Cameroon Digital Economy Assessment

Country Diagnostic

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WORLD BANK GROUP
THE WORLD BANK IBRD • IDA
IFC International Finance Corporation

DE4A Digital Economy for Africa

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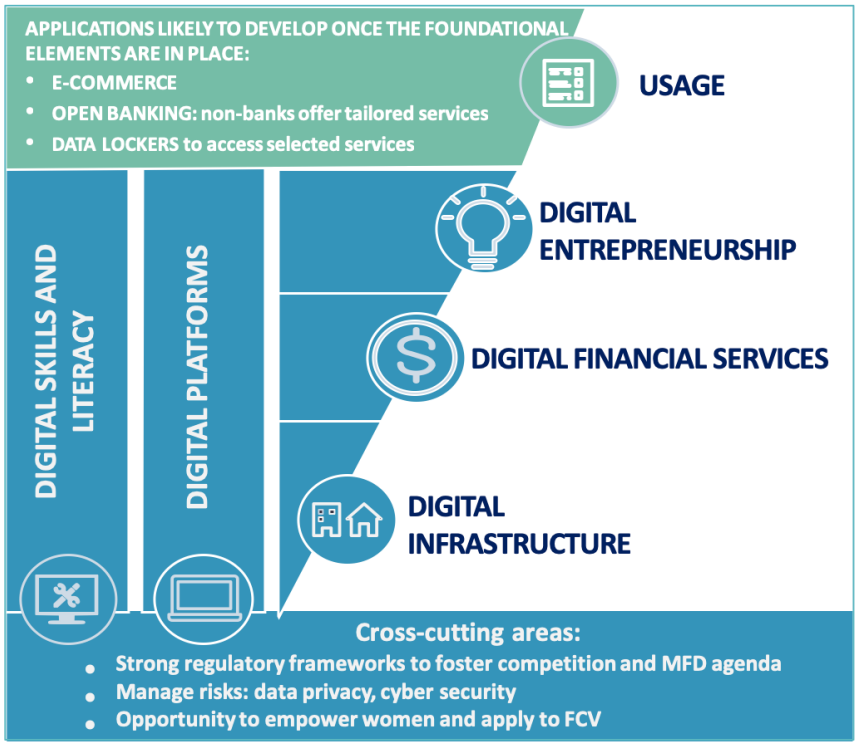
ABOUT DE4A

This assessment of Cameroon's digital economy was launched as part of the World Bank Group's (WBG) Digital Economy for Africa (DE4A) Initiative,[1] which sets out a standardized methodology focused on five key foundations. The assessment maps the strengths and weaknesses that characterize the national digital economy ecosystem (Figure 1) and identifies challenges and opportunities for future growth.

Figure 1. Five key foundations of the digital economy ecosystem



The digital transformation is re-shaping our global economy, permeating every sector and aspect of daily life—changing the way we learn, work, trade, socialize, and access public and private services and information. In 2016, the global digital economy was worth about US$11.5 trillion, equivalent to 15.5 percent of the world's overall gross domestic product (GDP). It is expected to reach 25 percent in less than a decade, quickly outpacing the growth of the overall economy. However, countries such as Cameroon still only capture a fraction of this growth and need to strategically invest in the foundational elements of their digital economy to keep pace.

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

[1] Additional DE4A country diagnostics being prepared include Rwanda, Kenya, Ghana, Nigeria, Madagascar, Mozambique, and the Seychelles.

automation. Assessing where strategic investments and interventions need to be made is a critical first step to enabling digital economy growth.

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

- *Digital infrastructure.* The availability of affordable and quality Internet, which is instrumental to bringing more people and businesses online.

- *Digital platforms.* The presence and use of digital platforms that can support greater digital exchange, transactions, and access to public services online.

- *Digital financial services.* The ability to pay, save, borrow, and invest through digital means, which is key to increasing financial inclusion and the e-commerce market.

- *Digital entrepreneurship.* The presence of an ecosystem that supports entrepreneurs, startups, and bigger companies to generate new products and services that leverage new technologies and business models, which is critical to widen and deepen digital economic transformation.

- *Digital skills.* The development of a tech-savvy workforce, with both the basic and advanced digital skills to support increased technology adoption and innovation and enable investments in high value-added services.

This report is part of WBG support to the Digital Economy Moonshot for Africa, a new and vast initiative in partnership with the African Union that calls for every African individual, business, and government to be digitally enabled by 2030. The Moonshot relies on first undertaking a diagnostic of the digital economy of select African countries and more precisely its five foundational elements. The DE4A diagnostic tool provides an integrated framework for assessing the enabling environment and level of development of the digital economy in an African country.

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

ACKNOWLEDGEMENTS

The methodology used for this assessment relied on in-country fact-finding missions, interviews and questionnaires, desk research, regional and global benchmarking, and consultations with stakeholders. In-country fact-finding missions were undertaken in March–April 2019 in preparation of this diagnostic. In addition to desk research conducted, missions were also conducted in April–June 2019 to allow for broad stakeholder consultation with the government and private sector, followed by discussions on the conclusions and findings in February 2020. The analysis presented in this paper draws on regional and global benchmarking, based on standardized indicators that form part of the DE4A diagnostic methodology. The analysis also draws on government statistics and data shared by the private sector.

This report was researched and prepared by a team from the WBG, including Yevgeniya Savchenko (Senior Economist, HAFE3), Natalia Agapitova (Senior Economist, EA2F2), Vincent Perrot (Senior Education Specialist, HAFE3), Vincent de Paul Mboutchouang (Education Specialist, HAFE3), Marieta Fall (Senior Public Sector Specialist, EA2G2), Valery Gwet Nyemeck (Consultant, EA2G2), and Thomas Djoto (Consultant, HAFE3). The report benefited from valuable feedback and thoughtful comments provided by Elisabeth Huybens (Country Director, AFCC1) and Halil Dundar (Practice Manager, HAFE3), and by colleagues who reviewed the background papers, Julia Lieberman (Operations Officer, HEDGE) and Koji Miyamoto (Senior Economist, HEDGE). Moreover, the report benefitted from feedback received from WBG internal peer reviewers, who kindly reviewed this report. Comprehensive national stakeholder consultations were undertaken in preparing and finalizing the document.

The team would like to express their sincere gratitude to the Ministry of Basic Education, Ministry of Secondary Education, Ministry of Higher Education, Ministry of Employment and Vocational Training, and the Le Réseau des Professionnels du secteur des Telecommunications, des TIC et du Numérique in Cameroon.

The Cameroon DE4A Diagnostic commissioned several background papers and builds on recent WBG country work, and these benefitted from the inputs of many stakeholders. Further to the public stakeholders mentioned, the team wishes to express its thanks to the numerous public and private stakeholders that contributed their time and effort to the elaboration of this report and the associated background papers.

ACRONYMS AND ABBREVIATIONS

AI	Artificial Intelligence
ANTIC	National Agency for Information and Communications Technologies
ART	*Agence de Regulation des Telecommunications*
ATM	Automated Teller Machine
BEAC	Bank of the Central African States
BMZ	German Federal Ministry for Economic Cooperation and Development
CEMAC	Economic and Monetary Community of Central Africa
CAR	Central African Republic
CDN	Content Delivery Network
CIABAF	Committee for the Assignment of Radio Frequency Bands
COBAC	Banking Commission for Central Africa
DE4A	Digital Economy for Africa
DFS	Digital Financial Services
EGDI	e-Government Development Index
GDP	Gross Domestic Product
GESP	Growth and Employment Strategy Paper
FTTB	Fiber-to-the-Building
FTTH	Fiber-to-the-Home
G2B	Government-to-Business platforms
G2G	Government-to-Government platforms
G2C	Government-to-Citizens platforms
GSMA	*Groupe Spéciale Mobile Association*
ICT	Information, Communication, and Technology
IDI	ICT Development Index
IT	Information Technology
INS	National Institute of Statistics
ISP	Internet Service Provider
IXP	Internet Exchange Point
M&E	Monitoring and Evaluation
MFI	Microfinance Institution
MNO	Mobile Network Operator
PE	Private Equity
RIC	*Réseau Interuniversitaire du Cameroun*
ROSCA	Rotating Savings and Credit Association
SDGs	Sustainable Development Goals
SME	Small and Medium Enterprise
SSA	Sub Saharan Africa
TRB	Telecommunications Regulatory Board
UNCITRAL	United Nations Commission on International Trade Law
UNCTAD	United Nations Conference on Trade and Development
USF	Universal Service Fund
USSD	Unstructured Supplementary Service Data
VC	Venture Capital
WBG	World Bank Group

EXECUTIVE SUMMARY

OVERVIEW OF EACH PILLAR'S PERFORMANCE

Cameroon is displaying a relatively fair but feeble performance in terms of digital infrastructure, digital financial services and digital entrepreneurship compared to regional peers (and low performance compared to more advanced countries). In the 2017 ICT Development Index (IDI) of the International Telecommunications Union (ITU), Cameroon ranked only 149 of 176 countries and was the 18th ranked country in Africa.[2] Cameroon's IDI score highlighted only relative strengths in terms of penetration of mobile telephony and international access. The diverse financial landscape features a large number of active formal institutions (454). Yet, the Cameroon market is in the startup stage for its digital financial services (DFS) ecosystem; financial inclusion in Cameroon has room for growth, and the usage of DFS remains low. Finally, although Cameroon has one of the highest rates of early-stage entrepreneurial activity, its economy ranks in the lower tier of global assessments on entrepreneurship, innovation, and competitiveness. Doing business within Cameroon involves high costs and complex procedures: Cameroon ranks 166th among 190 economies in the 2019 Ease of Doing Business, the lowest ranking among regional competitors.

The country lags behind other comparable countries on the other two pillars of the digital economy, namely digital platforms and digital skills. Data on key indicators to assess the state of digital platforms in Cameroon are not available, which in itself is a strong indication of the work that remains to be done to improve the development, access, and use of digital platforms in Cameroon. Notably, the digital government platforms offered across different government agencies are not interconnected and interoperable. Cameroon's level of spending on education is below the average of both Sub Saharan Africa and peer countries. The low quality of education and limited market relevance of skills development programs translate into youth being poorly prepared for the labor market and post-secondary studies. At the tertiary level, most students enroll in the general stream and few study science and engineering. Recognizing these challenges, the government is committed to developing digital skills at all levels of its national education system to achieve the Sustainable Development Goals (SDGs), as reflected in the Education Sector Strategy 2020–2030 under preparation.

Pillar	Overall performance	Key indicators

Digital infrastructure

Indicator	Source and date	Cameroon	SSA average
Penetration of 3G/4G (%)	ART 2017 and GSMA 2020	87%	74%
% of population covered by 3G mobile network (%)	MINEPOSTEL 2017 and GSMA 2019a	90%	70%
Average monthly retail price of mobile broadband as % of GNI	ITU 2017 and GSMA 2019b	3.1%	1.4%

[2] This composite index combines 11 indicators to monitor and compare developments in ICT. The three-stage model measures the country's ICT readiness, intensity, and impact. The model correlates directly to the enabling environment for a growing digital economy.

Digital platforms

Indicator	Source and date	Cameroon	Africa average
Digital Adoption Index - government cluster	World Bank 2016	0.45	0.39
Open Data Inventory Score	Open Data Watch 2019	Score 36/100	ranks 19 of 43 countries
E-Participation Index	UN 2016	0.16	.25

Digital financial services

Indicator	Source and date	Cameroon	SSA average
Adults with access to a transaction account (%)	Findex 2017	34.6%	42.6%
Mobile money access rate (%)	IMF financial access survey 2017 and GSMA 2018	15%	45.6%
Adults who saved at a formal institution (%)	Findex 2017	10.9%	26.9%

Digital entrepreneurship

Indicator	Source and date	Cameroon	SSA average
Innovation Capacity – ranking (and score)	Global Innovation Index 2018	111 of 126 Score: 23.85 of 100	n/a
Firm-level technology absorption, 1 = not at all and 7 = to a great extent	WEF Global Information Technology Report (GITR) 2016	4.4	n/a
% of firms with access to email	World Bank Enterprise Survey	54.4 (2016)	58.5

Digital skills

Indicator	Source and date	Cameroon	SSA average
Skills readiness index	The Global Information Technology Report 2016	3.8 (107 of 139)	n/a
Internet access in Schools	World Economic Forum 2017-2018	3.7 (91 of 137)	n/a

ASSESSMENT OF EACH PILLAR'S STRENGTHS, WEAKNESSES, ROADBLOCKS, AND OPPORTUNITIES

Cameroon can rely on relatively solid strengths in terms of digital infrastructure, digital financial services and digital entrepreneurship compared to peers to nurture its digital economy. The Internet market is growing fast in Cameroon, driven by the deployment of 3G and 4G mobile broadband services and the fact that Cameroon significantly invested in terrestrial backbone networks and in diverse submarine fiber optic cables. In terms of DFS, the regional central bank facilitates entry to the DFS market. A new regulation clarified the roles and responsibilities of the Banking Commission for Central Africa - COBAC (supervision) and the Bank of the Central African States - BEAC (oversight). Cameroon is proactive in dealing with cybercrime and cybersecurity: building on the legal framework, the government took further action in securing digital transactions and e-commerce in 2010. Finally, a small but dynamic community has developed to support digital entrepreneurs in the way of tech hubs and online groups. Cameroon's Silicon Mountain demonstrates the country's potential to nurture homegrown digital hubs. There is a promising increase in the use of e-payments in e-commerce. Women's participation in digital ventures is slowly increasing. Though falling short of gender parity, female Cameroonian entrepreneurs are ahead of their regional peers and have access to targeted training opportunities.

However, the growth potential of the digital economy in Cameroon is substantially constrained in all pillars of the digital economy:

- Digital infrastructure: Some geographic areas remain totally uncovered and Internet access remains limited. Mobile telephony and Internet retail prices appear relatively expensive, especially for low-income individuals. International connectivity remains non-competitive despite the existence of multiple submarine cables. In spite of modest progress, Cameroon still lacks the regulatory instruments and institutional capacity to ensure that every Cameroonian is digitally connected. Camtel maintains a monopoly over the country's international access and significant national terrestrial fiber networks.
- Digital platforms: A legal and policy framework for government data archiving and digital preservation is not yet in place. The government has not adopted a policy on open data. The digital government platforms offered across agencies are not interconnected and interoperable. The government has not set up shared systems to offer digital platforms across agencies and does not have a partnership with the private sector for the managing or offering of such systems.
- Digital financial services: The absence of a national and regional financial inclusion strategy limits DFS development in Cameroon, along with other lacking regulations and systems. Almost a third of the population is still excluded from financial services. Recourse to formal savings and borrowing is still scarce and regulations do not yet allow digital credit. Several other financial regulations in Cameroon restrict the issuance of e-money to banks. Weak credit infrastructure hampers access to finance.
- Digital entrepreneurship: Digital enterprises in Cameroon offer products and services with low technology content. Cameroon remains a minor player in the global digital economy in terms of exports of digital goods and technology acquisition. The digital sector represents only a fraction of economic activities in Cameroon and demonstrates a downward growth trend. Infrastructure and logistics deficiencies make it difficult for digital businesses to operate. The country lacks a coherent set of policies and regulations. Access to finance remains a key challenge for digital entrepreneurs at all stages.
- Digital skills: The absence of a national framework, institutional arrangements, and quality formal education and training strategies impedes the development of digital skills. Issues around the digital strategic plan could compromise the harmonious development of the digital economy. Secondary education and general university education do not offer a diversity of professional skills related to the digital professions. Eighty percent of secondary schools do not

have sufficient infrastructure (such as electricity and Internet connection) and the necessary equipment to delivery ICT courses. In university education, the training of digital experts is known for low student retention rates. In addition, the low wages of teachers at all levels hinders the education quality.

Major opportunities for the digital economy are to be found in the digital infrastructure and digital entrepreneurship pillars, thanks to the country's existing assets and past successes, as well as in the digital skills pillar, that could generate substantial benefits to the development of digitally-related jobs and the private sector overall. Cameroon can embrace the digital economy by leveraging its assets, such as its geographic position and relatively extensive infrastructure. For instance, more competition and infrastructure sharing could reduce the capital expenditure for infrastructure, extend service to rural and underserved communities, and improve the efficiency of the broadband value chain. 4G mobile broadband developments could boost the growth of high-speed technologies throughout the country. Acknowledging the coverage gaps and lack of economic rationale for private operators to invest in remote and sparsely populated areas, the regulator has already been implementing several universal service projects. There are encouraging examples of digital startups developing innovative business models for service delivery to local populations, and several regional digital businesses launched activities in Cameroon. Venture capital and private equity firms have limited activity, but recent trends are positive. Informal savings groups or tontines are potential sources of financing. E-payments in e-commerce show a promising increase. Informal education via online training platforms, such as Moodle and MOOCs, is a quality alternative that is already available to meet the short-term need for digital specialists. Every sector in Cameroon is affected by digital transformation, so the future needs for digital skills are enormous.

The table[3] below summarizes and provides a qualitative assessment of the relative strengths, weaknesses and opportunities within each of the five pillars of the digital economy.

Pillar	Key strengths	Key weaknesses and roadblocks	Opportunities
Digital infrastructure	• Fast growth of the Internet market • Decrease in the actual prices of telephony • Significant investments in the terrestrial backbone • Fiber infrastructure deployed by key public service concessionaires	• Stagnation of mobile telephony penetration • Some uncovered areas • Expensive mobile telephony and Internet services • Lack of regulatory instruments • Camtel dominance threatens competition	• Geographic position and extensive infrastructure • Access networks can be improved • Only very high-speed technologies will grow • Set up of multiple Universal Service Fund (USF) projects

[3] **Legend**: GREEN: Strong strengths/Limited weaknesses/Strong opportunities; GRAY: Medium strengths/Moderate weaknesses/Medium opportunities; YELLOW: Low strengths/Substantial weaknesses/Low opportunities.

Digital platforms	• Relative improvements in access and growing expectations for e-government and e-commerce platforms • Digital transactions and protection of personal data policies	• Comprehensive legal and policy framework not yet in place • No policy on open data • Government platforms not interconnected or interoperable • Active digital platforms face similar problems of limited Internet connectivity and capacity	• Development of both back-office systems and service delivery platforms • Centralized delivery of administrative services for simplification and efficiency • Update of e-commerce legislation
Digital financial services	• Facilitated market entry • Clear supervision and oversight roles • Proactivity in dealing with cybercrime and cybersecurity • Digital transaction legal framework	• Absence of financial inclusion strategy • One-third of population excluded from financial services • Recourse to formal savings and borrowing is scarce • Regulations do not allow digital credit • Weak credit infrastructure hampers access to finance	• Untapped market for digital payment interoperability • Service providers perceive regulation as prudential • Microfinance institutions (MFIs) embrace digital transformation • High willingness to pay for financial services
Digital entrepreneurship	• Silicon Mountain demonstrates country's potential • Promising increase in use of e-payments • Women's participation in digital venture is increasing	• Low technology content offered by digital firms • Infrastructure and logistics deficiencies a challenge for digital businesses • Lack of coherent set of policies and regulations • Access to finance is a key challenge for entrepreneurs	• Increasing number of digital businesses launched • Positive venture capital and private equity trends • Tontines are potential sources of financing

Digital skills	• Information, Communication, and Technology (ICT) is in the official curriculum of basic education, but infrastructure is limited, and the quality is low • Vocational training and university courses • All areas of training to produce digital experts • Digital transformation administration and companies • Strong political will and market demand for digital skills	• Eighty percent of schools do not have the infrastructure necessary to teach ICT classes • Secondary education offers limited training opportunities for digital skills • Digital training has low student retention rates • Lack of programs aimed at producing specialized digital skills • Scarce digital skilled labor force • Gap between skills and labor market needs • No national program on digital skills development	• Set up of public digital spaces open to all • Online training platforms is a quality alternative to meet short-term digital skills need • Basic digital skills are in demand for education

SUMMARY OF HIGH-PRIORITY RECOMMENDATIONS

This assessment led to the formulation of 39 recommendations covering the five pillars of the digital economy, with different time horizons (short, medium and long term) and different priority levels (high, medium and low). The topics covered include policy and regulatory framework, resource management and coordination, governance, ecosystem and capacity building. The table below summarizes only the high-priority recommendations, while all recommendations are described in detail in Section 5 of this document.

Topics	Pillar	Objectives	Horizon
Policy and regulatory framework	Infrastructure	Improve the legal and regulatory environment to lower barriers to entry, especially on markets where Camtel enjoys a dominant position	Short-term
	Platform	Update the legal and regulatory framework for e-government and e-commerce platforms	Short-term
	Financial	Provide support to the BEAC to improve mobile money regulation	Short-term
	Entrepreneurship	Create regulations and policies to enable digital entrepreneurship	Medium-term
	Skills	Revise the national education system as related to digital skills development	Medium-term
Resource management and coordination	Infrastructure	Develop asymmetric regulation to facilitate the entry of new operators	Short- to Medium-term
Governance	Infrastructure	Develop a framework for collaboration between the various public bodies	Long-term
	Platform	Prioritize and coordinate the implementation of government digital platforms for uptake	Short-term
Ecosystem	Infrastructure	Define and delineate “relevant markets” for	Long-term

		proper regulation	
	Financial	Improve mobile money regulation	Medium-term
	Entrepreneurship	Promote scaling up of existing digital incubators that are privately run and have proven results	Short-term
Capacity Building	Platform	Promote capacity transfers from the private sector to support the sustainability of digital platforms	Medium-term
	Skills	Establish a formal e-skills reference framework	Long-term
		Implement rapid training courses	Short-term

Countries with relatively high prices for Internet connectivity and limited penetration like Cameroon are poorly prepared to face the COVID-19 crisis; pursuing actively its digital agenda will strengthen the country's ability to respond to and recover from this crisis. The country is not equipped with the right digital infrastructure to enable remote work at scale, thus affecting business continuity and decision-making abilities. Scarce broadband access puts at risk economic activities, cash transfers, and remittances, while limiting distance learning and weakening health coordination response. Each pillar has a role to play in this response. For instance, as countries impose extreme social distancing measures, closing the digital divide is therefore of paramount importance to ensure economic interactions continue happening, and better prepare countries for future crises. In addition, ensuring the continuity of public services to safeguard the welfare of populations is key as the country needs to rely on digital technologies as the "new normal" for work, schooling, and government services. Finally, powering FinTech is a one way to support the most impacted businesses and communities, as economies are increasingly relying on fintech to stay afloat, and demand for services such as mobile payments, food delivery, and e-commerce shopping will grow exponentially.

1. DIGITAL ECONOMY OVERALL PERFORMANCE

Summary of each pillar's overall performance

Digital infrastructure	In the 2017 ICT Development Index (IDI) of the International Telecommunications Union (ITU), Cameroon ranked only 149 of 176 countries and was the 18th ranked country in Africa.[4] Cameroon's IDI score highlighted only relative strengths in terms of penetration of mobile telephony and international access.	MEDIUM
Digital platforms	Data on key indicators to assess the state of digital platforms in Cameroon are not available, in itself an indication of the work that remains to be done to improve the development, access, and use of digital platforms. The digital government platforms offered across different government agencies are not interconnected and interoperable.	LOW
Digital financial services	The diverse financial landscape features 454 active formal institutions. Yet, the Cameroon market is in the startup stage for its digital financial services (DFS) ecosystem. Financial inclusion in Cameroon still leaves room for improvement, and the usage of DFS is low.	MEDIUM
Digital entrepreneurship	Although Cameroon has one of the highest rates of early-stage entrepreneurial activity, its economy ranks in the lower tier of global assessments on entrepreneurship, innovation, and competitiveness. Doing business within Cameroon involves high costs and complex procedures. Cameroon ranks 166th among 190 economies in the 2019 Ease of Doing Business, the lowest ranking among regional competitors.	MEDIUM
Digital skills	Cameroon's level of spending on education is below the average of both Sub Saharan Africa and peer countries. The low quality of education and limited market relevance of skills development programs translate into youth being poorly prepared for the labor market and post-secondary studies. At the tertiary level, most students enroll in the general stream and few study science and engineering. Recognizing these challenges, the government is committed to developing digital skills at all levels of its national education system to achieve the Sustainable Development Goals (SDGs), as reflected in the Education Sector Strategy 2020–2030 under preparation.	LOW

1.1 DIGITAL INFRASTRUCTURE

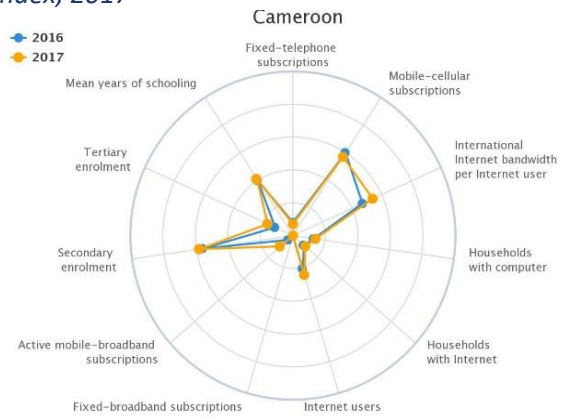
Several key milestones of the Cameroon digital strategic plan have already been reached, but some of the 2020 targets appear hard to reach. A Ministry of Posts and Telecommunications' 2018 report highlighted several areas that have seen considerable progress, such as the increase in international capacity, development of a national backbone, increase in household equipment (such as radio,

[4] This composite index combines 11 indicators to monitor and compare developments in ICT. The three-stage model measures the country's ICT readiness, intensity, and impact. The model correlates directly to the enabling environment for a growing digital economy.

television, and computer) and regulation of quality of service (MINSPOTEL 2018). However, other targets still appear to be far away, such as the number of jobs in the digital space or the percentage of the population with access to mobile broadband.

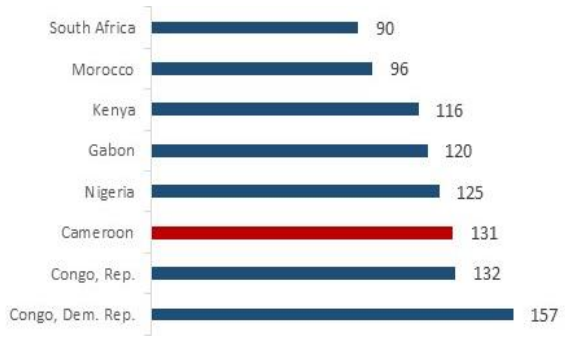
Looking at international rankings of the country's performance on digital infrastructure, Cameroon appears to have a low-middle rank within developing countries (especially Africa), and lags behind more advanced economies. According to the 2017 IDI of the ITU, Cameroon ranked only 149 of 176 countries and was the 18th ranked country in Africa (Figure 1).[5] Cameroon's IDI score highlighted only relative strengths in terms of penetration of mobile telephony and international access. According to the mobile connectivity index of the Global System for Mobile Communication Association (GSMA), Cameroon ranked 131 of 163 countries, with a score of 42.8. As a comparison for Sub Saharan Africa, Kenya ranked 116, Gabon 120, Nigeria 125, Congo 132, and the Democratic Republic of Congo 157. Cameroon's performance on the GSMA index (Figure 2) reveals weaknesses on the "Spectrum" and "Network" aspects; network performance relates to mobile download speeds (50 percent) and mobile latencies (50 percent),[5] while Spectrum performance relates to spectrum assignments to mobile operators.

Figure 1. Cameroon's ITU ICT Sector Development Index, 2017



Source: ITU 2017.

Figure 2. GSMA Mobile Connectivity Index, 2017 (selected countries ranking)



Source: GSMA 2017.

Internet usage increased steadily over the past few years before stagnating in 2017, and Cameroon appears to be in the middle pack of that indicator compared to neighbor countries. Overall, the percentage of individuals using the Internet increased from 10 percent in 2013 to 23 percent in 2017. This puts Cameroon in a good position in Sub Saharan Africa, comparable to Nigeria at 26 percent and above Kenya at 13 percent. Computer penetration in Cameroon was 13.7 percent in 2017, which is quite low in absolute terms; however, it is higher than Africa's average of 9.6 percent for the same period, further supporting the country's position (ITU 2017).[6]

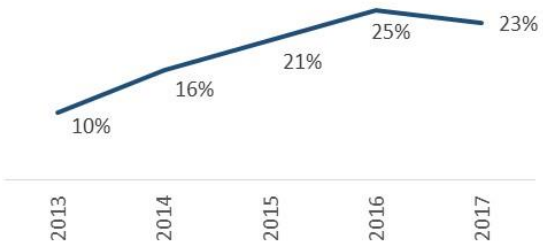
The penetration of mobile telephony has stagnated at about 87 percent of the population as of 2017 (ART 2018). There were 19.7 million mobile telephony subscriptions at the end of 2017 in Cameroon (ART 2018), quasi-exclusively prepaid (99 percent), for a population estimated at around 24 million people.[7] Discarding the multi-SIM effect, the penetration rate in terms of unique subscribers was about 45 percent at the end of 2017, which puts Cameroon in the lower end in the Central African region. There were also 710,000 fixed telephony subscriptions as of the end of 2017 (ART 2018).

[5] This composite index combines 11 indicators to monitor and compare developments in ICT. The three-stage model measures the country's ICT readiness, intensity, and impact. The model correlates directly to the enabling environment for a growing digital economy.
[5] GSMA Mobile Connectivity Index Launch Report. See https://www.gsma.com/mobilefordevelopment/resources/mobile-connectivity-index/.
[6] See https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume2.pdf.
[7] World Bank Indicators

1.2 DIGITAL PLATFORMS

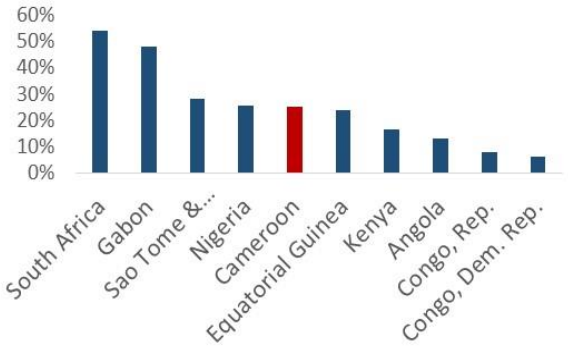
Data on important key indicators to assess the state of digital platforms in Cameroon are not available, in itself an indication of the work that remains to be done to improve the development, access, and use of digital platforms. As part of its Strategic Plan, the government of Cameroon aims to start tracking several key indicators, including the number of online transactions, and setting up a single identification system for citizens with a target of having 50 percent digitally enabled citizens by 2020. With regard to private sector platforms, available data show Cameroon in the middle of the pack, but, with the improvements in the proficiency of e-commerce platforms, Cameroon is in the top 10 of African countries in 2017 (Figures 3 and 4).[8] This diagnostic primarily looks at Cameroon's core and common elements of digital platforms.

Figure 3. Percentage of individuals using the Internet in Cameroon, 2013–2017



Source: ITU 2013-2017.

Figure 4. Percentage of individuals using the Internet, 2017



Source: ITU 2017.

The digital government platforms offered across different agencies are not interconnected and interoperable. A main challenge in their development remains the level of Internet connectivity. Few functional, interactive platforms go beyond providing information on service delivery to citizens. E-payment is mostly used for e-commerce platforms and has not been integrated in government platforms, such as for taxation services. ICT capacity and skills in government agencies are limited, and the local private sector's capacity in digital technology and software and hardware development is fledgling.

The development and management of digital government platforms in Cameroon have been mostly financed through donor funding and implemented by international enterprises with little capacity transfer. Government agencies enter often unsustainable maintenance contracts with international service providers for the continuing operation of their platforms. For example, the Republic of Korea through the Korea International Cooperation Agency (KOICA) granted the development of Cameroon's Online e-Procurement System (COLEPS), and the National Agency for Information and Communication Technology (NAICT) manages the Public Key Infrastructure (PKI), serving as root certification authority. Given these limitations, the government decided to introduce capacity building programs within the scope of major projects to ensure technology transfer, maintenance, and sustainability. That approach allows capacity transfer to government officials in the case of customized digital solutions developed by local private companies, but it has yet to be applied meaningfully for the more robust and complex digital platforms usually developed by international and more advanced companies.

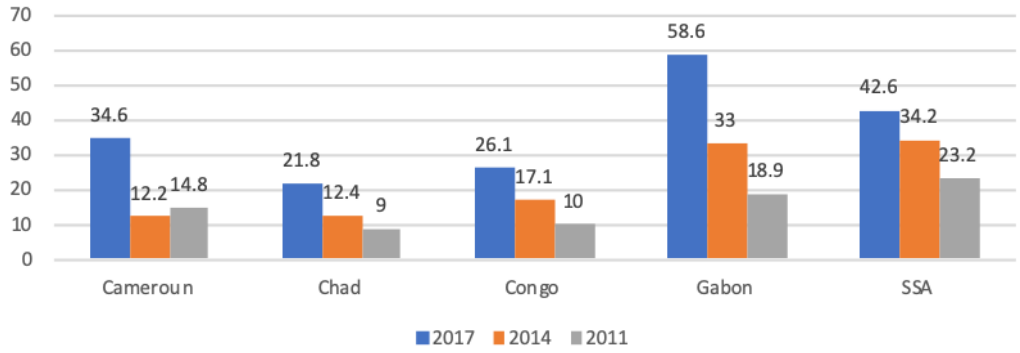
[8] UNCTAD B2C E-commerce Index 2017. See https://unctad.org/en/PublicationsLibrary/tn_unctad_ict4d09_en.pdf.

1.3 DIGITAL FINANCIAL SERVICES

The diverse financial landscape has 454 formal institutions in activity. This number includes 11 banks, 6 financial institutions, 412 MFIs, 19 insurance companies, 4 electronic money institutions, and the Post. Two major money transfer operators are also present, essentially offering over-the-counter services. As a member of the Economic and Monetary Community of Central Africa (CEMAC), the Cameroon financial sector is governed by the Central African States Bank (BEAC) and the Banking Commission for Central Africa (COBAC).

Yet, the Cameroon market is at the startup stage for its DFS ecosystem. DFS are provided by banks in partnership with telecom operators. Access to financial services grew from 12.2 percent in 2014 to 34.6 percent in 2017, along with similar trends in the rest of the CEMAC region, which is attributable to the growth of mobile money accounts (Figure 5). In Cameroon, mobile money accounts are held by 15.1 percent of the adult population, which falls right after Gabon (43.6 percent). The specific market for e-payments is also less developed than in countries of the Economic Community of West African States, such as Côte d'Ivoire (38.9 percent) and Senegal (31.8 percent), where e-money developed.

Figure 5. Percentage of adults with access to a transaction account



Source: Findex.

The financial sector remains shallow and essentially bank-based. The banking sector's contribution to financing the economy is limited, accounting for only 10 percent of the domestic credit granted to the private sector. On average, almost 50 percent of the banking sector's assets are controlled by three banks and almost 50 percent of the banking sector's assets are controlled by foreign banks (mainly European banks). The microfinance sector plays an important role in the region and serves nearly 1.8 million members and clients (about 7 percent of the adult population). The telecom sector accounts for 17 million subscribers.

The country went through a structural adjustment program, which stipulated a significant increase in the minimum capital required by banks. Due to these reforms, traditional banks tightened conditions of access to their services, resulting in the marginalization of a large segment of the population and an increase in financial exclusion, especially in rural areas. On average, there are only 3.64 ATMs per 100,000 adults.[6]

The usage of DFS is low. In Cameroon, while close to 30 percent of the adult population made or received a digital payment, only 5.2 percent paid a utility bill digitally and the same proportion proceeded to digital payments online. In 2017, only 10.9 percent adults had saved at a formal financial institution, while 31.9 percent declared having saved though an informal group or club (Findex).

[6] IMF Financial Access Survey 2017. See https://data.imf.org/?sk=E5DCAB7E-A5CA-4892-A6EA-598B5463A34C.

Borrowing from friends or family is also more popular than borrowing from a financial institution: 32.7 percent versus 7.7 percent. In 2016, mobile money transactions in Cameroon reached US$1.5 million, with more than 49 million transactions, of which the highest share goes to air time top-ups (Table 1). This volume reached 415 million transactions in 2018, almost ten times more.

Table 1. Usage of DFS in Cameroon, 2016

DFS	Volume in millions	Value in FCFA	Value in US$
Top up	16,957,815	373 143 782 850	$644,995,057
Money transfers	9,798,861	219 248 812 880	$378,982,719
Cash out ATM	109,740	4 877 974 795	$8,424,874
Cash out bank branches	9,459,649	245 020 009 789	$423,527,611
Payments	13,505,917	45 493 354 900	$7,781, 020
Total	**49,831,982**	**887 783 935 214**	**$1,534,572,666**

Source: BEAC 2016.

Access to mobile money increased exponentially from 1.8 percent to 15.1 percent. This access also features a geographic slant, with urban areas in certain provinces having higher access than rural areas. On the other hand, there is 87 percent mobile SIM penetration in the population, and according to GSMA Intelligence, Cameroon is one of the fastest growing countries in Africa in terms of mobile access to the Internet.

Financial inclusion in Cameroon still leaves room for improvement. Although Cameroon has a level of account ownership above 34 percent, it still scores below the median of Sub Saharan Africa countries (42.6 percent). Cameroon recorded sustained growth in several bank and mobile accounts between 2011 and 2017. As a lower middle-income country, Cameroon has a mobile money access rate (15 percent) that is closer to the average of low-income countries (17 percent). The role played by the mobile banking sector in the country is proportionally less important than in other neighbor countries, such as Cote d'Ivoire.

1.4 DIGITAL ENTREPRENEURSHIP

Although Cameroon has one of the highest rates of early-stage entrepreneurial activity, its economy ranks low on entrepreneurship, innovation, and competitiveness. According to the Global Entrepreneurship Monitor survey (2016), Cameroon had a very high Total Early-stage Entrepreneurial Activity rate of 27.6 percent compared to the 17.6 percent regional average and 12.3 percent global average. However, in 2018, Cameroon ended in the lower tier of the global assessments on entrepreneurship, innovation, and competitiveness indexes. It was also at the bottom of all these rankings compared to regional competitors, such as Nigeria, Kenya, Ghana, and Senegal. An online survey revealed that most enterprises are online marketplaces and IT services or cyber cafes, rather than high-value software programming or hardware development. The rare cases of digital innovation are process innovation or business model innovation.

The digital sector represents only a fraction of the economic activities in Cameroon and demonstrates a downward growth trend. The latest enterprise census of 2016 *(*Institut National de la Statistique 2018) identified 983 firms in the ICT sector, or 0.6 percent of the enterprises registered in Cameroon. Although in absolute terms the number of ICT firms increased since 2009, in terms of share of economic activity the number decreased. Even more worrying, the business development service sector shrunk dramatically, both in absolute terms from 5,303 firms in 2009 to 1,337 firms in 2016 and as a share of economic activity.

Doing business within Cameroon involves high costs and complex procedures. Cameroon ranks 166 among 190 economies in the Doing Business 2019 report, the lowest ranking among regional competitors. Based on feedback from the consultations, the lack of intellectual property rights is of particular concern to digital entrepreneurs.

Given the large and young population, digital entrepreneurship has the potential to become an engine of economic transformation in Cameroon, which will set the country on a new growth trajectory. Between 2000 and 2016, the digital economy's contribution to Cameroon's GDP increased from 1.4 percent to 5 percent and generated 10,000 direct jobs and US$232 million in taxes. Digital entrepreneurship is an important opportunity for the large number of youth entering the labor force.

The government's digital strategic plan includes a priority area related to digital entrepreneurship. Areas focus on "Developing a local digital industry" and "Encouraging research and innovation," with specific objectives to produce more computers and ICT products domestically, reduce ICT imports, and create research and development hubs for digital technologies. Potential actions include enacting taxation measures to support startups, creating a venture capital fund, using government procurement to support company innovation, and setting up a forum between the government and ICT companies

1.5 DIGITAL SKILLS

Advanced digital skills enable users to use digital technologies and knowledge in an empowering and transformative way to create and innovate in ICT professions. Such skills include critical thinking, creativity, collaboration, problem-solving, and computer thinking. Among the recent and rapidly developing sectors that digital skills contributed to in Cameroon are e-commerce, mobile money, and utility service platforms, such as CardioPad, Gifted Mom, lalala.com, WeCashUp, and many others.[7]

The government decided to develop digital skills at all levels of its national education system to achieve the SDGs. The strategic axes 4 and 7 in their digital strategic plan state specific objectives to achieve by 2020, including changes in the education system to make human resources more efficient, competitive, and employable. The development of digital skills supply in Cameroon aims to exploit the digital infrastructure, to first increase the production and supply of digital content and then to develop a local digital industry and encourage research and innovation. Despite efforts to revise the national education system, a mismatch exists between the digital skills taught and the skills needed to satisfy the local labor market.

In Cameroon's education system, skills development happens either in the formal education and training system or informally through opportunities offered by the environment. Cameroon's formal education and training system is organized into four subsystems: Basic Education, Secondary Education, Vocational Training, and Higher Education and Research. Non-formal education includes all organized and sustainable educational activities that do not correspond exactly to the definition of formal education, for example, ways of learning in workplaces.

ICT education is in the official curriculum of basic education. The goal is to familiarize children with technologies, information systems, and means of communication. However, the implementation of this teaching program is limited. For more than 80 percent of schools, ICT education is an unaffordable luxury—no electricity, no computers, no Internet connection, no teaching material, and no trained teachers (MINEDUB 2017 and 2018).

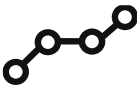
[7] https://www.investiraucameroun.com/telecom/0105-10709-orange-s-engage-a-soutenir-la-numerisation-des-universites-publiques-camerounaises.

Informal or non-formal education is a means of training that mainly targets people who have not been able to follow a digital education in the formal system. Informal education can happen anywhere—the workplace, a neighbor's house, or in an informal training school—and is the most widely used means of training in the world to transmit digital culture. To support the informal sector, in some countries digital skills reference frameworks ensure that at the end of learning the citizen can compete in the digital economy. Unfortunately, Cameroon does not yet have such a framework.

Several private providers complement the education system's advanced digital skills training. These private companies include Cisco, Huawei, Oracle, Microsoft, and many others. These leaders in the field sign agreements with the government or with other private stakeholders that allow them to create training academies on almost all of the campuses at state and private universities. The resulting training programs lead to internationally well-known certifications.

2. KEY STRENGTHS OF DIGITAL ECONOMY

Summary of each pillar's strength

 **Digital infrastructure**	The Internet market is growing fast in Cameroon, driven by the deployment of 3G and 4G mobile broadband services. Internet usage is increasing fast and telephony usage remains stable, suggesting a decrease in telephony prices. Cameroon significantly invested in the terrestrial backbone networks, and key public service concessionaires put in place additional fiber infrastructure. In addition, competition from additional submarine cables has increased the robustness and diversity of Cameroon's access to the global Internet. The Electronic Communications Law is instrumental in articulating the functions of ART and highlighting the rights and responsibilities of subscribers and operators.	**STRONG**
 **Digital platforms**	The rise of Internet users in Cameroon modified the value chain and business models of private companies and brought positive changes in government processes and population needs and habits. All of the main types of digital platforms are now found in Cameroon—Government-to-Government (G2G), Government-to-Business (G2B), Government-to-Citizens (G2C), and e-commerce. Government policies do address the security and protection of digital transactions and personal data	**MEDIUM**
 **Digital financial services**	The regional central bank facilitates entry to the DFS market. A new regulation clarified the roles and responsibilities of COBAC (supervision) and BEAC (oversight). Cameroon is proactive in dealing with cybercrime and cybersecurity. Building on the legal framework, the government took further action in securing digital transactions and e-commerce in 2010.	**STRONG**
 **Digital entrepreneurship**	A small but dynamic community has developed to support digital entrepreneurs in the way of tech hubs and online groups. Cameroon's Silicon Mountain demonstrates the country's potential to nurture homegrown digital hubs. There is a promising increase in the use of e-payments in e-commerce. Women's participation in digital ventures is slowly increasing. Though falling short of gender parity, female Cameroonian entrepreneurs are ahead of their regional peers and have access to targeted training opportunities.	**STRONG**
 **Digital skills**	The national system for the development of digital skills shows several strengths, including political will, strong demand, and training provision. At the higher education level, training programs include short-term and long-term vocational training and university courses. Almost all areas of training will be required to produce digital specialists and professionals.	**MEDIUM**

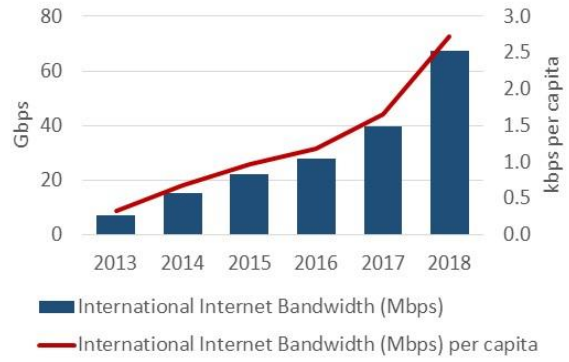
2.1 DIGITAL INFRASTRUCTURE

The Internet market is growing fast in Cameroon, driven by the deployment of 3G and 4G mobile broadband services. It reached more than 8.3 million subscribers in 2017,[8] favorably comparing to peer countries in terms of unique mobile broadband subscribers**.** Broadband services are mostly provided by mobile telecommunications operators using 3G and 4G technologies. But, fixed technologies (DSL, cable, fiber-to-the-home [FTTH], and so on) remain underdeveloped with only about 20,000 subscribers in 2017 for Camtel (including DSL, FTTH, and so on, but excluding CDMA) and 3,200 subscribers for smaller fixed Internet Service Providers (ISPs).

The average revenue per user (all services combined) is decreasing progressively, however Internet usage is increasing fast and telephony usage remains stable, suggesting a decrease in the actual prices of telephony. The evolution of average revenue per user for mobile services combined with the evolution of data usage suggests that the actual prices (including bonuses) of telephony services may be decreasing significantly.

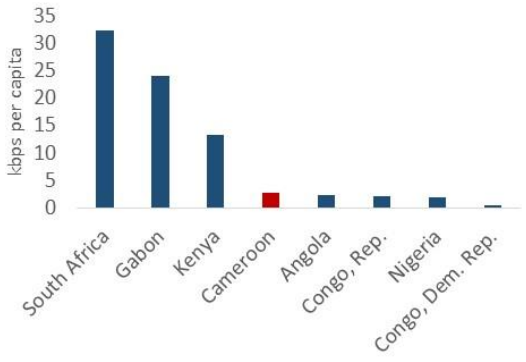
Cameroon made significant investments in the terrestrial backbone networks at the national level, and key public service concessionaires have enacted additional fiber infrastructure. Camtel has deployed more than 12,000 kilometers of fiber and some additional 8,000 kilometers are expected to be added by the end of 2020. As with international connectivity, Camtel is the only operator licensed to sell capacity on the national network. While Viettel has also laid about 8,000 km of optical fiber, the company is not authorized to resell capacity to other market players and restricts the network to its own use. Additional fiber infrastructure has been put in place by key public service concessionaires, such as Cameroon Oil Transportation Company, Electric Power Generation and Distribution Company, and Campost. However, existing regulations prevent the latter from competing with Camtel.

Figure 6. Evolution of international bandwidth (absolute and per capita)



Source: TeleGeography

Figure 7. Benchmark of international bandwidth per capita as of 2018



Source: TeleGeography

There is significant availability of inter-urban infrastructure laid out by Camtel. Operators confirm that the availability of intra-urban fiber optic networks is high in main cities, deployed by both licensed operators and unlicensed ISPs. The urban optic fiber loops of Camtel amount to a total of 275 kilometers in nine large cities, while MTN has a total of 468 km of urban optic fiber loops. Deployment costs were not disclosed, preventing an assessment of these links' affordability.

[8] Ibid.

Cameroon's international connectivity is extensive. Prior to 2012, Cameroon's Internet gateway was primarily through the monopoly-controlled South Africa Transit (SAT)-3 cable and expensive satellite links. Since 2012, competition from additional submarine cables has increased the robustness and diversity of Cameroon's access to the global Internet. The incumbent operator, Camtel, owns direct connections to all four of the international submarine cables. Additionally, Camtel owns the indirect connections through the Nigeria-Cameroon Submarine Cable System (NCSCS) and is in the process of constructing a link through Equatorial Guinea. The diversity of routes has increased international bandwidth and increased the international bandwidth per capita.

The government of Cameroon made notable efforts to catch up with regional peers and to improve the environment for investment in the country's communications infrastructure.[9] Several policy and regulatory decisions contributed to making the digital infrastructure market more attractive to the private sector and improving competition among key players. These include simplifyng licensing and network interconnection processes, offering for sale the fixed line incumbent Camtel's mobile arm to MTN, awarding 3G and 4G LTE licenses to three international operators to compete with incumbent Camtel, and launching the country's digital 2020 program.

The Electronic Communications Law is instrumental in articulating the functions of ART and highlighting the rights and responsibilities of subscribers and operators respectively. This was necessary given the multiplicity of institutions that claim ownership over implementation of policies and regulations in the country. The law also classifies licenses under two broad categories: authorization regime (for the establishment and/or operation of electronic communications networks and services) and declaration regime. The law also includes a special decree that mandates an Inter-ministerial Committee for the Assignment of Radio Frequency Bands (CIABAF) be responsible for allocating the country's spectrum resources.

2.2 DIGITAL PLATFORMS

The rise of Internet users in Cameroon modified the value chain and business models of private companies and brought positive changes in government processes and population needs and habits. Although governments do not adapt at the same pace as citizens' demands evolve, there is a growing expectation for agencies to harness digital technology to transform sectors' productivity and better service delivery. In the private sector, companies are upgrading their production systems and communication approaches. Several digital platforms were launched, for e-procurement, mobile money, and e-commerce. The use of social media networks and over-the-top media services is increasing too.

The four main types of digital platforms in Cameroon mostly use client-server architectures, with e-payment yet to be integrated in government platforms. The main challenge in the development of government platforms remains the level of Internet connectivity and capacity, while private sector platforms experience difficulties around the use of e-payments and of trust and logistics.

- *Government-to-Government platforms (G2G).* In Cameroon, such platforms are usually located in and administered by one government agency and serve many government agencies to manage data and resources. Or, these platforms consist of back-office systems to manage certain functions within an agency, such as mailing or archiving. Examples include PROBMIS, an integrated financial management system, and SIGIPES, a human resources management system.[10]
- *Government-to-Business platforms (G2B).* These platforms are the most frequently used government digital platforms in Cameroon, aimed at delivering services to businesses and other private companies. Examples include SYDONIA, the automated customs management system, and

[9] One of the last to introduce 3G in 2014.
[10] SIGIPES II is an ongoing initiative/platform that will merge payroll (ANTELOPE) and career management (SIGIPES) for one integrated human resources management system for government officials.

COLEPS, a digital platform for managing and tracking public contracts.

- *Government-to-Citizens platforms (G2C).* These platforms are the most commonly implemented and mostly consist of agencies' informational websites. They have not yet, in most cases, graduated to two-way online systems to deliver services. For example, the government uses several databases to manage information, such as for issuing drivers' licenses and vehicle registration services, but with no systems and interfaces to interact with customers directly. The government wants to establish a digitized single identification system for more efficient and secure interactions with citizens across sectors (including private sector citizens' interactions), notably for service delivery. A few initiatives were launched but were not completed (such as the electronic cadaster) and are not coordinated.
- *E-commerce platforms:* These platforms enhance marketing methods to facilitate transactions between commercial enterprises and their customers. Since the e-commerce law, private initiatives mostly launched in the major cities and are expanding around the country. E-commerce platforms in Cameroon continue to face challenges, especially with regard to the trustworthiness of online transactions, the use of digital payment methods hampered by access to mobile money solutions, and the logistics required to deliver purchased goods.

Government policies do address the security and protection of digital transactions and personal data. Cameroon's e-laws of 2010 on cybersecurity and electronic communications provide a legal framework for the protection of ICT networks and critical infrastructure. More recently, a national ICT security policy was also elaborated to emphasize national ICT networks and information systems protection. The management of copyrights falls under the regulation of the African Intellectual Property Organization and other international regulations. Existing copyright and taxation laws apply to e-commerce in Cameroon, but the taxation of online services provided by businesses with no legal presence in the country is not addressed.

2.3 DIGITAL FINANCIAL SERVICES

The regional central bank facilitates entry to the DFS market. Access to DFS is supported by a regulatory framework established by the BEAC. Both the payment system law and e-money regulation aim to provide conditions under which non-bank entities can provide financial services to the unbanked and underbanked.

A new regulation (dating back to December 14, 2018) clarifies the roles and responsibilities of COBAC (supervision) and BEAC (oversight). It also distinguishes the requirements applicable to the legal regime of payment instruments relating to services (activities) and the providers empowered to exercise them (actors). The new law favors an inclusive approach of regulating payment services activities, including the issuance and management of e-money; further distinguishes and avoids confusion between e-money and payment accounts; clarifies the conditions for authorization of credit institutions and MFIs for payment service activities; and creates a specific category of institutions exclusively providing payment services. Lastly, the text aims to clarify the regime for the protection of customers' funds given to payment institutions, as well as the requirements for agents and specific rules on anti-money laundering and the financing of terrorism.

Cameroon is proactive in dealing with cybercrime and cybersecurity. As early as 2010,[11] the country had an almost complete legal framework for cyber crimes. This law provides for the incrimination of all cyber-criminal acts. Building on this legal framework, the government took further action in securing digital transactions and e-commerce in 2010.[12] The law establishes a digital certification process and

[11] See https://www.unodc.org/res/cld/document/cmr/2010/loi_sur_la_cybersecurite_et_la_cybercriminalite_html/Loi_2010-012_cybersecurite_cybercriminalite.pdf.
[12] See https://docplayer.fr/15984657-Loi-regissant-le-commerce-electronique-au-Cameroon.html.

signature from the certification authority. This allows DFS providers to obtain certificates for smart contracts and other digital services. These are delivered by the *Agence Nationale des Technologies de l'Information et de la Communication*. In addition, the Cameroon digital strategy is based on eight strategic objectives of which building trust in digital technology is key.

2.4 DIGITAL ENTREPRENEURSHIP

A small but dynamic community has developed to support digital entrepreneurs in the way of tech hubs and online groups. ActivSpaces, a physical co-working space, and two Whatsapp groups with more than 250 members serve as active communities where digital entrepreneurs meet and exchange information. ActivSpaces was created in 2010 as a tech hub in Cameroon with branches in Buea (South West Region), Douala (Littoral Region), and Yaounde (Central Region). It runs co-working spaces, startup incubators, short courses, and internship programs. Such hubs enable new digital entrepreneurs to convene and bounce ideas off of each other with funding support from international philanthropic foundations (for example, Omidyar Network and Salesforce Foundation) and technical support from multinational firms (for example, Google Developers Group).

Cameroon's Silicon Mountain demonstrates the country's potential to nurture homegrown digital hubs. Silicon Mountain is a nickname coined to represent the technology ecosystem in Cameroon's mountain area. The ecosystem is centered around the University of Buea and 12 other academic institutions. The government also backs a new technology hub to be called "Cameroon Silicon River" in Yaoundé. It will be modeled after Silicon Mountain and funded by Cameroon's Ministry of Scientific Research and Innovation. However, Yaoundé has few known tech entrepreneurs compared with Silicon Mountain.

There is a promising increase in the use of e-payments in e-commerce. According to We Are Social, as of January 2018, Jumia.com is Cameroon's ninth most popular website and the only e-commerce site in the top 20. Only 0.5 percent of Cameroonians have a credit card but 2 percent have made and/or received mobile payments via GSMA and 0.7 percent make online purchases and/or pay bills online. Jumia collects 90 percent of payments post-delivery (in cash) and the remaining 10 percent via e-payments, which reflects substantial progress in the growth of e-payments despite a lack of trust and lack of penetration of mobile money.

Women's participation in digital ventures is slowly increasing. The Likalo 2.0 digital marketing agency, Africa Home online store, and Afrik Digital Marketplace virtual incubator were all founded by women (Fon 2017).

Though falling short of gender parity, female Cameroonian entrepreneurs are ahead of their regional peers and have access to targeted training opportunities. According to the 2016 World Bank Enterprise Surveys, Cameroon is ahead of the region in terms of the percentage of firms with female participation in ownership (39.7 percent versus 29.2 percent), percentage of firms with majority female ownerships (31 percent versus 13.4 percent), and firms with a female top manager (22.9 percent versus 15.8 percent). There are avenues dedicated to women entrepreneurs, such as Fintech Challenges or B2B platforms initiatives with the BMZ.

2.5 DIGITAL SKILLS

The national system for the development of digital skills shows several strengths, including political will, strong demand, and training provision. Specifically, the political will by the government to develop the education and training sector; strong social demand for education; strong social and political demand for the professionalization of education and training; private education and training provision at

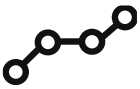
all levels of the education system; the generalization of computer and ICT teaching at all levels of education and training; and the creation throughout the national territory of training courses for ICT experts and professionals in secondary and higher education.

At the higher education level, training programs consist of short-term and long-term vocational training while university courses include digital skills subjects. Programs consist of (1) short-term vocational university courses (Bac/GCEAL + 2 years) that train students for jobs as specialized supervisors (Brevet de Technicien Supérieur or equivalent); (2) long-term vocational university courses (lasting more than two years) that train students for jobs as executive officers (Bac/GCEAL + 3 years) or design officers (Bac/GCAL + 4/5 years); and (3) general university courses. Students are trained on subjects, such as management of information systems, industrial IT, maintenance of computer systems, electronics, computer engineering, telecommunications and networks, and communication (journalism, audiovisual, computer graphics, and multimedia) (MINEDUB 2018). Although these are running programs, it is unfortunately difficult to collect verified data on them.

Almost all areas of training will be required to produce digital specialists and professionals. The training spectrum for digital specialists has broadened beyond traditional and new digital engineering and digital systems professions. Instruction now covers new digital artistic creation professions, such as multimedia or animation, as well as digital human science professions, such as knowledge and information management. The training of digital experts and professionals in the formal education system takes place in secondary education, vocational training, and above all in higher education. However, higher education also has a low retention rate, a lack of specialized education, and a lack of equipment.

3. KEY WEAKNESSES/ROADBLOCKS OF DIGITAL ECONOMY

Summary of each pillar's weaknesses and roadblocks

 **Digital infrastructure**	Mobile telephony penetration has stagnated as of 2017. Some geographic areas remain totally uncovered and Internet access remains limited. Mobile telephony and Internet retail prices appear relatively expensive, especially for low-income individuals. International connectivity remains non-competitive despite the existence of multiple submarine cables. In spite of modest progress, Cameroon still lacks the regulatory instruments and institutional capacity to ensure that every Cameroonian is digitally connected. The control of Camtel over certain parts of the value chain continues to threaten competition and expansion by other operators.	**SUBSTANTIAL**
 **Digital platforms**	A legal and policy framework for government data archiving and digital preservation is not yet in place. The government has not adopted a policy on open data. The digital government platforms offered across agencies are not interconnected and interoperable. The government has not set up shared systems to offer digital platforms across agencies and does not have a partnership with the private sector for the managing or offering of such systems.	**SUBSTANTIAL**
 **Digital financial services**	The absence of a national and regional financial inclusion strategy limits DFS development in Cameroon, along with other lacking regulations and systems. Almost a third of the population is still excluded from financial services. Recourse to formal savings and borrowing is still scarce and regulations do not yet allow digital credit. Several other financial regulations in Cameroon restrict the issuance of e-money to banks. Weak credit infrastructure hampers access to finance.	**SUBSTANTIAL**
 **Digital entrepreneurship**	Digital enterprises in Cameroon offer products and services with low technology content. Cameroon remains a minor player in the global digital economy in terms of exports of digital goods and technology acquisition. The digital sector represents only a fraction of economic activities in Cameroon and demonstrates a downward growth trend. Infrastructure and logistics deficiencies make it difficult for digital businesses to operate. The country lacks a coherent set of policies and regulations. Access to finance remains a key challenge for digital entrepreneurs at all stages.	**SUBSTANTIAL**
 **Digital skills**	The absence of a national framework, institutional arrangements, and quality formal education and training strategies impede the development of digital skills. Issues around the digital strategic plan could compromise the harmonious development of the digital economy. Secondary education and general university education do not offer a diversity of professional skills related to the digital professions. Eighty percent of secondary schools do not have sufficient	**SUBSTANTIAL**

	infrastructure (such as electricity and Internet connection) and the necessary equipment to delivery ICT courses. In university education, the training of digital experts is known for low student retention rates.	

3.1 DIGITAL INFRASTRUCTURE

Available data suggest that population coverage by the existing mobile infrastructure is extensive in Cameroon yet some geographic areas remain totally uncovered and Internet access remains limited. The satisfactory coverage of mobile telephony is facilitated by the highly urbanized population, yet geographic coverage remains quite partial, which excludes rural populations from certain services and economic opportunities. Telephony services were available in about 90 percent of households nationwide in 2017, with 98 percent in urban areas and 84 percent in rural areas. However, only 16 percent of households had an Internet connection in 2017 in the whole country (MINEPOSTEL 2017).

Mobile telephony retail prices appear relatively expensive, especially for low-income individuals, and these prices have stagnated for the past five years, while over-the-top services are progressively eroding revenues per user. Using a price basket methodology compared to population income, mobile telephony services appear relatively expensive in Cameroon compared to other peer countries, representing about 12 percent of average monthly gross income per capita in Cameroon as of 2017, compared to 2 percent in Kenya and 4 percent in Nigeria. However, retail prices of telephony have been relatively flat since 2014 according to ART, when considering only the facial prices,[13] suggesting limited competitive intensity in this market. The average revenue per user is decreasing progressively, yet Internet usage increases fast and telephony usage remains stable, suggesting a decrease in the actual prices of telephony. This could be triggered by growing competition on the mobile telephony market and/or the risk of telephony services being cannibalized by over-the-top services, such as WhatsApp.

Mobile Internet prices also appear relatively expensive, and low-income individuals remain excluded from this service, at least from a "comfortable" usage. Using a price basket methodology compared to population income, mobile broadband services appear relatively expensive in absolute terms. When compared to the gross national income they represent around 2.6 percent of average monthly gross income per capita in Cameroon as of 2017, in line with Nigeria (2.5 percent) and cheaper than Kenya (4 percent). The fast-growing average monthly usage of data suggests that mobile Internet consumption is not yet constrained in average by prices.

Cameroon's international connectivity remains non-competitive despite the existence of multiple submarine cables, leading to unused capacity and limited international bandwidth per capita. Today, Camtel owns direct connections to all of the international submarine cables: SAT-3/WASC, WACS, ACE, and SAIL. Additionally, Camtel owns indirect connections through the Nigeria-Cameroon Submarine Cable System (NCSCS) and is in the process of constructing a link through Equatorial Guinea. About 15 percent of the SAT3 and only 30 percent of WACS cable capacity has been used since its launch 17 years ago. The diversity of routes increased international bandwidth and international bandwidth per capita, yet a massive margin of progression remains compared to peer countries. The prices of international capacity in Cameroon are high compared to peer coastal countries in both West and East Africa.[14] Government-owned Camtel manages and sells all of the international capacity, which severely limits options for competitors and translates into higher retail prices for consumers.

[13] Considering only the facial prices may hide potentially significant effects of bonuses.
[14] Figures should be used cautiously given that services are not always directly comparable.

The market dominance of Camtel in the ownership of critical infrastructure continues to threaten competition and the viability of investment in additional network expansion by other operators. Camtel maintains a monopoly over access to the country's international and terrestrial fiber networks and appears to enjoy the protection of the Regulator. At the international level, Camtel controls all of the landing stations in the country, which translates into power over wholesale international connectivity prices and ultimately high retail prices for Internet services. The quality of service is also affected. For example, the international bandwidth available per Internet user is lower in Cameroon than, for instance, in landlocked Mali, where two operators operate their own gateways. At the national level, Camtel also controls all of the national fiber optic backbone in the country, and competitors were prevented from developing their own fiber infrastructure. Such market structure does not favor smaller ISPs to develop.

Infrastructure sharing between operators is limited or non-existent. Several existing regulatory instruments provide access to electronic network communication for the public and infrastructure sharing. However, there is little evidence that any mobile operators share its infrastructure in the urban areas where it operates. Recently, the government increased efforts to encourage infrastructure sharing, however, enforcement of these orders is still a challenge for both the Ministry and ART.

Significant risk exists for duplication of infrastructure in some areas while significant sections of the country are left with no fiber connectivity. Operators consulted expressed the limitations they face in deploying infrastructure due to regulatory impediments that prevent them from building inter-city networks, as well as the high prices of Camtel for national transit. In this context, small ISPs are the most penalized, since they fully rely on Camtel's infrastructure and have little bargaining power on prices.

In addition to the IXPs, Cameroon hosts several commercial datacenters that provide service, but no national mutualized datacenter. Datacenters are used to cache international content, host local traffic, and as nodes of CDNs and IXPs. The main public datacenter is owned by Campost; it hosts several digital projects of the government and provides for all digitally enabled services of Campost. The remaining datacenters belong to the large telecoms operators: a Tier 3 datacenter owned by Orange Cameroon; two datacenters owned by MTN; and two datacenters owned by Viettel. The country has no modern mutualized datacenter, which limits its ability to develop e-government services**.** Datacenter and IXP infrastructure play a key role in decreasing the cost and latency of content access.

Despite modest progress, Cameroon still lacks the regulatory instruments and institutional capacity to ensure that every Cameroonian is digitally connected. The ITU's ICT Regulatory Tracker (2017) ranks Cameroon relatively low (56 out of a score of 100), only ahead of a handful of countries, such as Eritrea, Djibouti, Libya, and Niger. The tracker ranks countries based on the separation of functions of the regulator, clarity of mandates, and robustness of both the competition framework and regulatory regime. The most significant challenges are with the competition framework and regulatory regime.

Mandates of the various institutions managing the ICT sector lack capacity and clarity. The Telecommunications Regulatory Board and ANTIC are responsible for overseeing the sector. ART operates under the technical supervision of the Ministry of Post and Telecommunications and is responsible for regulating, controlling, and monitoring the activities of telecoms operators, as well as ensuring compliance with relevant legislation and resolving disputes between operators. ANTIC has the mandate to promote and monitor the actions of public authorities in the area of ICT.

An audit confirmed that the executions of license obligations by operators were appreciable but that the quality of service was unsatisfactory.[15] In October 2018, ART concluded an audit of the quality of

[15] Arcep mobile service quality audit.

service of mobile operators. Among the factors affecting quality were instability of the power supply of antenna sites and the numerous cuts of fiber optic due to civil works on roads alongside which the fiber optic networks are laid down (Shema 2018).[16] This audit was carried out before the recent signing of the amendments to the concession agreements granted to the operators, without an appropriate regulatory framework. As a result, no financial sanctions were imposed. Protocols signed in February 2019 define the process for monitoring quality of service indicators, which will allow ART to control and finally carry out the operators' sanctions.

3.2 DIGITAL PLATFORMS

A legal and policy framework is not yet in place for government data archiving and digital preservation, and in practice, agencies define and apply their own procedures on the matter, when they exist. These aspects were not the main focus of the above-mentioned law on cybersecurity, which emphasized personal data protection and systems and networks security. More specific policies on ownership and licensing of government data were developed but have not yet been disseminated.

The government has not adopted, published, or disseminated a policy on open data. There is an open data initiative convening efforts for the collection, storing, and sharing of publicly available information through Cameroon's National Institute of Statistics (INS). The INS collects data and produces statistics on demand for other sectors but does not publish the results on its web platforms with regularity. Moreover, digital analytics are rarely used to analyze data for policy making, governance, and private sector development.

The digital government platforms offered across different government agencies are not interconnected and interoperable (Table 2). A major project aiming to connect all of the government offices at central, regional, and local levels by optical fiber launched in 2008. Due to financial constraints, the implementation of that priority project stopped in 2017. Shared systems have not been set up to offer digital platforms across government agencies to save cost and improve efficiency. Sharing systems would include data centers, connectivity networks, payment networks, online portals, content management systems, and certification authorities. Apart from using private telecommunication operators' networks for Internet access and hosting the websites of public agencies, the government does not have a partnership with the private sector in the managing or offering of shared systems.

Table 2. Key government digital platforms and their status

Platform	Purpose	Status
ANTILOPE	Payroll management system for public servants (salaries and pensions).	Compatibility problems with SIGIPES I.
SIGIPES I and II	Career management system for public servants. SIGIPES II is in development and will provide a single integrated platform to manage civil servants' career, payroll, and pension.	Data duplication and compatibility problems between ANTILOPE and SIGIPES I. They generate different registration numbers to single civil servants.
PROBMIS	Integrated Public Financial and Budget Management System managed by the Ministry of Finance with all of the ministries connected	Uses a dedicated network that is not always available.
SYDONIA	Automated Customs Management System.	Has been credited, along with performance contracts, for increases in customs revenue. Does not handle online payments.
COLEPS	Online e-procurement system managed by the Ministry of Public Contracts (MINMAP).	Lack of initial awareness and need for training of potential users. Has been piloted with several ministries and agencies with the objective to be operational with all MDAs by 2023.

[16] See https://energies-media.com/art-qualite-service-telephonie-internet-fourniture-elec/.

The majority of government agencies have their own websites that are static and rarely updated. The government does not have an integrated corporate presence on the Internet. Each government agency is in charge of managing its own information system. Most monitoring consists of tracking the number of individual visits to the websites. Users' satisfaction with the quality of government platforms and the services they deliver is not systematically monitored. Statistics are not collected at a central level. Key government digital platforms in Cameroon also face problems regarding the reliability of the electricity supply, availability of the Internet, the lack of system integration with other applications, and poor interconnection with local offices.

3.3 DIGITAL FINANCIAL SERVICES

In Cameroon, almost a third of the population is still excluded from financial services. Although Cameroon has a level of account ownership above 34 percent, it still scores below the median of Sub Saharan Africa countries (42.6 percent). Cameroon recorded sustained growth in the number of bank and mobile accounts between 2011 and 2017. As a lower middle-income country, Cameroon has a mobile money access rate (15 percent) that is closer to the average of low-income countries (17 percent). On average, there are only 3.64 ATMs per 100,000 adults.[17]

A few factors limit the growth of private sector participation in DFS. First, service providers perceive regulation to be too risk-averse. Also, person-to-person transfers attract a high tax rate in Cameroon. This situation should improve once the regulation allowing for payment institutions comes into place. The new regulation allows payment institutions to offer small amounts of credit that is also a positive for both the private sector and end users. The private sector should be able to offer additional products and services while end users are able to access financial services beyond an account of value.

The absence of a national and regional financial inclusion strategy limits DFS development in Cameroon, along with other lacking regulations and systems:

- *Fintech startups suffer from the lack of a clear legal category. The* new law on payment services as well as the current banking law does not address Fintech as a specific category of providers.
- *Mandating interoperability is seen as a weakness of the regulatory framework.* This law has the potential to disrupt the DFS market since it mandates all payment service providers to channel their transactions to the regional switch and ensure that all of their transactions are interoperable with the existing payment infrastructure.
- *There is no agent banking regulation.* Regulation and the technical limitations of mobile network operators' (MNOs) availability hamper service delivery in rural areas. No specific agent banking regulation allows non-banks to deliver financial services remotely.
- *Without a biometric identification system, challenges inevitably emerge,* such as exclusion, lack of interoperability, inefficiencies, and lack of robustness.
- *There is no regulation on the management of data privacy,* nor regulation concerning recourse for mistaken transactions.
- *The financial consumer protection framework on DFS lacks guidelines protecting customer funds and privacy.* The 2011 Emoney Directive regulates e-money, but it fails to require customers' funds to be safeguarded in at least one escrow account. Furthermore, it is silent on the possible uses of customers' funds, hence exposing them to risky investments.

Cameroon represents 41 percent of the regional volume of e-money, yet the supply of DFS is still not diversified. More sophisticated financial products (micro-credit and micro-insurance) are slow to

[17] IMF Financial Access Survey 2017. See https://data.imf.org/?sk=E5DCAB7E-A5CA-4892-A6EA-598B5463A34C.

develop. Trust in the formal financial sector is low, although the financial inclusion rate increased to 34.6 percent between 2014 and 2017. Despite various DFS initiatives, Cameroon is principally a cash economy, and the use of semi-formal credit unions and savings clubs is still high. The most common form of savings and loans is provided by community groups known as "njangis" in anglophone Cameroon or "tontines" in the Francophone parts of the country, which are part of the informal sector. These rotating savings and credit associations (ROSCA) are popular and generally formed based on common lifestyle factors.

The recourse to formal savings and borrowing is still scarce, and regulations do not yet allow digital credit. In 2017, only 10.9 percent of adults saved at a formal financial institution, while 31.9 percent declared they saved though an informal group or club (Findex). Borrowing from friends or family (32.7 percent) is much more popular than borrowing from financial institutions (7.7 percent).

Several other financial regulations in Cameroon restrict the issuance of e-money to banks. As a result of this restriction, telecom operators must offer financial services only in association with a bank. In addition, the regulator put a ban on telecom operators offering remittance services to countries outside the CEMAC region. All of these restrictions limit growth and the scaling-up of e-money services. Agents of telecom e-money service providers operate in rural areas, but due to network issues, there are several cases of agents and customers losing money in electronic transfers. Money transfer is still considered a postal service in Cameroon.

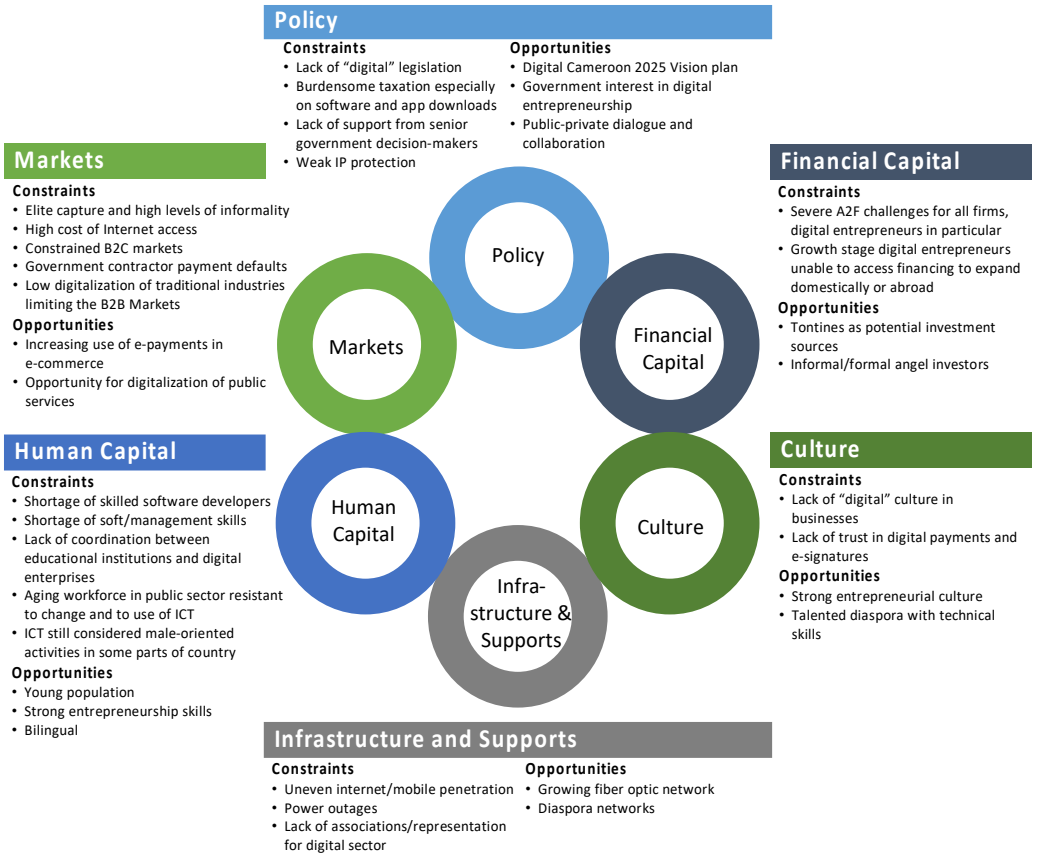
The government wishes to control USSD code pricing by telecoms operators from now on. Telephone companies operating in Cameroon will have to submit to the regulator pricing for access to Unstructured Supplementary Service Data (USSD) codes. This is the case, for example, of the code #150# of mobile operator Orange, which gives access to the Orange Money service, or *126# to access the money transfer service via mobile on MTN Cameroon.

Weak credit infrastructure hampers access to finance. Domestic credit to the private sector is low at 15 percent of GDP in the Central African Republic and Cameroon. According to business surveys, firms identify access to finance as a major constraint. The value of the collateral needed for a loan is very high. Insolvency frameworks are ineffective because of the limited capacity of the court system.

3.4 DIGITAL ENTREPRENEURS

The digital entrepreneurship ecosystem presents numerous constraints. A bilingual population and the increasing use of e-payments bring unique advantages. There is a growing investor community and support system. But Cameroon remains a minor player in the global digital economy in terms of exports of digital goods and technology acquisition. Digital enterprises offer products and services with low technology content. Digital startups remain small and have difficulty obtaining growth capital. And the difficult business environment presents challenges with regards to lack of financing, weak infrastructure, and burdensome taxation.

Figure 8. Constraints and opportunities of the digital entrepreneurship ecosystem in Cameroon



Digital enterprises in Cameroon offer products and services with low technology content. To date, no assessment of digital entrepreneurship has taken place in Cameroon, and little data exists on digital firms. An online survey revealed that most enterprises are online marketplaces, IT services, and cyber cafes, rather than high-value software programming and hardware development. The rare cases of digital innovation are process innovation or business model innovation.

Infrastructure and logistics deficiencies make it difficult for digital businesses to operate. Although the fiber optic network needs to be expanded, a more critical need is to stop weekly power outages occurring as often as 30 percent of the time outside big cities. The growing fintech sector is constrained by the high cost and lack of access to the Internet and requires partnerships with banks.

Because digital entrepreneurship is a relatively new phenomenon in Cameroon, the country lacks a coherent set of policies and regulations. For example, the lack of clarity and enforcement of regulations of digital transactions leads to a lack of acceptance by public and private actors. This hampers the speed of digital transactions and opportunities for creation of digital ventures.

New forms of taxation directly target digital markets. For example, the customs code and finance law states that software downloads will be taxed at 30 percent. When combined with the 18.25 percent VAT and other taxes, the taxes on importing software totals 57.62 percent.

The government and digital entrepreneurs have limited dialogue. Digital entrepreneurship still lacks voice and representation, and trust is lacking between the government and the private sector. A specialized body is needed for designing and implementing programs and policies supporting digital development.

Access to finance remains a key challenge for entrepreneurs, and it is even more acute for digital entrepreneurs at all stages. Local financial institutions and private investors do not understand the digital sector, adding to the lack of financial products for local entrepreneurs. Given the intangible nature of digital entrepreneurship, most businesses do not qualify for lines of credit even under government programs. Digital entrepreneurs are classified as high-risk/high-reward investments that make them attractive to venture capital firms once they can prove their business model.

Cameroon digital entrepreneurs are disconnected from global digital investors. Funding does not exist in the ideation stage—banks face their own liquidity constraints and digital enterprises find it difficult to demonstrate tangible profits. According to the IFC, the aggregate nominal amount of startup investments as a percentage of GDP remains the lowest in Sub Saharan Africa at 0.06 percent. According to VC4Africa, an online community of venture capitalists, angels, and entrepreneurs, 57 percent of African digital entrepreneurs self-fund their businesses, 11 percent receive support from friends and family, and 15 percent receive grants. Angel investment is still a rare phenomenon.

Educational institutions and digital enterprises lack coordination. The National Advanced School of Engineering, also called Polytechnique, has received equipment and technical assistance from the Bank, India, and Israel. Its small and medium size enterprises (SMEs) incubator and high-tech center have equipment that would be beneficial if rented out to digital entrepreneurs. However, the school and private entrepreneurs do not cooperate, leaving equipment underused.

3.5 DIGITAL SKILLS

The absence of a national framework, institutional arrangements, and quality formal education and training strategies impede the development of digital skills. Specifically, the main impediments are: no national digital skills framework that guides the training, self-training, and national certification of individuals' digital skills; no institutional arrangements for the systematic development of digital skills of teachers and trainers; low effectiveness of formal education and training strategies and methods; non-recognition by the formal education and training system of digital skills acquired through non-formal or informal learning; and low quantitative and qualitative training of experts and professionals.

Issues surrounding the digital strategic plan could compromise the harmonious development of the digital economy in Cameroon. These issues link to digital service provision, demand, governance, and training. Problems that could hinder service include the absence of a national broadband infrastructure plan in Cameroon; liberalization of the international access gateway market, with a view to reducing tariffs; high tariffs for high-speed Internet access; the weakness or even non-existence of a local industry dedicated to content production; and insufficient supervision and promotion of research and innovation.

Secondary education and general university education do not offer a diversity of professional skills related to digital professions; the same applies to general university education. However, the professional integration of graduates is possible through additional specialized training in private training centers. Several ICT training programs offer such programs: maintenance and installation of systems; development of traditional, web, and mobile application and software; network and system administration and security; database administration and security; and so forth. State and private universities offer vocational training leading to bachelor's or master's degrees in digital technology. Unfortunately, reliable statistical data are on these training programs are nonexistent.

With regard to general university education, the training of digital experts is mainly in three disciplines (mathematics, computer science, and physics) known for low student retention rates, and

there is no evidence of a plan to promote digital skills for girls and women. In particular, the capacity of trainers and researchers remains relatively low, although relevant data on this capacity are not available. In addition, verified data on annual training capacity of experts and professionals in the national formal education system in the digital field are not available. They include, but are not limited to, skilled workers (lower secondary level training), technicians (upper secondary level training), executives (long university education), and senior technicians (short university education). According to the Digital Inclusion index 2020 of the Economist Intelligence Unit, "despite evidence of government support for female ICT students, female digital associations and female-driven start-ups, there is no evidence of a plan to promote digital skills training for women. The key policy from the Ministry of Posts and Telecommunications, the Digital Cameroon: 2020 Strategic Plan, also does not include any specific initiatives targeted at women. The government of Cameroon does not have a policy to promote STEM education for females. While the Ministry of Posts and Telecommunications has two policy initiatives that come close to directly promoting STEM education for females, there is no explicit plan towards such a goal. Well-performing female ICT students are meant to be given support, according to the "Seven-Year Mandate". The Digital Cameroon: 2020 Strategic Plan only mentions offering support to the "technological and scientific vocations of women", without going any further. One notable initiative outside government, however, is the NextGen Centre based in Yaoundé. The center is a technological school with a special focus on girls, which currently has over 800 pupils who are trained in STEM-related courses."

Computer science education is in the official curriculum of all secondary education streams; yet, the weak equipment of schools limits this education. The additional costs required from each student for computer training have so far not equipped secondary schools. Computer rooms, where they exist, are generally underequipped. On the plus side, training of a body of secondary school computer science teachers began in 2007 at the Ecole Normale Supérieure de Yaoundé and became widespread in the higher teacher training schools. About 1,000 high school computer teachers have been trained to date.

Table 3. Current state of digital skills for school years (roughly ages 10–20, secondary school)

Indicators: Digital skills (life cycle)	Current status		Previous status		Trend and benchmark
	Year	Value	Year	Value	
Internet access rate (number of schools with Internet*100/total number of schools)	2016	19,60% [21]	2015	12,40% [20]	+7,17
The rate of Internet access in the public (number of schools with computers for students*100/total number of schools)	2016	10,9% [21]	2015	12%	-1%
Number of computers per student (total number of computers/total number of students)	2016	2.8% [21]	2015	2,5% [20]	+0,3

Source: Compiled by the authors of Rapport d'analyse des données statistiques du MINESEC 2015 and Carte Scolaire du MINESEC 2016.

Computer science courses are mainly theoretical where this education is provided. There is also a disparity between better-equipped urban areas and less-equipped rural areas, and between less-equipped public institutions and better-equipped private institutions.

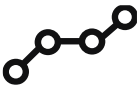
Several business schools exist in Cameroon,[18] but their training offers do not integrate the programs aimed at producing graduates specialized in e-commerce. The government subsidizes some large business schools, which unfortunately have the same mismatch problems mentioned above. Revision of the curricula for the training of digital skills in these schools is critical to produce specialists with the capacity to innovate in the sector.

[18] A list of these schools can be found at https://www.asso-apej.org/107+repertoire-des-grandes-ecoles-et-universites-du-cameroun.html.

In the public and private and formal and informal sectors, the digital skilled labor force is scarce. A passionate learner will later be forced to self-educate or acquire advanced knowledge in the informal world to be able to claim to develop applications requiring a certain level of complexity. Few companies will offer learners specialized development training, whether in the public or private sector. Developers with advanced digital skills will be more tempted to search for jobs abroad because of higher compensation.

4. KEY OPPORTUNITIES OF DIGITAL ECONOMY

Summary of each pillar's opportunities

 **Digital infrastructure**	Cameroon can embrace the digital economy by leveraging its assets, such as its geographic position and relatively extensive infrastructure. More competition and infrastructure sharing could reduce the capital expenditure for infrastructure, extend service to rural and underserved communities, and improve the efficiency of the broadband value chain. 4G mobile broadband developments could boost the growth of high-speed technologies, such as FTTH. Access networks can be improved. Acknowledging the coverage gaps and lack of economic rationale for private operators to invest in remote and sparsely populated areas, the regulator has been implementing several USF projects.	**STRONG**
 **Digital platforms**	Digital transformation could occur in various sectors through the development of back-office systems and service delivery platforms. There is a need for digital government platforms to centralize the delivery of administrative services for simplification and efficiency. Implementation of a one-stop-shop. Private companies could have more of a willingness to play a bigger role in supporting the development of digital government platforms.	**MEDIUM**
 **Digital financial services**	There is a large, untapped market for full digital payment interoperability. Service providers perceive regulation to be prudential. MFIs progressively embrace digital transformation. The low rate of financial inclusion and success of mobile money offerings indicate the demand and willingness to pay for formal DFS. Service providers perceive regulation to be too risk-averse, but this situation will be improved once the regulation allowing for payment institutions comes into place.	**MEDIUM**
 **Digital entrepreneurship**	There are encouraging examples of digital startups developing innovative business models for service delivery to local populations. Several regional digital businesses launched activities in Cameroon. Venture capital and private equity firms have limited activity, but recent trends are positive. Informal savings groups or tontines are potential sources of financing. E-payments in e-commerce show a promising increase.	**STRONG**
 **Digital skills**	Governments are setting up open public digital spaces. Informal education via online training platforms, such as Moodle and MOOCs, is a quality alternative to meet the short-term need for digital specialists. Every sector in Cameroon is affected by digital transformation, so the future needs for digital skills are enormous. Basic digital skills, such as data security and privacy, are in demand for consumer education and need to be included in formal and informal education and training systems. At the higher education level, the national strategy will be supported by the e-National Higher Education Network project, which aims to strengthen ICT usage, e-learning, and e-administration in Cameroonian universities.	**STRONG**

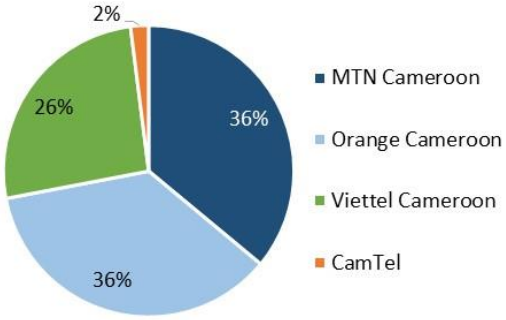
4.1 DIGITAL INFRASTRUCTURE

Cameroon can embrace the opportunities of the digital economy by leveraging its assets, such as its geographic position and relatively extensive infrastructure. Cameroon occupies a strategic geographical position and has important structural elements to play a central and driving role in the development of the digital space in Central Africa. It represents an ideal crossing point for traffic exchanges between the terrestrial infrastructures of the region. Cameroon is also the natural exit to submarine stations for Chad and Central African Republic, two landlocked countries. Optical fiber interconnection with Chad has been effective since 2012 and interconnection projects with Congo and Central African Republic are underway. All international communications from Cameroon as well as from Chad are routed through these cables. The arrival of the new SAIL transoceanic submarine cable directly connecting Brazil (Fortaleza) and Cameroon (Kribi) will enable Cameroon to further improve the security and redundancy of its international connections, in addition to increasing its capacity. This project will further strengthen Cameroon's political and economic status in the Central African region.

More competition and infrastructure sharing could reduce the capital expenditure for infrastructure, extend service to rural and underserved communities, and improve the efficiency of the broadband value chain. Camtel is the only operator licensed to sell capacity on the national network. While Viettel has also laid about 8,000 kilometers of optical fiber, the company is not authorized to resell capacity to other market players and restricts the network to its own use. This is a missed opportunity to improve the efficiency of this segment of the broadband value chain.

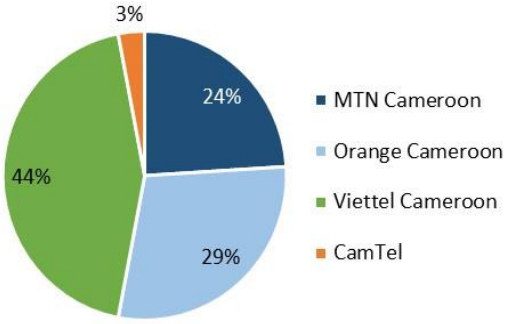
With the development of high-speed 4G mobile broadband (offering a user experience close to traditional fixed broadband technologies), it is expected that only very high-speed technologies, such as FTTH, will grow and that the existing ISPs relying on technologies other than FTTH will face significant challenges to remain competitive.

Figure 9. Market shares in the mobile market (2G+3G+4G subscribers), 2018



Source: Telegeography.

Figure 10. Market shares in the mobile Internet market (3G+4G subscribers), 2018



Source: Telegeography.

Acknowledging coverage gaps and the lack of economic rationale for private operators to invest in remote and sparsely populated areas, the regulator implemented a large variety of USF projects. All operators are required to contribute 3 percent of revenues (excluding taxes) to the USF. In 2017, 38 billion CFAF were spent on more than 50 activities that revolved around developing mobile networks coverage in rural, border, and remote areas; setting up polyvalent community centers; increasing digital communication; acquiring software and hardware; and deploying submarine cables. However, not all activities were finalized during the year and the reminder of the 2017 budget, 19.4 billion CFAF, was credited to the following year's fund to finalize pending and ongoing actions. Major difficulties, such as

slowness in the procurement procedures and lateness in having funds released, were encountered during the execution of the 2017 actions.[19]

4.2 DIGITAL PLATFORMS

The government prioritized digital transformation in various sectors through the development of both back-office systems and service delivery platforms. The emphasis is on developing the foundational elements of e-government with an integrated approach to strengthening government business and communication processes (government email domain, intranet, and so on), and developing more efficient tools to support public financial management. The health, education, agriculture, commerce, and tourism sectors were prioritized for the development of digital service delivery platforms.

Both businesses and citizens believe priority needs for digital government services should be the centralized delivery of administrative services for simplification and efficiency. A survey conducted in 2017 by the Korean consultant firm DAEYEONG UBITEC identified needs in terms of digital service delivery (Table 4). Local government officials believe service delivery, anti-corruption, and tax collection mechanisms should be the main focus. The private sector and citizenry believe the priority should be to increase the transparency and efficiency of administrative processes, including developing unique digital platforms for public service delivery (one-stop-shops). Leaders of private companies emphasized their need to play a bigger role in supporting the development of digital government platforms.

Table 4. Key findings of survey on e-government master plan

Target groups	Major complaints about service delivery	Most requested area for digital services
Local governments	-Service delays -Lack of information -Non-transparent service -Complicated process	-Public health -Taxation -Property and resident registration -Issuance of licensing -Vehicle licensing
Enterprises	-Service delays -Lack of information -Non-transparent and complicated processes	-Provision of online administrative services -Centralized service centers (one-stop-shops)
Citizens	-High taxation rate -Low quality of public health services -Complicated processes (registration, vehicle licensing, immigration, customs, property)	-Computerization of administrative processes -Centralized service centers (one-stop-shops)

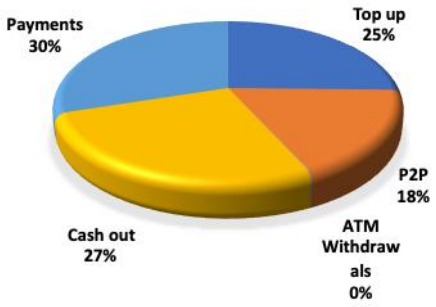
4.3 DIGITAL FINANCIAL SERVICES

There is a large, untapped market for full digital payment interoperability. Interoperability in e-money transactions should allow two e-money users, registered with two different institutions, to carry out financial transactions. If this is possible for international pre-paid cards (such as Visa or MasterCard), this was not yet the case in 2018 for mobile money. Several projects to implement this interoperability are underway at the initiative of mobile operators, the Cameroon state, and the Central Bank. In November 2018, the MTN and Orange groups announced an alliance to create mobile wallet interoperability (MOWALI), the firm that will be responsible for the interoperability of mobile money transactions between their respective subscribers. The service would also be accessible to other operators as well as to banks and MFIs. This initiative is currently being studied with various national authorities.

[19] Report of projects financed by the fonds spécial des télécommunications (FST), 2017.

Service providers perceive regulation to be too risk-averse, but this situation will be improved once the regulation allowing for payment institutions comes into place. Person-to-person transfers attract a high tax rate in Cameroon. The new regulation allows payment institutions to offer small amounts of credit that is also a positive for both the private sector and end users. The private sector is able to offer additional products and services while end users are able to access financial services beyond an account of value. Regulation needs to be more conducive by allowing non-banks to enter the financial market directly, which encourages the sector to grow.

Figure 1 Usage of DFS in Cameroon, 2018



MFIs progressively embrace digital transformation. Advans Cameroon is an MFI that has taken a new and innovative approach to DFS. To encourage savings, mobile cash collectors visit clients every day to collect deposits and use mobile phones to log transactions. In addition, a network of agent outlets offers CICO transfers used by clients and cash collectors. Advans also created a network of non-transacting agents responsible for administration, such as client registration and loan request processing.

The low rate of financial inclusion and success of mobile money offerings indicate the demand and willingness to pay for formal financial services (Figure 11). All of the service providers who were part of the mission understand the opportunity, given the high penetration of mobile telephony in the country. Furthermore, the cost of opening a bank branch in Cameroon was found anecdotally to be approximately US$600,000. Thus, DFS promises to significantly cut costs while simultaneously increasing outreach. For MNOs, the initial motivation of mobile money came from its ability to limit churn and promote customer loyalty. However, the significance of mobile money and its contribution to the bottom line has opened up new opportunities for revenues. As such, mobile money providers are fueled by a desire to offer additional services and expand their outreach further.

The absence of a national and regional financial inclusion strategy limits DFS development in Cameroon. Unlike several countries in Sub Saharan Africa, Cameroon does not have a national financial inclusion strategy despite recent progress in terms of financial inclusion, particularly with the introduction of the mobile money service by mobile operators. Having a clear financial inclusion strategy or roadmap can help define priority areas to tackle based on a preliminary diagnostic on access to finance.

4.4 DIGITAL ENTREPRENEURSHIP

There are encouraging examples of digital startups developing innovative business models of service delivery to local populations. For example, Gifted Mom employs 12 staff who provide medical follow-up and consultations by telephone to 52,000 pregnant women and young mothers nationwide. So far, Gifted Mom has raised more than US$220,000 through prizes and competitions.

An increasing number of regional digital businesses have launched activities in Cameroon. For example, Jumia, the largest e-commerce platform in Africa founded in Nigeria, opened its business in Cameroon in 2014. In 2016, the e-retailer expanded its network in Cameroon by reaching an agreement with Campost, the public postal operator, and incorporated the 234 interconnected post offices across the country, as well as Campost's delivery fleet. This innovative solution allowed Jumia to resolve the issue of lack of formal addresses that prevented home delivery.

Venture capital and private equity firms (VC/PE) have limited activity in Cameroon, but recent trends are positive. According to the World Economic Forum Global Competitiveness Index, access to venture capital has been slowly but steadily improving since 2010. However, these trends start from a very low base, and VC/PE firms in Cameroon still receive minimal investment from domestic institutional investors, such as pension funds and insurance companies. Most VC/PE funds are financed by foreign investors, including diaspora funds.

Informal savings groups or tontines are potential sources of financing. Tontines are popular traditional savings groups that allow people to pool their funds together to finance loans. The startup iDjangui, based in Douala, is an online tontine that allows users to finance individuals or businesses using funds stored in their mobile wallets. The startup works with MTN as its mobile network partner and launched its pilot in May 2019; its application has been available since March 10, 2020. iDjangui hopes to act as a bridge between tontines and banks.

4.5 DIGITAL SKILLS

On the demand side of digital skills, strategic actions consist first to ensure the digital transformation of the administration and companies, and then to promote the digital culture by generalizing the use of ICT in society. Governance and regulation are in turn included in the areas of digital confidence building; assurance of human capital development and digital leadership; and finally, assurance of improved governance and institutional support. Demand issues include: (1) the low rate of access to high-speed Internet by businesses, (2) the slow process of digitizing public service administrative procedures; (3) the low availability of online services; (4) the low digital transformation of society; (5) the very low rate of access to high-speed Internet by households; (6) a low culture of ICT use; and (7) the low transformation of business sectors due to the low availability of ICT solutions.[20]

Governments are setting up public digital spaces that are open to all. These sites are designed to provide discovery, training, and support services for the use of digital technology. They take different names depending on their main targets: telecentres, fablabs, tech hubs, incubators, and so forth. The government's Multipurpose Community Telecentres project was a less successful example of this approach. In addition to this mixed government initiative, other initiatives (mainly private) to create fablabs are beginning to emerge, such as Ongola FabLab in Yaoundé.

Informal education via online training platforms, such as Moodle and MOOCs, is a quality alternative to meet the short-term need for digital specialists. New opportunities for online certification training are being created, as are MOOCs and many tutorials in a wide variety of fields. A 2017 study shows that there is a crisis in higher education in Sub Saharan Africa, including Cameroon (Roland and others 2017). The study shows a mismatch between the skills required in the field and those taught in the classroom, and that higher education must play a social and development role and focus on the widespread use of ICT. Although these online training methods can produce digital professionals, they remain informal.

The Cameroonian entrepreneur must be trained to remain competitive. If we assess the performance of national companies and the quality of Cameroonian business leaders, the proportion of entrepreneurs who could be described as "without a diploma" or as graduates of primary education may pose a problem. Yet, they do have smartphones that allow them to access social network content and even participate in e-commerce. An education and training strategy must be designed for this category of company.

[20] Government of Cameroon's Plan Stratégique Numérique Cameroun 2020.

The Cameroonian government is undertaking a e-National Higher Education project to help develop basic digital skills. The main objective of this project is to modernize the national higher education system by supporting the development of learning based on ICT. The implementation of this program is organized around two main actions: (1) the provision of one laptop to each student and (2) the development of the infrastructure for e-learning and e-administration.

Box 1. Examples of successful informal digital skills training

- The **Ministry of Women and Family Development** (MINPROFF), in association with ORANGE Cm, supports women in the management of income-generating activities using ICT. The latest achievement of this movement is the creation of a digital home at the Centre for the Advancement of Women and the Family in Akono.
- The **Maker Camp,** a gathering of digital enthusiasts, held their first assembly in November 2018, bringing together more than 150 young people from across Cameroon. It was organized by Ongola Fablab ("fablab solidaire de Yaoundé") under the theme "Digital entrepreneurship: the contribution of digital manufacturing."
- **Africa Code Week** is an initiative by the software company SAP that aims to strengthen digital education in Africa and provide young people with the skills they need for the 21st century. This initiative has trained more than 2.3 million young people in 37 African countries.

All sectors without exception in Cameroon are affected by digital transformation; the future need for digital skills is enormous. The sectors of education, e-commerce, health, agriculture, administration, postal services, and tourism will rely on the development of web responsive and mobile platforms. This great interest is even manifested in advanced research at the university level, where researchers can develop and experiment with new models adapted to local realities based on the fundamentals of artificial intelligence, the Internet of Things, and so on. Camtel and the University of Yaounde signed in July 2019 an agreement to build a Centre for Innovation and Training in Artificial Intelligence. The centre should be operational by the end of 2020.

Basic digital skills, such as knowledge data security and data privacy, are in demand for general consumer education and need to be included in formal and informal education and training systems. Programs to be included at all levels of the education system could include, for example, (1) knowledge in protecting one's personal data, mostly in the context of digital commerce where sensitivity of data is the most important issue to care for to prevent financial losses; and (2) what is a strong password, its relevance, and how to create and protect those type of data. These can be required learning programs to integrate in consumer education. Education related to data security should include teaching and knowledge on the protection of software programs and computer data and communication systems against unauthorized access, modification, destruction, disclosure, or transfer, whether accidental or intentional, by building physical arrangements and software checks.

5. RECOMMENDATIONS

PRIORITIZED RECOMMENDATIONS BY TOPIC AND PILLAR

Topics	Pillar	Objectives	Priority	Horizon
Policy and regulatory framework	Infrastructure	1. Improve the legal and regulatory environment to lower barriers to entry, especially on markets where Camtel enjoys a dominant position	High	Short-term
		2. Reorganize the institutional framework and sectoral regulation	High	Medium-term
	Platform	3. Update the legal and regulatory frameworks for coherent development of e-government and e-commerce platforms	High	Short-term
		4. Develop technical standards and an interoperability framework	Medium	Medium-term
	Financial	5. Provide support to the BEAC to improve mobile money regulation	High	Short-term
		6. Design national strategies and frameworks for cybersecurity, consumer protection, and financial inclusion	Medium	Medium-term
		7. Strengthen financial transparency and implement a financial reporting strategy	Medium	Medium-term
	Entrepreneurship	8. Create regulations and policies to enable digital entrepreneurship	High	Medium-term
	Skills	9. Update the national education system as related to digital skills development	High	Medium-term

1. **Improve the legal and regulatory environment to lower barriers to entry, especially on markets where Camtel enjoys a dominant position** to increase investment in networks, lower prices, and improve the quality of digital services. A systematic approach is needed, starting with an institutional and regulatory framework to address Camtel's monopoly of connectivity infrastructure. The financial viability, or lack thereof, of operators stemming from monopoly threats leads to the concentration of limited resources in more profitable areas, risking the extension of broadband infrastructure to rural and remote areas. Beyond this, policy and regulatory instruments should target geographic areas and/or populations where there is a market failure to reduce digital divides. For the national and international wholesale markets, market dominance criteria should be defined and appropriate tools and regulatory measures implemented (cost models, catalogs of interconnection, separation of accounting, and so on). Increased operator competition would stimulate the use of existing infrastructure (such as Camtel backbone, submarine cable landing stations, and so on) and lower service prices for users.
2. **Reorganize the institutional framework and sectoral regulation** to clarify roles and responsibilities, sectoral challenges, and the "convergence" of services and growing influence of

the use of digital in other economic sectors. The roles of the Ministry of ICT and the Regulator need to be clarified. Improving the institutional framework is the first step for effective implementation of regulatory reforms.

3. **Update the legal and regulatory frameworks to promote the integrated and coherent development of digital platforms for e-government and e-commerce**. Comprehensive legislation is needed for e-government, with regard to government data archiving, open data, and so on. A stocktaking of existing regulation would determine gaps and whether they are best addressed through new legislation or adapting and updating existing legislation. This should include assessing the implementation of existing policies on cyber data security and data protection as well as the implementation of more specific policies on ownership and licensing of government data. Measures to further the development and access to e-payment methods should be undertaken. The legal and regulatory framework for e-commerce adopted in 2010 needs updating. A fragmented approach to developing legislation should be avoided to ensure coherence.
4. **Develop technical standards and an interoperability framework.** Different government agencies have developed digital platforms in Cameroon; however, none of those applications can interact or interoperate with one another even when beneficial. To enhance coherence and facilitate the exchange of information, technical standards are needed for data management and processing and an interoperability framework defined to converge relevant digital platforms, as well as with relevant third parties.
5. **Provide support to the BEAC to improve mobile money regulation.** The legal framework should address, among others, the specific usage of customers' funds. It is recommended that the BEAC require that the funds not be placed in risky assets but rather liquid ones. The regulation should also forbid payment of interest on e-money accounts and clarify the possibility of sharing profits with e-money account holders. In the contract agreement with the consumer, e-money issuers should provide disclosures on fund reimbursement, transparency of fees, and customer claim support numbers.
6. **Design national strategies and frameworks for cybersecurity, consumer protection, and financial inclusion**. The government recognizes the roles and responsibilities of various stakeholders in the protection of Cameroonians' interests in cyberspace[21], however, no steps have been taken to establish a cybersecurity strategy. It is recommended that the government establish an observatory of financial services to act as a mediator between financial service providers and consumers but also to ensure that price transparency rules are complied with. The consumer protection framework should not only focus on the financial access space but should also include e-commerce and other e-services (health, education, etc.)
7. **Strengthen financial transparency and implement a financial reporting strategy.** The strategy should include: (1) a regional credit registry, a regional balance sheet database, and credit information bureaus, accessible to financial institutions to facilitate the granting and management of credit; and (2) the strict application of the requirement for financial institutions to publish their financial statements, which should help develop the interbank market.
8. **Create regulations and policies to enable digital entrepreneurship** with regards to streamlining business registration, simplifying tax code, and reducing corruption. The capacity of public officials and policy makers needs to be built to advocate the digital agenda and design effective national policies.
9. **Revise the national education system** as related to digital skills development to focus on basic

[21] Note: the World Bank undertook a review of the maturity of cybersecurity capacity in Cameroon at the invitation of the Ministry of Posts and Telecommunications (MINPOSTEL) in 2019. The consultations took place using the Centre's Cybersecurity Capacity Maturity Model (CMM), which defines five dimensions of cybersecurity capacity: i) Cybersecurity Policy and Strategy; ii) Cyber Culture and Society; iii) Cybersecurity Education, Training and Skills; iv) Legal and Regulatory Frameworks and v) Standards, Organizations, and Technologies.

digital skills, digital specialist skills, and specialized digital skills. Underprivileged populations with limited means should be considered at all levels and scholarships could play a more important to underprivileged populations in accessing digital skills training at university level.

Topics	Pillar	Objectives	Priority	Horizon
Resource management and coordination	Infrastructure	10. Develop asymmetric regulation to facilitate the entry of new operators	High	Short- to medium-term
		11. Revise legal and regulatory frameworks for different exploitation rights	Medium	Medium-term
	Platform	12. Promote the ".cm" domain name, which is Cameroon's only digital territory at the international level	Low	Short- to medium-term

10. **Develop asymmetric regulation to facilitate the entry of new operators** and the provision of regulatory tools adapted to this environment. This would promote an increase in foreign investment in the sector (telecom operators, innovative service providers, and so on).
11. **Revise legal and regulatory frameworks for different exploitation rights** to promote the migration of existing licenses to simpler and more equitable guidelines. This would improve competition between operators and reduce regulatory uncertainty for present players and potential investors.
12. **Promote the ".cm" domain name, which is Cameroon's only digital territory at the international level.** This domain would help settle questions of confidence in the security and serenity of the business environment. Even Cameroonian officials, national emblems, and entities do not use Cameroonian digital identifiers to communicate. It should be taught at school in the ICT Basic Training Manual.

Topics	Pillar	Objectives	Priority	Horizon
Digital Inclusion	Infrastructure	13. Review the operation of the USF	Medium	Short- to medium-term
	Platform	14. Extend broadband connectivity to targeted rural areas and support with institutional targeted capacity building	Medium	Medium- to long-term

13. **Review the operation of the USF** to strengthen the deployment of broadband in rural and peri-urban areas and potentially subsidize access to specific user groups (isolated villages, poor households, women, people with disabilities, and so on). This could stimulate the adoption of digital services by populations currently excluded from the digital economy. If no improvements are made in the coming years, the Government should consider the possibility to disband the USF.
14. **Extend broadband connectivity to targeted rural areas and support with targeted capacity building.** The government should increase investments to improve broadband connectivity to rural areas and local governments especially in those areas. In the latter case, civil servants should receive capacity building and training programs to manage the digital platforms. The interconnection of government institutions to the national fiber optic backbone is a priority of the digital strategic plan. Such initiative is particularly relevant in the ongoing COVID-19 crisis, in

which government and business continuity relies more and more on virtual interactions.

Topics	Pillar	Objectives	Priority	Horizon
Governance	Infrastructure	15. Develop a framework for collaboration between the various public bodies (electricity, oil, and gas)	High	Long-term
	Platform	16. Prioritize and coordinate the implementation of government digital platforms for uptake	High	Short-term
	Financial	17. Support national credit bureau implementation	Medium	Short- to Medium-term

15. **Develop a framework for collaboration between the various public bodies** to facilitate access to infrastructure networks (for example, electricity network and oil pipelines). Better collaboration with other infrastructure sectors would pool certain investments and reduce network deployment costs.
16. **Prioritize and coordinate the implementation of government digital platforms for uptake.** The government elaborated a lengthy plan to develop and integrate digital platforms to provide services to businesses and citizens. However, given limited resources, the government should identify existing platforms to strengthen and new ones to implement in a coordinated manner on the basis of select criteria, such as the need and potential for transformative impact on people's lives, cost-benefit analysis, and realism of implementation. Platforms particularly relevant for the mitigation of (and recovery from) the COVID-19 crisis could also be prioritized. The digitization of the delivery of routine key administrative services with the necessary built-in identification verification mechanisms (civil registration, licenses, and so on) would meet these criteria. Digitizing and protecting government records and data and establishing the foundations of e-government should also be a first step. The needs of people with disabilities should be fully incorporated in the design of these platforms.
17. **Support national credit bureau implementation**. The absence of a national credit bureau hampers proper evaluation of creditors and potential credit; hence the low availability of funds being channeled to the private sector. The current support to the regional credit registry could be revised to include national antennas to evolve in national credit bureaus. Alternative scoring methods could also feed into the credit database to enhance access to credit.

Topics	Pillar	Objectives	Priority	Horizon
Regional	Financial	18. Support effective implementation of interoperability by GIMAC	Medium	Medium-term

18. **Support effective implementation of interoperability**. The GIMAC (*Groupement interbancaire monétique de l'Afrique centrale*) will need support in rolling out the process. This project could be run in three main components: (1) improve and adapt the infrastructure of the GIMAC; (2) improve and adapt the regulatory framework; and (3) obtain stakeholder engagement. Implementing e-government platforms at the treasury level can increase tax collection and other revenue streams from its citizens (aligned with SDG 17.1) by offering faster, more secure, less expensive, and more transparent payments via mobile money.

Topics	Pillar	Objectives	Priority	Horizon
Services	Infrastructure	19. Develop monitoring tools and compare	Low	Medium-

		tariffs for citizens		term
	Platform	20. Involve citizens upstream in the design of government digitally enabled services	Medium	Medium-term
	Entrepreneurship	21. Increase incentives for angel investors and support the structure and capacity of angel networks	Medium	Short-term
		22. Develop innovative crowdfunding solutions to share risks among several investors	Medium	Short-term

19. **Develop monitoring tools and compare tariffs for citizens** as well as the quality of services, for the regulator to improve the quality of service and transparency on service prices.
20. **Involve citizens upstream in the design of government digitally enabled services** to ensure they respond to their needs and for ease of use. Efforts to consult the private sector and citizens in the elaboration of the 2017 ICT master plan was a good start, but the government should go further in involving citizens upstream in the design of platforms as well as iteratively in implementation to improve offerings and services. Increasing digital literacy (including of women) is another key aspect of uptake.
21. **Increase incentives for angel investors and support the structure and capacity of angel networks to drive investment into early-stage digital businesses.** Supporting setup and operational costs can increase the number and quality of angel investors in Cameroon.
22. **Develop innovative crowdfunding solutions based on tontines principles to share risks among several investors**. Formalizing the tontines principles could provide much needed credit for digital entrepreneurs as a source of startup capital and especially as a source of working capital.

Topics	Pillar	Objectives	Priority	Horizon
Ecosystem	Platform	23. Promote open data and citizen feedback	Medium	Medium- to long-term
		24. Enhance the security of the national cyberspace	Medium	Medium- to long-term
	Financial	25. Support bill payment aggregation and fintech development	Medium	Medium- to long-term
	Entrepreneurship	26. Promote the scaling up of existing digital incubators that are privately run and have proven results	High	Short-term
		27. Expand current markets and create new ones for digital technologies	Medium	Long-term
		28. Develop a platform for public-private dialogue on the digital agenda	Medium	Short-term
		29. Strengthen the links between Silicon Mountain, Douala, and Yaoundé's digital entrepreneurship ecosystems to create digital corridors	Medium	Medium-term
	Skills	30. Create a formal innovation framework to encourage, organize, and supervise digital incubators and their outputs	Medium	Medium-term

		31. Reactivate the *Réseau Interuniversitaire du Cameroun* (RIC) project	Low	Short-term

23. **Promote open data and citizen feedback to foster a culture of trust and transparency and spur innovation and collaboration**. This will include working with key institutions, such as the INS, to make key datasets available for free in a machine-readable format and reusable without requiring any permission, as well as regularly releasing publicly updated data. A quick win for all ministries would be to ensure their websites are regularly updated and provide at a minimum an interface with users for their opinions and feedback.
24. **Enhance the security of the national cyberspace** to facilitate and increase the use of digital platforms. To make sure Cameroon's cyberspace is reliable, actions need to be undertaken to strengthen citizens' trust in digital platforms. The main objective is to increase Cameroon's cybersecurity index, per the government's own 2020 objective. This can be done by securing government applications, enhancing the trustworthiness of private digital platforms (including through regulation, notably to provide more clarity regarding authentication of e-contracts and e-signatures), and promoting best practices for social media networks with regard to security and privacy.
25. **Support bill payment aggregation and fintech development, especially in the context of the COVID-19 crisis**. To reduce fragmentation of the bill payment process as is the case in Cameroon, the IFC could work with utility companies to create a common aggregator that will help facilitate bill processing, improve speed, and reduce cost. In Cameroon, 30 percent of mobile money is used toward bill payment. In the fintech area, the current hub could be enhanced with the creation of an Innovation Fund that will help support fintech development through matching grants. Powering FinTech is a one way to support the most impacted businesses and communities, as economies are increasingly relying on fintech to stay afloat, and demand for services such as mobile payments, food delivery, and e-commerce shopping will grow exponentially.
26. **Promote scaling up of existing digital incubators that are privately run and have proven results.** Identify options for improving their work and scaling up results through targeted government programs. Digital incubators have the potential to support start-ups involved in developing or deploying innovative services, in response to the COVID-19 crisis (e.g. health monitoring systems, virtual tools for businesses and citizens, etc.). Include rigorous M&E and a results framework as part of the scaling-up strategies.
27. **Expand current markets and create new ones for digital technologies** across all sectors as well as within the government and public contracting, to improve the scope and reach of public services. The potential of crowd-working platform should be explored, especially for women with mobility hurdles and time constraints, as crowd-working platforms have the potential to increase employment opportunities for women (and also youth).
28. **Develop a platform for public-private dialogue on the digital agenda**. This dialogue should go beyond existing organizations, such as GIKAM, and involve digital startups and their representatives.
29. **Strengthen links between Silicon Mountain, Douala, and Yaoundé's digital entrepreneurship ecosystems to create digital corridors.** This could be done through incentives for joint applications to programs that span on both ecosystems, national mentorship programs, networks and exchanges, and support increased links between the ecosystems.
30. **Create a formal innovation framework to encourage, organize, and supervise digital incubators and their outputs.** The framework would help regulate the innovation skills of specialized digital platforms. Several sectors are involved, particularly in e-commerce, health, transport, and agriculture.

31. **Reactivate the *Réseau Interuniversitaire du Cameroun* (RIC) project** and make the E-National Higher Education Network project operational. Both projects are fundamental infrastructure for educational innovation and the expansion of digital skills. These projects can make it possible to implement continuous training programs to strengthen the capacities of learners of all types and develop online courses and other virtual or video conference spaces to support pupils, students, and disadvantaged groups.

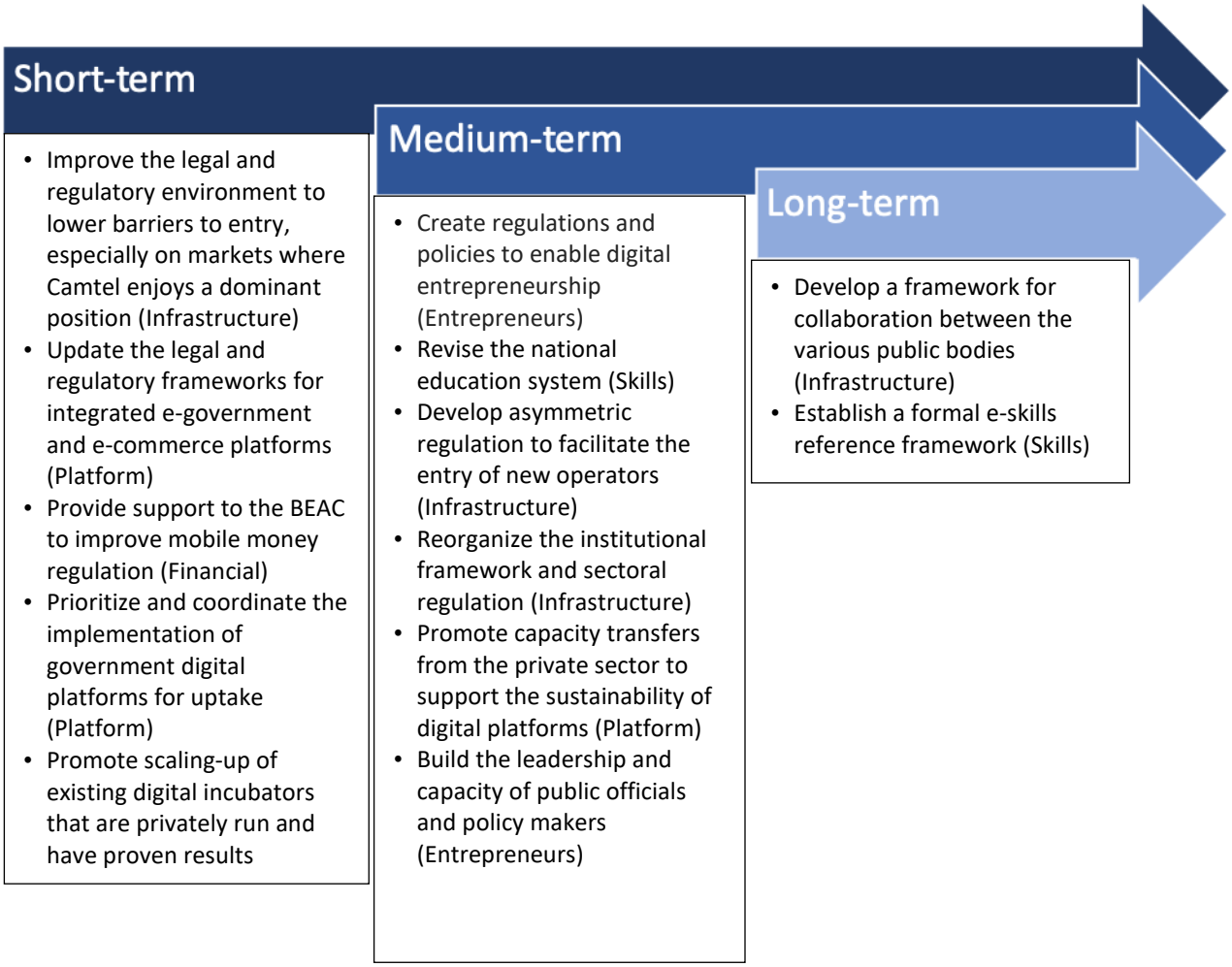
Topics	Pillar	Objectives	Priority	Horizon
Capacity Building	Platform	32. Promote capacity transfers from the private sector to support the sustainability of digital platforms	High	Medium-term
	Financial	33. Provide advisory services to DFS stakeholders in such areas as benchmarks, pricing, and market insights.	Low	Medium-term
	Entrepreneurship	34. Build the e-leadership and capacity of public officials and policymakers to design and implement digital policies including e-procurement	High	Medium-term
		35. Support adoption of digital technologies in traditional industries including digital money, digital marketing, e-commerce and the digital presence	Medium	Short-term
	Skills	36. Establish a formal e-skills reference framework	High	Long-term
		37. Implement rapid training courses	High	Short-term
		38. Create a free zone to conduct pilot experiments on digital skills	Medium	Short-term

32. **Promote capacity transfers from the private sector to support the sustainability of local digital platforms.** In addition to the investments that need to be made to develop the right digital skills and foster digital entrepreneurship,[22] the government can foster links between multinational companies and the domestic private sector to facilitate technology development and transfer of knowledge and skills. Also, they can embed such capacity transfer programs in government initiatives for the maintenance and sustainability of digital platforms.
33. **Provide advisory services to DFS stakeholders in such areas as benchmarks, pricing, and market insights.** Product innovation and fintech can only be propelled if knowledge and benchmarks are provided to DFS providers. Another advisory area could be pricing and transparency as well as the current update of the regulatory framework. IFC could help obtain market insights to ensure the BEAC incorporates providers' needs while preserving risks. Another area of advocacy could relate to digitization of government payments.
34. **Build the leadership and capacity of public officials and policymakers for advocating the digital agenda and designing national policies**. This could be done through government recognition and award of good practices, training, and capacity development, and knowledge exchange with other countries. The COVID-19 crisis is leading countries to accelerate dramatically their digitization, given social distancing measures as well as travel restrictions. Public officials need to learn and absorb quickly best practices and solutions, to be adapted and implemented in the country.

[22] Identified as the key hurdles and prerequisites to the development of digital platforms in Cameroon by officials consulted in MINPOSTEL.

35. **Support adoption of digital technologies in traditional industries, which would increase their resilience to the COVID-19 crisis.** Based on the results of the technology adoption survey and in collaboration with the private sector (e.g., investors, lead firms), the government should launch targeted programs for digital technology adoption in industries such as agriculture and agribusiness that can have a transformational impact on productivity and livelihoods as well as expand digital markets. Based on lessons of experiences from other SSA countries, the e-Voucher program for smallholder farmers may provide a platform for collaboration between the government and digital businesses and activate new markets for digital services (World Bank, 2019). Other sectors may also benefit from similar initiatives, especially as the COVID-19 crisis is generating strong constraints in terms of supply chains, customers interactions, staff management, etc.
36. **Establish a formal e-skills reference framework for digital skills.** Cameroon should complement the initiatives already underway with a formalized reference framework. Such a tool would serve as a strategic orientation guide for the development of digital skills for the country and define the common basis for new programs. It could be a free online platform for assessment and the certification of digital skills, which would be co-administered by any eligible ministry. This framework could eventually provide a response to digital mediation problems. By coupling an artificial intelligence module to this platform, it will also be able to identify new training needs and possibly make recommendations regarding learners' profiles. Digital skills capacity building interventions at the TVET level should also be considered.
37. **Implement rapid training courses tailored to the needs of new technologies** that would bring the supply in line with the demand and thus supply the sector with a skilled workforce. This would initiate a virtuous circle that would foster digital innovation and entrepreneurship.
38. **Create a free zone to conduct pilot experiments on digital skills.** This could provide a favorable framework for the implementation of ongoing projects relating to training and professional integration, digital transformation, and improvement of the business climate.

Figure 15. Timeline for high-priority activities



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