible to crosscheck and synchronize these data and apply algorithmic methods to step up fiscal controls.	Extend the scope of e-taxation to SMEs; then set up an application to generalize pre-filed declarations Synchronize and cross-check public data produced by other administrative bodies Oversee algorithmic management of tax inspections; Apply algorithmic management of tax inspections in 2019–20	• MEFP • MCTPEN • Electronic payment stakeholders (banks and EMEs)	Regulatory acts to apply the 2012 Law to extend online filing obligations to SMEs, microenterprises, and the public Long-term public communication campaign

Source: Report authors.

140 "Foundational identity" provides information to one unique and centralized identifier (ID) and biometric data relating to a registered person (fingerprints, eye iris, face image). Several functional identities can be derived from this foundational identity, all of which relate to the same ID and each having specific attributes relating to the functional domain concerned.

Box 11. Leveraging the Expertise of an IT Industry Leader to Strengthen Digital Taxation

In the context of maximizing finance for development (MFD)*, the World Bank has invited Microsoft, a founding partner of the Digital Development Partnership (DDP), to share the firm's expertise on the options for strengthening digital taxation in Senegal. Microsoft conducted a digital maturity assessment and prepared a report with recommendations aimed at reinforcing Senegal's digital taxation vision, thus improving tax collection efficiency, increasing citizens' satisfaction, and boosting the overall efficiency of the whole tax system. Key extracts and findings are presented below (with further details available upon request).

DGID already has been credited with multiple digitization initiatives:

- E-tax: An operational solution consisting of online tax submission, currently reserved for major taxpayers. DGID is examining the possibility of opening this service to SMEs.
- M-Tax: A mobile application (under development) to extend tax operations to the majority of taxpayers familiar with the unstructured supplementary service data (USSD) and SMS services.
- My Personal Space: A web interface that will help the taxpayer to make her/his tax declaration, pay taxes, and monitor the processing of contentious petitions.
- Digitization per batch: Mass digitization of physical documents to extract financial information.

In this context, Microsoft resorted to the digital maturity model for taxation to evaluate Senegal's current tax system in relation to international best practices of digital transformation for tax services. The model measures the status of the three main pillars over a diverse set of enablers, scored on a scale of 1 to 4 (with 1 = *lagging* and 4 = *best practice*):

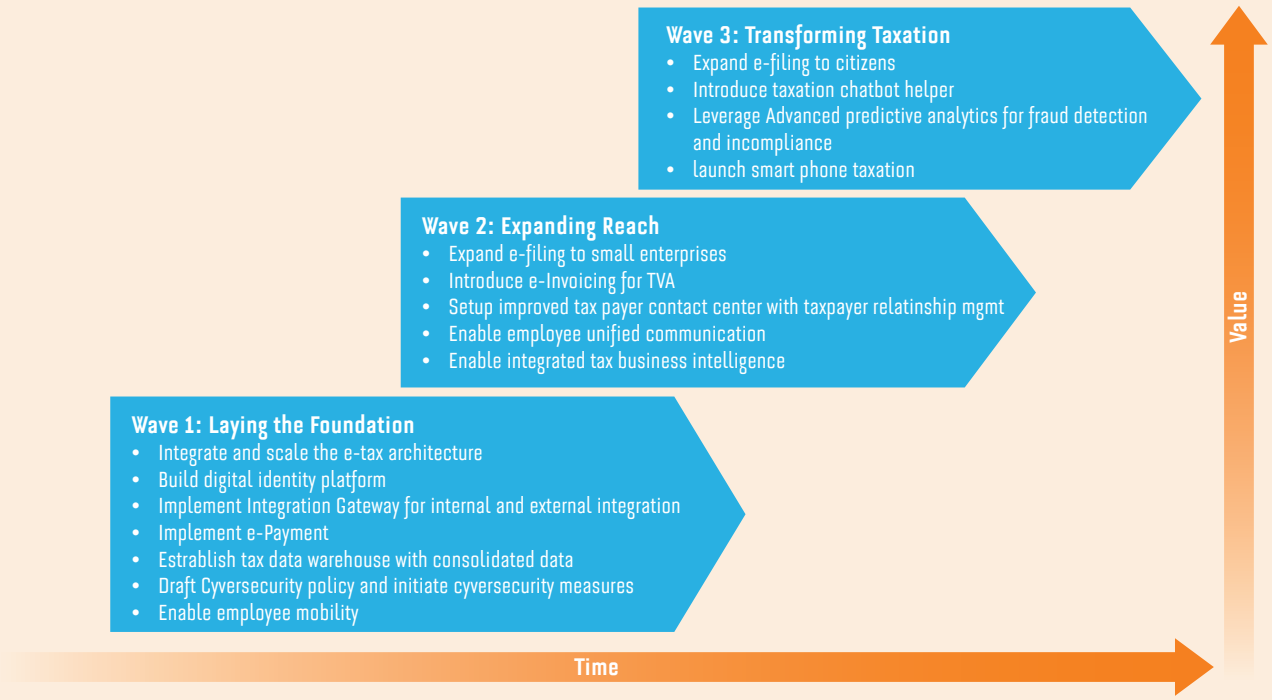
1. Engage taxpayers pillar focuses on improving taxpayers' experience through new dematerialized services and is measured over 3 capabilities and 18 enablers;
2. Optimize operations pillar rationalizes internal processes with the new process controlled by the data and is measured over 3 capabilities and 11 enablers;
3. Empower tax officials, through which employees have the tools required to make the right decisions and provide the best service, is measured over 3 capabilities and 7 enablers.

Based on the initial results of the maturity assessment and consultations, a roadmap has emerged to empower DGID with a plan to address the gaps and advance the transformation to e-Taxation. Seven key initiatives have been highlighted as essential to build the foundation for the transformation. These are as follows:

1. Digital identity: One of the key unified registers to identify and authenticate taxpayers (individuals or businesses);
2. Gateway to integration: Integration between the internal systems of DGID and other government entities
3. Electronic deposit integration and scale-up: Integration and scalability of various electronic deposit initiatives to meet the scheduled and future workloads;

4. Electronic billing: Major initiative that may create new opportunities to improve compliance through the electronic declaration of bills by taxpayers;
5. Cybersecurity: Prerequisite to extend access to dematerialized services;
6. Productivity and mobility of tax services staff;
7. Advanced analytics of statistics.

High-Level Roadmap for e-Taxation



Source: Microsoft.

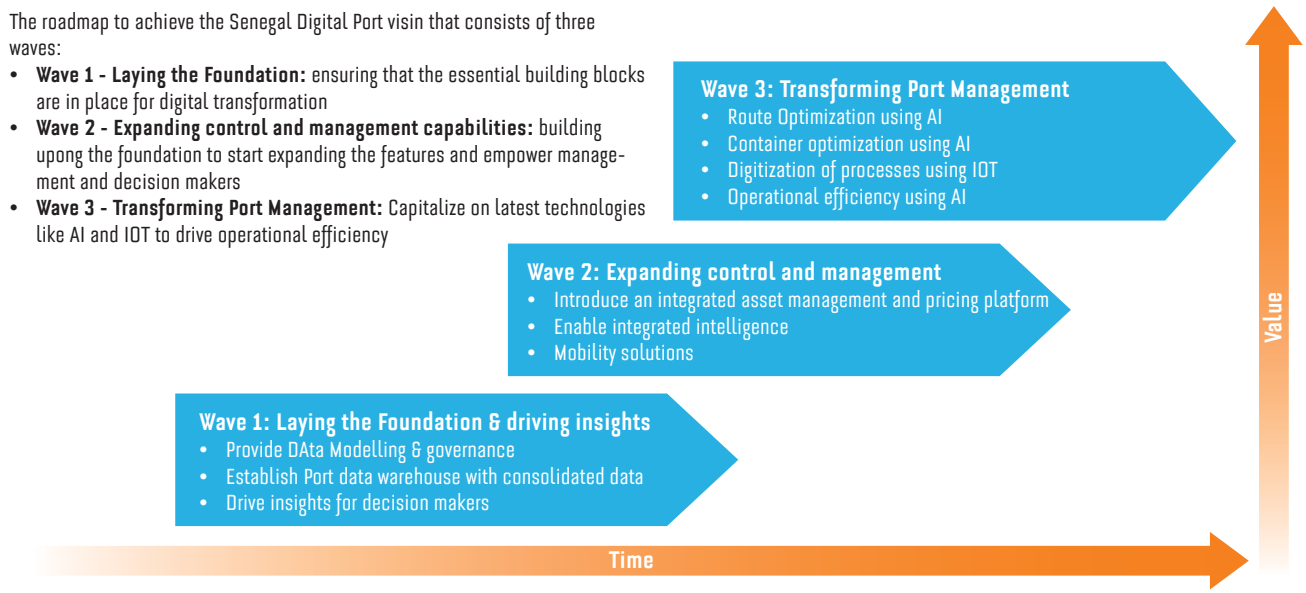
* Under the MFD approach, the WBG helps countries maximize their development resources by drawing on private sector solutions, expertise and financing to address and fund development challenges, thereby reserving scarce public financing for those areas, where private sector engagement is either suboptimal or unavailable.

between its key stakeholders. The PAD is located within the city of Dakar, causing serious difficulties of access and movement. Any container traffic increase would adversely impact the whole city and the port. The congestion within the port space hinders the performance of some terminals and leads to isolated behaviors of stakeholders seeking to take advantage of the situation to the detriment of the PAD. For example, because the monthly rent for a square meter of storage is much lower than the rent in town, the available areas within the PAD are overused, resulting in port premises being transformed into warehouses, reducing movement areas, and contributing to the congestion of the port itself. Moreover, the congestion can be also explained by a mismanagement of usage zoning and delayed investment in productivity tools, which have slowed handling services, configuring the space, and addressing the lack of land reserves.

Against this background, establishing an integrated Port Management System is necessary to address these challenges through five areas of intervention:

- **Land zones use and control:** These are clear revenue opportunities for the PAD. Regulations and laws must enable free and dynamic pricing based on supply and demand. An integrated, data-driven management system can monitor and manage land zones and drive insights to take decisions based on rental prices elsewhere, transportation costs, and storage costs.
- **Drive insights to management:** Interconnections between systems and databases are highly needed to provide real-time data and insights for the overall management, accelerating decision-making on critical business issues, reducing manual interventions and minimizing risks of mistakes. This initiative would also tackle fake weights and optimize the processes, using a solution such as "data warehouse" and "machine learning" to drive insights from trends and patterns.
- **Technology tie:** A win-win situation is to be reached with Dubai Ports (DP) to drive faster processing. It is therefore recommended to leverage IoT solutions to capture

Figure 28. High-Level Roadmap for the E-Port Project



Source: Microsoft 2018.

Table 13. Modernizing PAD Management

Description	Objectives	Project Leaders/ Stakeholders	Prerequisites
PAD, economic lifeblood of Senegal, is facing multiple challenges related to poor governance and lack of coordination of stakeholders' activities. Establishing an integrated information system and adopting paperless payments are critical to effectively address these challenges.	Digitizing and orchestrating port processes to become a one-stop-shop system to manage goods with a platform that integrates interoperable interfaces of all PAD stakeholders.	Ministry of Fisheries and Maritime Economy/Department of Ports and Inland Maritime Transport MEFP PAD stakeholders	Adopt regulatory and institutional measures enabling PAD to take a leading role in the digital transformation process
	Establishing a one-stop-shop for e-payments for port transactions that will in turn necessitate additional measures making it mandatory to shift to full paperless payments for all port procedures.		
	Deploying a centralized electronic transaction system that will aim to save energy by avoiding overconsumption and anomalies relating to distribution network and waste.		

Source: Report Authors.

weights from DP directly without extra validation. Doing so would entail DP's permitting Senegal to enter DP's zone. Reducing processing time could be an appropriate incentive for DP to provide entry access.

- **Physical security:** The PAD needs more efficient and smart ways to manage access to authorized people and vehicles, while monitoring the access control of unauthorized ones. This security system needs to be integrated with the central port management information system (MIS).
- **E-Payment:** The establishment and adoption of a one-stop-shop for electronic payments for port transactions will help ease the workflow for businesses and accelerate goods handling. In addition to the digital system, regulatory measures may be required to make the use of e-payment mandatory for the PAD's transactions.

Based on these recommendations, the following roadmap was prepared in partnership with Microsoft to leverage the latter's industry expertise and capitalize on the WBG MFD approach.

Overall, a digital transformation of the PAD, which has a strategic importance for Senegal and the whole region, can help address a significant number of its challenges, while giving rise to new opportunities. A recommended three-stage roadmap can assist in phasing the implementation of the integrated port management system necessary

to advance the transformation (summarized in Table 12). The technical viability of the project is high, as most of the PAD's stakeholders already have appropriate information systems. The difficulty will be mostly related to the PAD's capacity to play a leading role by ensuring the adoption of the required new statutory provisions.

4. Additional Initiatives

Three additional initiatives are proposed to transform other aspects of the digital economy in Senegal.

Identifying Assets and Creating the National Digital Land Registry

Identifying assets and creating the national digital land registry are essential to establish an asset-based tax system. The objective is to remove the impediments to developing rural land assets, therein paving the way for agricultural actors to access bank financing.

In Africa, the shortcomings noted in the reliable identification of assets constitute a significant blockage to land ownership. Land ownership is often random because of the absence of an up-to-date land registry. Land may have several owners at the same time, each holding a paper in support of her/his claim, especially in the context of overlapping general and customary rights. This chaotic process often leads to serious conflicts resulting in recurring land scandals. These scandals put the entire country in a position of land insecurity, which is detrimental to the business climate. Nevertheless, each plot has a unique number, an owner, and a value. The cadaster supports the function of protecting ownership rights and property taxation by public authorities.

With the technological advances brought by geomatics and geographic information systems (GIS), the land registry can become more reliable. The challenge lies in digitizing the physical assets covering urban and rural land, buildings, farmland, and all geo-localized infrastructure and related activities. This digitization opens new perspectives and the emergence of new societal concerns for spatial and urban planning, environment, and sustainable development.

Unique National Digital Address Registry for Housing and Economic Activities

The national digital address registry for housing and economic activities is the essential complement to assets identification. National digital addressing is a vital component of modernizing all land distribution and management services. All large companies and governments manage files containing the addresses of their customers, suppliers, and staff. The development of home care services as well as of direct marketing and e-commerce creates an increasing need for the use of addresses. The public security corps, police, firefighters, and express mail services, among others, need to be able to very quickly locate the places, in which they are required to intervene. It therefore is essential to have a base of geo-located addresses, which can be obtained only through digitization.

The challenge of establishing national digital addresses depends on the scale of the task and the need to link digital mapping techniques with manual field surveys. The task entails being able to find oneself on a map and is accomplished by using a geocoding technique that consists of taking an address (street name, house number and/or apartment number) and associating it with the latitude and longitude to locate the place.

Beyond the purely technological aspects, this process is complicated by the cultural aspects related to the notion of addresses, as well as by the multiplicity, or nonexistence, of the name(s) that currently designate a particular location. In this context, it is necessary to engage

Table 14. Identifying Assets and the National Digital Land Registry

Description	Objectives	Project Leaders/ Stakeholders	Prerequisites
Identifying assets and the national digital land registry are priority levers to establish an asset-based tax system. In addition to increasing State revenues, this initiative would remove impediments to the development of rural land and assets, and open access to bank financing.	Digitalize cadaster and introduce a unique and reliable identifier. Create coherence between built parts of land assets and parts used for economic activity. Tax estates reliably and systematically. Potentially create thousands of jobs (related to geomatics services).	MEFP Ministry of Territorial Governance, Spatial Development and Planning *(Ministère de la Gouvernance Locale du Développement et de l'Aménagement)* DGID	Preliminary feasibility study. Consultation with stakeholders.

Table 15. Unique National Digital Address Registry for housing and economic activities

Description	Objectives	Project Leaders/ Stakeholders	Prerequisites
This initiative is essential for the development of e-commerce and logistics services. The initiative is expected to create thousands of new jobs as well as to provide vital support for public safety and home care services.	Reliability to develop logistics services. Reliability to harmonize public water, electricity, postal, telephone, and television service files. Creating thousands of jobs in distribution and home delivery of goods and services as well as jobs for SMEs specialized in mapping and geomatics.	Ministry of Territorial Governance, Development and Land Planning Ministry of Infrastructure, Land Transport and Development SENELEC, Senegalese Water Co. (SDE), Post Office	Determine budget for the preliminary study that integrates regulatory prerequisites; consult with stakeholders; develop a communication plan.

Source: Report Authors.

Table 16. Leveraging New LPWAN Networks

Description	Objectives	Project Leaders/ Stakeholders	Prerequisites
Senegal must anticipate the arrival of new LPWAN networks (Sigfox, Lora, Nb-IoT) and free up the frequencies to enable investors to install these networks and deploy experiments and proofs of concept across various sectors, such as health, education, agriculture, transportation, logistics, security, etc.	Place this technology at the service of the masses. Create new IoT professions; promote creation of start-ups in this field. Reach productivity gains in production activities. Control the standards used in IoT equipment,	MCTPEN ARTP Ministry of Higher Education and Research Universities Support structures (incubators, accelerators, etc.) Start-ups	Release frequencies for experimentation and deployment of services.

Source: Report authors.

institutional actors to obtain an accepted and operational system. These actors include specialized public entities (ARTP, ADIE, National Agency for Territorial Development *(Agence Nationale de l'Aménagement du Territoire – ANAT)*, Municipal Development Agency *(Agence de Développement Municipal – ADM)* and Local Development Agency *(Agence de Développement Local – ADL)*); tax and land registry services; postal services; municipalities; public security services; roads and transport services; sanitation managers; and telecommunications, water, and electricity networks.

Digital Potential for LPWAN Networks

It is through the rapid adoption and development of experimentation that solutions adapted to the Senegalese context can be designed with local skills. Youth initiatives and innovations must be supported, and young people encouraged to create start-ups.

Given Senegal's high Internet penetration rate and existing digital infrastructure capacity, the next logical step in connectivity and new innovative services is to leverage Internet of Things (IoT) solutions. The first IoT experiment in Senegal was the project AKILEE by Senelec, in which a real-time electricity consumption data of subscribers were analyzed and advice given on energy saving. The same applies to the automatic water consumption statement by the Senegalese Water Company *(Sénégalaise des eaux – SDE)*. It is critical for Senegal to anticipate the arrival of new low-power wide-area networks (LPWANs), such as Sigfox, Lora, and Nb-IoT, and take the necessary measures to free up the frequencies for them. Releasing the frequencies will enable investors to install these networks and deploy the experimentation and proofs of concept. The stakes are high for health, agriculture, livestock, transportation, distribution, and security.

4. CONCLUSION

The Government of Senegal is prouder than ever to display its ambitions in the digital economy that has a strong potential to benefit the entire Senegalese economy and society. The Digital Senegal 2025 Strategy (SSN2025) and the second implementation phase of the Emerging Senegal Plan (PSE) aim to stimulate the digital transformation of all socioeconomic sectors and to position Senegal on the international scene as a regional digital leader. In the years to come, the digital economy is expected to be one of the key drivers of global economic growth and job creation. It will also promote financial inclusion of the most vulnerable populations, reduce economic and geographic divides, and involve the population in new economic activities, helping them develop necessary skills and knowledge.

Despite this consensual vision, a common observation shared by multiple stakeholders in Senegal is related to the difficulties of implementing it. These difficulties are due primarily to the lack of clear leadership in the institutional sector governance; lack of an updated legal and regulatory framework favorable to the complete opening of the foundational broadband infrastructure sector; and lack of private sector commitment (linked to unfavorable sector regulations and inefficient competition management) necessary to maximize the financial impact – among just a few constraints.

Policy Actions to Accelerate Progress of Senegal's Digital Transformation

The findings of this report elucidate these bottlenecks to enable Senegal to take full advantage of the digital economy's dividends. The following set of foundational policy actions is recommended to remove the existing obstacles to Senegal's digital transformation.

- **Strengthen governance and institutional framework of the digital economy** and address the lack of strategic coordination by creating a comprehensive inter-ministerial steering framework (establishing an Interministerial Committee supported by a Technical Committee anchored at MCTPEN) and aligning institutional positioning of various agencies to the adopted structure to maximize synergies and complementarities among public digital initiatives and projects.
- **Regulate digital infrastructure sector and stimulate competition,** more specifically (i) finalize the adoption of the main implementing decrees accompanying the new Telecommunications Code; (ii) strengthen the ex-ante asymmetric regulatory framework by ensuring that sufficient obligations are imposed on those with significant market power to remove the bottlenecks that impede the smooth functioning of markets; (iii) ease the regulatory burden for operators that lack significant market power; (iv) reinforce infrastructure-sharing regulations and access to alternative infrastructure (such as the ADIE fiber optic network); (v) restart the process to grant and extend 4G licenses to operators with global licenses.
- **Boost the implementation of SSN2025 with respect to fiber optic infrastructure and frequencies:** A detailed implementation plan will emphasize (i) pooling national public fiber-optic infrastructure within a patrimonial company and entrusting its management, maintenance and marketing to a private operator via a public-private partnership; (ii) revising spectrum allocation and pricing rules; (iii) realigning frequencies (including the frequency spectrum of the digital dividend), while reallocating mobile bands between services and applying a policy of use or sharing under which a licensed spectrum that is not used by the licensee may be made available; (iv) allocating unlicensed spectra for public Wi-Fi use and granting permissions on request to facilitate experimentation and launch expected innovations, particularly, IoT in industrial, scientific, and medical (ISM) frequency bands; and (v) allocating additional spectra for 4G services and fixed wireless broadband.
- **Follow SSN2025 guidance as well as recommendations of pertinent internal and external studies focused on other foundational DE domains, such as human capital, finance and entrepreneurship:** More specifically, prioritize digital skills and literacy by, inter alia, generalizing digital learning throughout the entire education system, promoting the diffusion of a digital culture, and supporting private providers of digital training; boost digital financial services and financial inclusion by adopting digital payment interoperability regulation, finalizing the law on electronic transactions to account for e-signature, reducing the cost of access to USSD and mainstreaming e-payment across public administration; and foster entrepreneurship and digital innovation by promulgating a favorable regulatory framework for start-ups, providing backing to entrepreneurship support structures, operationalizing a Digital Development Fund, and promoting alternative seed financing mechanisms.
- **Implement the second phase of the Emerging Senegal Plan: The following elements are essential to a successful implementation of PAP2:** (i) further streamline government procedures to form a comprehensive reform with a deployment strategy and measurable monitoring indicators; (ii) proactively facilitate user groups' participation during the design and implementation phases of digital services; (iii) guarantee the interoperability of different services and develop a Government Interoperability Framework to facilitate single authentication to conduct Digital Government

service transactions; (iv) develop a Government Data Management Plan to address management, operations, safeguarding, and access to government data issues; (v) finalize Senegal's National Cybersecurity Strategy (SNC 2022) and set up a national Cybersecurity Authority to implement the strategy; and (vi) review and update all applicable legal texts.

Moreover, the digital transformation of the country will require unprecedented collaboration and coordination among the ministries and agencies, and then among the population to ensure that policies are in place and are followed to prevent the furthering of a digital divide within the country.

In addition to the above-mentioned policy actions intended to address key challenges in the foundational areas of the digital economy in Senegal, three key potential projects are recommended to accelerate digital transformation of the selected sectors.

1. Digital Identity (e-ID)

The biometric identity card already covers approximately 70 percent of the population of Senegal and provides a solid foundation for the country's digital transformation. It will be necessary to *(i)* extend the coverage of the e-ID to reach universal access and maximize its use in all areas of the digital economy (including e-commerce, telecom operations, etc.); *(ii)* strengthen the sustainability and security of the e-ID system using public key infrastructure; and *(iii)* extend to MSMEs and individual taxpayers the e-Tax online reporting module currently limited to large companies.

2. Digital Taxation (e-Tax)

E-taxation has been successfully adopted in Senegal but with a limited number of users, mainly corporate enterprises. A three-phase roadmap is proposed to empower the DGID to address the gaps and achieve three strategic objectives: (a) improve the quality of service to the taxpayer and in the collection of taxes, (b) modernize the fiscal administration, and (c) increase tax collection and reduce tax evasion.

Key implementation initiatives highlighted in this report to scale the adoption of e-taxation include *(i)* establishing a gateway to facilitate integration between the internal systems of DGID and other government entities; *(ii)* ensuring that the various electronic deposit initiatives are integrated and scalable to meet the scheduled and future work load; and *(iii)* setting up an electronic billing initiative that can create new opportunities to improve compliance through the electronic declaration of bills by taxpayers.

3. Digital Port

The Autonomous Port Dakar (PAD) is the economic lifeblood of Senegal, accounting for 95 percent of the tonnage of imported and exported goods. The PAD is facing serious operational and management challenges. Some of them can be addressed through an integrated port management system that can improve land zones use, drive insights, ease interoperability of various actors' data systems, and open opportunities to set up a one-stop-shop for e-payment transactions. A proposed three-stage implementation approach to deliver on the above actions is suggested to lay the foundation and drive insights; expand control and management; and then advance the transformation of the port.

Three additional initiatives, inspired by and fully in line with SSN2025, are proposed to cover other aspects of Senegal's digital economy, while creating jobs and boosting local SMEs that specialize in mapping, geomatics, and IoT-enabled solutions development:

1. Identifying the assets and national digital land registry;
2. Implementing unique national address plan,
3. Leverage LPWAN's digital potential.

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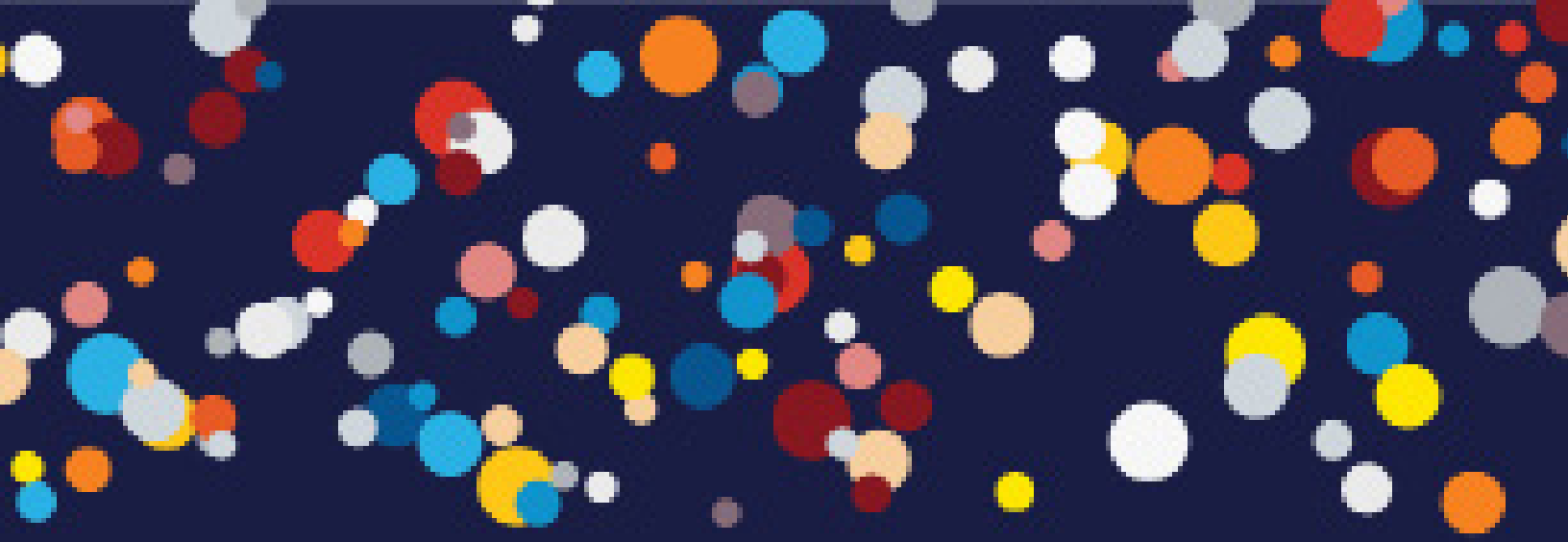

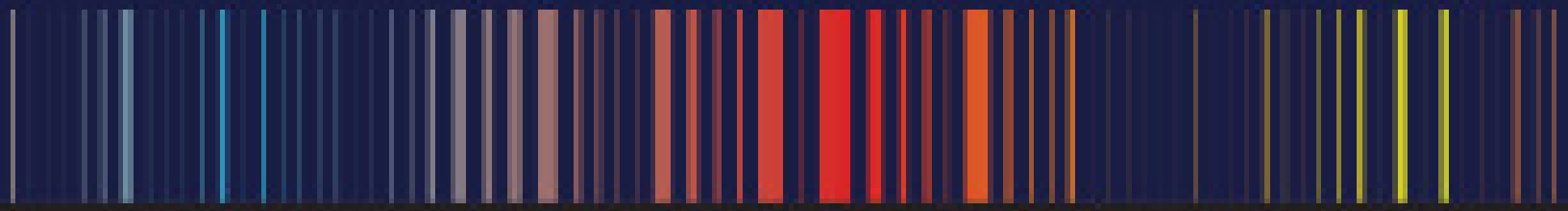

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