Madagascar Digital Economy Assessment

JUNE 2019

WORLD BANK GROUP

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Background and rationale to the Digital Economy Assessment (DEA)

The World Bank's new **"Digital Economy Moonshot" for Africa (DE4A)** calls for every African individual, business and government to be digitally enabled by 2030. These goals include five pillars and high-level targets, as shown below:
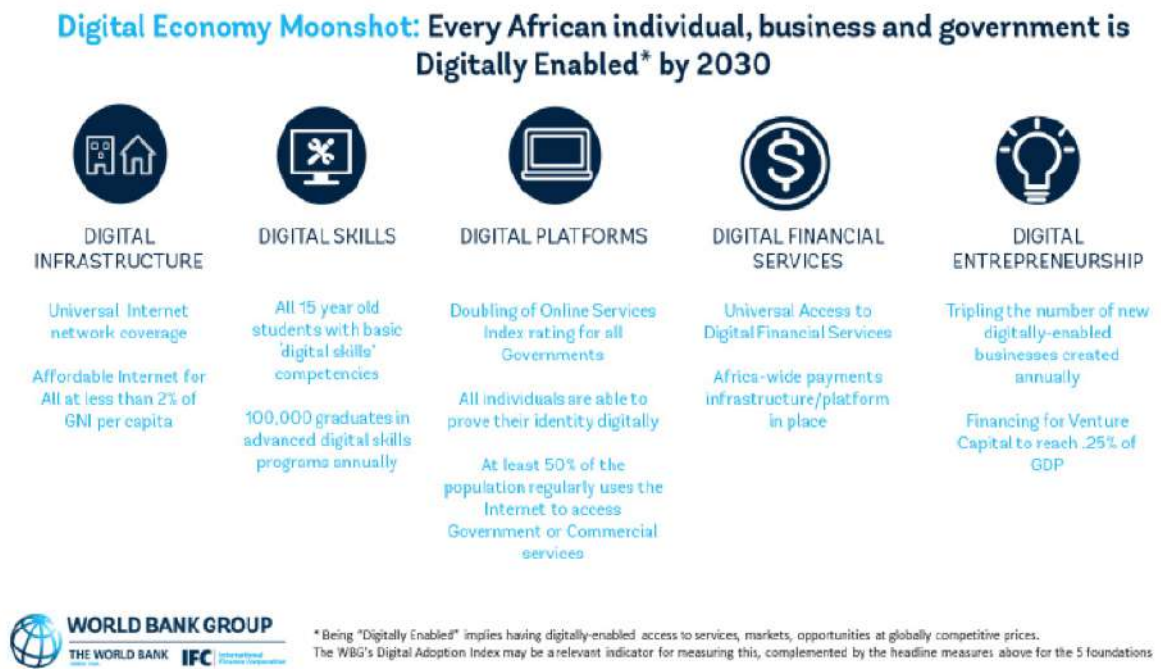
Figure 1: The five pillars of the digital economy and corresponding high-level targets (Digital Economy Moonshot for Africa, DE4A)

▸ *Digital Infrastructure:* the availability of affordable and quality internet, which is instrumental to bringing more people online.

▸ *Digital Skills*: the development of a tech-savvy workforce with both the basic and advanced digital skills to support increased technology adoption and innovation, by developing and applying digital technologies in ways that creates new opportunities.

▸ *Digital Platforms*: the presence and use of digital platforms that can support greater digital exchange, transactions and access to public and private services online.[1]

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1   For smoother narrative and alignment concerning digital private sector development – the parts related to commercial platforms have been merged with the section on entrepreneurship.

▶ *Digital Financial Services:* the ability to pay, save, borrow, and invest through digital means, which is key to accessing digital services and increasing the rate of online transactions.

▶ *Digital Entrepreneurship*: the presence of an ecosystem that supports firms to generate new products and services leveraging new technologies and business models, which can widen and deepen digital economic transformation.

The DEA is designed as a practical guide on the state of digital economies across Africa, and aims to identify key levers and constraints that can be lifted through targeted reform programs. It is based on the DE4A integrated framework, and can serve as a first step in building a national dialogue on how to further a country's digital economy, taking into account its specificities and national priorities.

Acknowledgements

Acronyms

ADSL	Asymmetric Digital Subscriber Line
AMIC	Association Malagasy des Investisseurs en Capital
AML	Anti-Money Laundering
ANRE	National E-Governance Agency
API	Application Programming Interface
ARPU	Average Revenue Per User
ARTEC	Autorité de Régulation des Technologies de Communication
ATM	Automatic Teller Machine
B2B	Business to Business
B2C	Business to Customer
B2G	Business to Government
BCMM	Madagascar Mining Cadastre
BEPC	Secondary Education Degree
BCM	Central Bank of Madagascar
BOA	Bank of Africa
BPO	Business Process Outsourcing
C2C	Customer to Customer
CEDS	Diplomatic and Strategic Study Center
CEPE	Primary Education Degree
CERT-MG	Computer Emergency Response Team – Madagascar
CMIL	Commission malagasy sur l'informatique et les libertés
CNaPS	National Social Security Agency
CNTEMAD	National Centre of Distance Learning of Madagascar
CPDCE	Committee for the Development of Electronic Commerce
CSBF	Banking supervisor
CTMM	Centre de Traitement Monetiques de Madagascar
DDoS	Distributed Denial of Service attacks
DE4A	Digital Economy Moonshot for Africa
DEA	Digital Economy Assessment
DFS	Distributed File System
DGA	Django Girls Antananarivo
DGI	Tax General Directorate
DGSU	Digital Government Services Unit
DREN	Regional Directorate of the National Education
DSI	IT Department
EASSy	East African Submarine Cable System
EDP	Economic Development Paper
ENAM	National School of Administration of Madagascar
ENI	National School of Computer Science

FDTIC	Universal Access Fund
Fintech	Financial Technology
FRAM	Parents Association (School)
GDP	Gross Domestic Product
GDSU	Global Digital Service Unit
GNI	Gross National Income
GSMA	Global System for Mobile Communications
HHI	Herfindahl–Hirschman Index
ICT	Information and Communications Technology
IEM	Initiative Emergence Madagascar.
IFC	International Finance Corporation
IMF	International Monetary Fund
IT	Information and Technology
ITU	International Telecommunication Union
IXP	Internet exchange point
KM	Kilometer
KPO	Knowledge Process Outsourcing
KYC	Know Your Customer
LDC	Least Developed Countries
LFS	Labor Force Survey
LIONS	Lower Indian Ocean Network
LMD	License, Master, Doctorate
MB	Megabyte
Mbps	Megabyte per second
MEF	Ministry of Economy and Finance
MEN	Ministry of Education
MFI	Microfinance Institutions
MFPRATELS	Ministry in charge of Public Functions
MG	Madagascar
MGA	Malagasy Ariary
MGIX	Madagascar Global Internet eXchange
MID	Ministry of Interior and Decentralization
MNO	Mobile Network Operator
MPTDN	Ministry of Telecommunications, Posts and Communication
MSME	Micro, Small and Medium Enterprises
NCSI	National Cybersecurity Index
NDP	National Development Plan
NIF	Fiscal Identification Number
NTIC	Nouvelles Technologies de l'Information et Communication
OMNIS	Office of National Mines and Strategic Industries
PAPSP	Public Sector Performance Project
PDF	Portable Document Format

PFM	Public Financial Management
PGDI	Governance and Institutional Development Program
PIC	Integrated Growth Poles Project
PoPs	Point of Purchase
PPP	Public Private Partnership
PREA	Reform Program for the Efficiency of the Administration
RTGS	Real Time Gross Settlement
S.A	Société Anonyme
SADC	Southern African Development Community
SIGFP	Integrated Public Finance Management System
SIGMP	Integrated Procurement Management System
SME	Small and Medium Enterprises
SMS	Short Message Service
SOE	State Owned Enterprise
SONAPAR	National Society of Participation
SOP	Series of Projects
Telma	Telecom Malagasy
TVET	Technical and Vocational Education and Training
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
USA	United States of America
USD	United States Dollar
USF	Universal Service/Access Fund
VAT	Value-Added Tax
WB	World Bank
WiMAX	Worldwide Interoperability for Microwave Access

Summary of Main Findings and Recommendations

Summary of main findings and recommendations

DIGITAL INFRASTRUCTURE

Key Issues

▸ Mobile and internet penetration remain low

▸ Affordability is the main constraint to internet usage in Madagascar

Recommendations

▸ Devise and implement a national broadband plan that contains concrete and realistic targets and timelines for increased internet penetration

▸ Enforce legislation that promote market competition as well as the efficient and transparent use of the universal access fund (FDTIC)

DIGITAL PLATFORMS

Key Issues

▸ Madagascar lacks a central coordination unit for all digital government services, resulting in highly segmented initiatives. The lack of a unique identifier across databases further hampers the possibility of integration.

▸ Prioritize a select number of flagship projects, while strengthening identity management systems (and unique identifier). Deliver them based on new methods and practices

Recommendations

▸ Create a digital government services unit

▸ Prioritize a select number of flagship projects (including unique identifier) and deliver them based on new methods and practices

DIGITAL FINANCIAL SERVICES

Key Issues

▸ The legal and regulatory framework is somehow limitative and not up to date with the trends and digitalization development

▸ Cost of entry into the market to new competitors is high

Recommendations

▸ Develop and implement a fintech legal framework and development strategy, including for consumer protection and capacity building

▸ Build capacity of existing and potential DFS providers, including knowledge and bench-

marks to boost product innovation and fintech, assistance on pricing and transparency.

DIGITAL ENTREPRENEURSHIP AND COMMERCIAL PLATFORMS

Key Issues

▸ Despite a blossoming business process outsourcing (BPO) and IT sectors, ideation and early-stage digital entrepreneurs receive little support, and later stage support suffers from lack of early-stage pipeline. Commercial platforms are at an incipient stage.

▸ Access to credit is extremely difficult in Madagascar in general, and for younger firms and startups in particular

Recommendations

▸ Strengthen cohesion, quality, and reach of the digital entrepreneurship support system, including incubators and other entrepreneurship organizations

▸ Enhance access to funding by supporting the creation of business angel networks, and re-examine international electronic transaction costs and restrictions

DIGITAL SKILLS

Key Issues

▸ Digital skills development, as well as technology adoption more broadly, are constrained by the low level of basic literacy and numeracy skills

▸ Madagascar lacks enough qualified university teachers to respond to the expansion of the ICT subsector, which is aggravated by significant brain drain

Recommendations

▸ Develop sustainable models for public universities to cope with larger student numbers and make funding based on results (employability) of graduates

▸ Provide merit- and means-tested scholarships to select universities, establishing linkages to the promotion of digital skills.

Introduction

Introduction

Madagascar at a Glance

Madagascar is an island nation located in the Indian Ocean off the south-eastern coast of Africa, and the fourth-largest island in the world with a surface area of 587,000 square kilometers. It has a population of approximately 25.5 million people, more than two thirds of which are below the age of 25, and urbanization currently stands at 38 percent[1]. Despite the country's extensive economic opportunities and expansive natural resources, real GDP per capita is one of the lowest in the world: it is estimated that in 2019, approximately three quarters of the population live on less than US$ 1.90 a day PPP. This situation can be largely imparted to decades of political instability and recurring crises, which have severely thwarted development efforts. The most recent crisis (2009-2013) had devastating effects on the economy[2], with an estimated loss of US$ 4 billion in 2010 US dollars between 2009 and 2017.

Madagascar has embarked on a positive trajectory since the return to constitutional order in 2014. Economic growth has consistently improved during the last four years, with GDP growth accelerating from 2.3 percent in 2013 to an estimated 5 percent in 2018. These achievements were underpinned by an ambitious economic reform program, aiming to attract private sector investments. They resulted in Madagascar gaining five spots on the 2018 Doing Business report within the space of a year, to reach the 162nd rank out of 190 economies. Improvements were registered in particular with regards to starting a business, obtaining credit and enforcing contracts. In 2019, Madagascar accomplished its first democratic transfer of power since independence, shoring up hopes for long-term stability and continued growth. The President presented his overall program, "Madagascar's Emergence Initiative"[3], which is based on three main pillars: i) improving basic social services; ii) strengthening governance and democracy; and iii) promoting economic growth.

The digital economy can support one of Madagascar's key challenges going forward: sustaining a more inclusive growth. The country's impressive economic expansion has been driven so far by only a handful of highly performing sectors, either based in urban areas or on exports of key commodities[4]. These have excluded the majority of the population, which lags behinds: in 2012, it was estimated that 93 percent of the population was engaged in

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1   UN Census bureau

2   Madagascar Country Economic Memorandum (WB, 2019)

3   Initiative Emergence Madagascar.

4   Mining and high value agricultural products such as vanilla

the informal sector, mostly operating at a subsistence level[5]. The poverty rate inched back a mere 2 percent between 2014 and 2018 to reach 75 percent of the population: only a small dent in spite of positive economic results. A well-functioning and performing digital economy can help developing countries achieve faster economic growth, offer innovative products and services to the population, create high value jobs and export revenue, and attain greater international competitiveness.

The National Development Strategy & Digital Economy

Digital entrepreneurship and the ICT sector are at the heart of the new government's development strategy. The newly elected President, Andry Rajoelina, has highlighted his support to innovation and new technologies, and in particular improving efficiency through the digitalization of public services. The government's development strategy, "*Initiative pour l'Émergence de Madagascar*" (IEM), which was released in 2018, identifies the development of ICT as one of the six priority sectors for economic development ("*Faire de Madagascar un pays leader en matière de services liés aux NTIC*"). Currently, according to this document, the ICT sector contributes 1.6 percent to Madagascar's GDP[6]. The document points to Madagascar's low labor costs and high skills of computer engineering graduates as clear factors of competitive advantage in the sector's development. The document also calls for the development of a 'business environment conducive to private sector which will create new companies and new jobs'[7].

The time is opportune to leverage the potential of digital technology to support a responsive government and promote a vibrant digital economy. Digital transformation has been described as the fourth industrial revolution, and if harnessed strategically, it can help reduce inequalities, and promote economic growth and high value job creation. It can also improve access to public services and to information, thereby strengthening government accountability and trust in the State. Much remains to be done in Madagascar. According to the World Economic Forum Global Information Technology Report, the country ranks 135 out of 139 economies in the 2016 Networked Readiness Index (NRI), which measures the degree of preparation of a nation or community to participate in and benefit from ICT developments[8]. However, thanks to increased mobile coverage (86 percent in 2018[9]) and reduced communication costs, internet usage is rapidly progressing, reaching 10 percent of the population

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5   Madagascar Country Economic Memorandum (WB, 2019)

6   P233, IEM

7   P226, IEM

8   Networked Readiness Index (available at: http://reports.weforum.org/global-information-technology-report-2016/networked-readiness-index/)

9   According to the Communication Technology Regulation Authority (Autorité de Régulation des Technologies de Communication, ARTEC)

in 2017, up from 0.65 percent a decade ago.[10] Mobile phone usage tripled in the last decade[11], boosted in part by a youthful population, 41 percent of which is aged 14 and under in 2017[12].

Madagascar has already made remarkable progress in the digital economy. Thanks to an entrepreneurial private sector, investments in fiber optics have resulted in Madagascar becoming the country with the fastest broadband internet on the African continent, internationally ranking ahead of countries such as France, Canada and the UK.[13] The country is increasingly becoming a destination for technology intensive business process outsourcing (BPO) companies, providing telecom and data processing services to major international businesses such as Air France, Amazon and Deliveroo. The BPO sector currently generates revenues estimated at US$ 115 million, and employs a labor force of about 15,000 people, which could rise to 100,000 people by 2030[14]. A dynamic mobile money industry is providing growing opportunities for financial inclusion, with the number of subscribers rising from 2.3 million in 2013 to over 4.6 million in 2016). The telecom industry also plays an important role in the promotion of start-ups through incubator programs such as NextA (Telma) and FabLab (Orange). The advances by both the public and private sector in the country offers mutually reinforcing opportunities for improvements in service delivery while simultaneously promoting the digital economy.

Diagnostic Methodology and Structure of this Report

Preparation of this diagnostic involved desk research on the areas comprising the five digital economy pillars, as well as several in-country missions during which members of a core research team conducted broad consultations with counterparts, government, the private sector, and user representatives (for a comprehensive list of stakeholders consulted, please see the Acknowledgement section). The analysis also draws on regional and global benchmarking, based on standardized indicators which form part of the DEA diagnostic methodology. The diagnostic was carried out on a quick turnaround basis: data collection was carried out between February and May 2019, and the report was finalized in June 2019. Based on client interest and demand, an in-country workshop was carried out to present the findings of the diagnostic, and build further dialogue with counterparts and stakeholders [this will be done after the Decision Meeting takes place].

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10   World Bank data.

11   There were 34 people mobile cellular subscriptions per 100 people in 2017, up from 11 in 2007 (World Bank data, https://data.worldbank.org/indicator/IT.CEL.SETS.P2?locations=MG)

12   World Bank, 2019

13   Madagascar was linked up to the East Africa, Submarin System (EASSy), a submarine Fibre Optic cable connecting Sudan to South Africa. At 24.9 megabits per second, Madagascar's broadband speed is now more than twice the global average (see Chapter 3). https://www.cable.co.uk/broadband/speed/worldwide-speed-league/

14   Madagascar Country Economic Memorandum (2019)

The chapters that follow will present a summary of key diagnostic findings, and current state of the five foundational pillars of the digital economy that form part of the DE4A diagnostic methodology (described in the 'About the DE4A Assessment Framework' section at the outset of the report). The first chapter will discuss the current access, quality and resilience of digital infrastructure, as well as availability and affordability of connectivity. The second chapter explores the prospect for expanding digital government, and the third and fourth chapters turn to examining the current state of the digital financial services and the digital entrepreneurship ecosystem. The last chapter looks at the current state of digital skills attainment and coverage, in relation to the basic, advanced and e-business skills needed to support further uptake of digital services, and application of digitally-enabled solutions.

Summarized Version of Diagnostic for Public Dissemination

This report is intended to provide a more in-depth perspective for each of the pillars, presenting detailed information of the current situation and recommendations, in conformity with the DE4A methodology, covering all the key questions it spells out. Its target audience are Bank staff and sectoral experts who would like to have a technical overview of the different pillars. Nevertheless, in order to communicate the results and recommendations to high-level decision-makers and the wider public, a summarized version of the report is also made available [following decision meeting]. This summarized version, visually intuitive and easy to read, will be limited to 7 pages maximum, available for both print and online reading [e.g. HTML format].

What this Assessment is not About

While the DE4A approach is sound and comprehensive, it should be noted that some important aspects are not covered for both practical and methodological reasons. Given space limitations and the typology used, important "analog complements" for the full functioning of a digital economy are either neglected or superficially treated. The first type of analog complement relates to institutions. While the DE4A methodology – and this report – explicitly acknowledges the role of legal and regulatory frameworks, other institutional dimensions are contemplated to a lesser extent. This is the case, for instance, of responsive and accountable institutions, whose functioning directly affects the quality of services delivered, either digitally or in-person. In addition, the understanding of these institutions – let alone providing recommendations on how to improve them – requires an entirely separate set of methods and skills.

The second type of analog complements refers to infrastructures beyond those dedicated to connectivity provision. With the fastest broadband Internet on the continent, Madagascar

has become an IT and business process outsourcing (BPO) hotspot. Yet consultations with private sector actors suggest that, of all the growth constraints for the sector, many are not related to the five foundations highlighted by the note. For instance, some of the major constraints stem from electricity problems (e.g. the high cost of generators) and poor public transportation (for BPO employees). In a similar vein, the development of a vibrant e-commerce sector in Madagascar – as in any country – is dependent on a minimally performing addressing system, which is inexistent in the country.

Despite the importance of these analog elements, they are not addressed to their full extent in this assessment. Doing so would expand the report beyond the acceptable length and deviate from the original goals. Any methodological choice implies, inherently, tradeoffs. This assessment offers a fundamental layer of knowledge needed to unlock the potential of Madagascar's digital economy. Yet, in order to shed light over important factors that are not fully captured by the DE4A assessment, a number of parallel efforts are being carried out in Madagascar, as we highlight below

Ongoing Assessments Complementary to the DE4A

In parallel to the DE4A the Madagascar Country Team is conducting a series of assessments that offer knowledge that is complementary to this assessment. The first one refers to the Country Economic Memorandum which, amongst others, closely examines the growing business and knowledge process outsourcing (BPO and KPO) sectors, as well as competition in the telecommunications sector. The second one refers to a Digital Government Maturity Assessment, which provides an in-depth evaluation of Digital Government Services in Madagascar followed by a blueprint for short and medium-term development of the sector. End-user research is currently being conducted with public service users, to identify the most immediate needs of Malagasy citizens in terms of service delivery coverage and quality. This research is the essential step prior to the development of a "catalog of services", one of the key recommendations in the section "digital platforms" of the DE4A.Finally, in complement to an Identity Management Systems Assessment previously conducted, a new study reviews the national legislation and its conformity to issues such as data privacy and protection.

Digital Infrastructure

Digital infrastructure

Importance of Digital Infrastructure

> ▸ 1996: First fixed-line telephony services
>
> ▸ 1971: International telephony is introduced
>
> ▸ 1995: Internet services first available through satellite connection
>
> ▸ Until 1997, the only operator and backbone infrastructure owner was the incumbent SOE Telecom Malagasy, created in 1993
>
> ▸ 1997: The first competitor, Madacom (now Airtel)[1], enters the market
>
> ▸ 1998: Orange Madagascar[2] is introduced
>
> ▸ 2001: Telma is privatized[3], and acquired by the group Axian in 2004 (with Government still currently holding 19.9 percent of shares)
>
> ▸ 2001: Gulfsat Madagascar (Blueline,) beginn providing internet, and mobile services in 2004.

Box 1: Key dates for the telecommunication sector in Madagascar

Digital infrastructure can play a significant role for islands nations such as Madagascar, connecting otherwise isolated populations to each other and to the rest of the world, and serving as a basic building block for economic productivity. Investments in technology can feed and diversify the local economy, but also benefit the entire region. Recent research suggests that an increase of 1 per cent in mobile-broadband penetration is associated with an increase in 0.15 per cent in GDP. The 2030 Agenda for Sustainable Development also recognizes the immense potential of ICT to "accelerate human progress" and specifically refers to the need to "significantly increase access to information and communications technology and strive to provide universal and affordable access to the Internet.".

Madagascar has significant potential as an ICT hub given its strategic location in the Indian Ocean. Faster and better-quality internet connection can promote development of the digital economy, with great potential for job creation, and contribution to GDP. However the cost of

1   Madacom was purchased by Celtel (which became Zain), a mobile telecommunications company founded in 1983 in Kuwait. Zain was subsequently acquired by Airtel, a subsidiary of the Indian telecommunications company Bharti Airtel.

2   Orange Madagascar is a subsidiary of Orange S.A., formerly France Télécom S.A., a French multinational telecommunications corporation.

3   France Telecom and Distacom became the shareholders of Telma to the tune of 32 percent each in 2001. The Axian Group acquired Telma in 2004, and became the majority shareholder.

internet access tends to be high in island nations with low population density such as Madagascar, because they need to deploy submarine cables for both domestic and international services, and profitability of the national backhaul is low.

Socioeconomic Rationale for Digital Infrastructure Development

Investments in digital infrastructure help increase accessibility, affordability and availability of ICT services, and are key to promoting the digital economy. New submarine cables will provide additional links and capacity as well as diversity Madagascar towards the African mainland and other international cable systems, while an extended backbone will facilitate access to ICT nationwide and improve quality of service. Reducing the costs and increasing the physical access to the network will allow a greater number of people to connect, communicate, and gain access to information, thereby reducing the digital divide. It should also lead to a drop in prices as the rise in subscribers increase profitability, thereby creating a virtuous circle. Madagascar's economy has already shown steady growth in recent years, which has helped to increase consumer spending on consumption in general and on telecom services in particular. These services are also expected to become cheaper should there be an intensifying competition between the existing operators.

Alignment with Country Development Strategy & Goals

Madagascar's last ICT National Policy for Development dates back to 2005, and was developed by the Ministry of Telecommunications, Posts and Communication (MPTDN). The vision of the policy is for Madagascar to become a leader in providing high-quality ICT services, which will accelerate the country's economic, social, and cultural development. While there is currently no broad policy document for ICT, the existing legislation aims to promote improved network coverage, enhanced quality of services and reduced costs of telecommunication through liberalization and competition, as well as efficient, independent, impartial and transparent regulation. The MPTDN has supported a number of projects to broaden ICT infrastructure and use. These includes (a) extending infrastructure to uncovered zones; (b) developing the Smart City Nosy Be; (c) deploying "digital window" computer labs in educational institutions; and (d) expanding the higher education research network and distributing tablet computers to schools.

Diagnostic Findings: Current State of High-Speed Internet Development

Although penetration rates have massively increased in recent year, Madagascar has one of the lowest ratios of mobile connection to population in the world. Penetration rates for mobile cellular subscription increased from 12 percent a decade ago to just over 40 percent in 2017, and the percentage of individuals using the internet rose almost tenfold between 2012 and 2017, to reach 10 percent. Although penetration rates remain well below averages in neighboring countries and Sub-Saharan Africa, they are consistent with countries with similar GNI per capita (see figure 2 below). Fixed-telephone subscription is lagging and has hardly shifted, still situated at 0.28 per 100 inhabitants. In addition, while 70 percent of the world's youth (15-24 years old) are online, and 30 percent in LDCs on average, it is estimated that less than 20 percent estimated to be online in Madagascar (ITU).
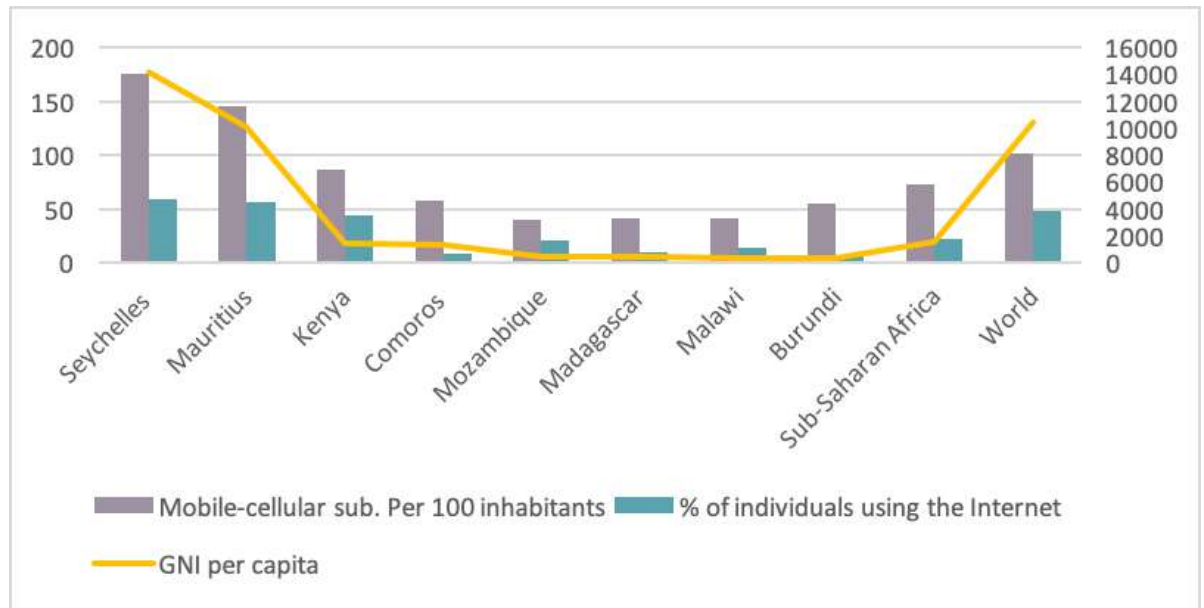
Figure 2: Mobile subscription rate per 100 inhabitants, Percentage of individuals using the internet, and GNI p.c. in selected countries(2017, US$, World Bank database)

Affordability is the main constraint to internet usage in Madagascar. The prices of mobile cellular basket and mobile broadband have dropped significantly since 2016, and are now well below Least Developed Country (LDC) and world averages. However, these services remain too expensive for a large portion of the population: Madagascar ranks 164 out of 181 on the cost of mobile cellular basket as a ratio of GNI per capita (see high cost of mobile broadband as percentage of GNI per capital in figure 3). The cost of fixed broadband is even more prohibitive, with Madagascar ranking second to last after Burundi on the broadband basket cost to GNI ratio

in 2017 (see figure 4). This situation is compounded by the high cost of mobile devices, which represents a significant barrier to access, given that the expansion of access to the internet is largely driven by mobile broadband. Although some operators have begun offering relatively cheap smartphones price, but they remain unaffordable for the majority of the population. The hefty 10 percent excise taxes imposed by Government on ICT equipment contributes to these high device costs. Women are likely to be the most impacted, given that they tend to lag behind in terms of smartphone ownership in low and middle-income countries.

The result of low internet penetration and usage is a comparatively profitability, thereby also constraining investments. The average revenue per user (ARPU) for mobile subscription is reached a modest US$ 1,7 in 2016 (down from US$ 2.2 in 2014). In this context, the Universal Access Fund (FDTIC), created in 2006, is key to promoting accessibility. As discussed later, the FDTIC aims to contribute to the funding of ICT development, and increase nationwide accessibility in underserved areas by extending the national backbone.
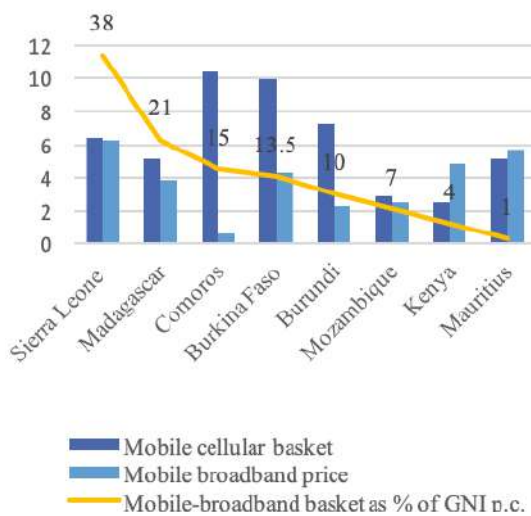
Figure 3: Cost of Mobile Cellular Basket, Mobile Broadbank, and Mobile Broadband Basket as percentage of GNI per capita (Source: ITU)
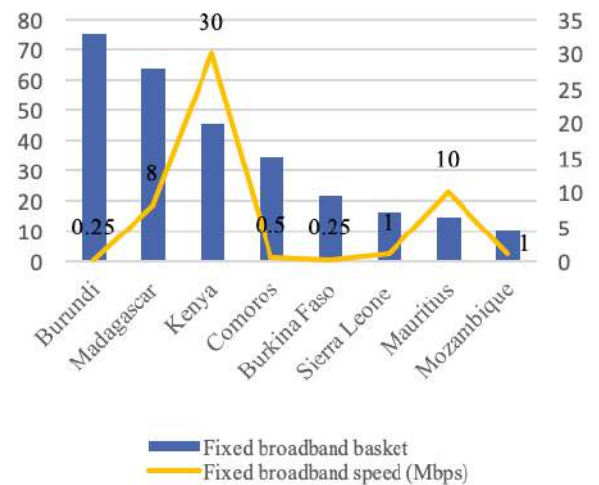
Figure 4: Cost of fixed broadband basket (US$, 2017), and broadband speed (Mbit per second, 2017) (Source: ITU)

SCALE OF INTERNET SERVICES AVAILABLE

The first international submarine fiber optic cable, LIONS (Lower Indian Ocean Network) landed in Madagascar in 2009, followed by EASSy in 2010 (see figure 5). The LIONS landing station, owned by Orange, connects on the eastern coast in Toamasina, while the Telma-owned EASSy landing station is situated in the south-eastern town of Toliara. The ME-TISS submarine cable, in which Telma has invested, is expected to connect in 2019, while the Africa-1 cable is expected in 2021. However there is currently no cost-connect policy that would allow several cables to connect on same landing stations.

Figure 5: The national fiber backbone and international undersea fiber connectivity (present and future)

Madagascar's main digital infrastructure is an optical fiber backbone, entirely owned by the incumbent operator Telma. The backbone runs 10,000 km across the country, connecting 60 major cities (see figure 6). Telma has announced it intends on investing a further US$ 284 million within the next five years (2019-2024), extending the backbone on the western coast to reach a total of 11,000 km. In 2014, the Government adopted a decree promoting mutualization, which also proscribes any investments in fiber optic backbone where such infrastructure already exists. Under the present legislation, all other mobile and internet service providers must connect to Telma's backbone to offer their services.

Figure 6: Fiber optic backbone throughout Madagascar. Source: Telma (2019)

TELMA's fixed-broadband offerings include ADSL and fixed wireless using WiMAX, as well as fiber-optic connections, mainly to businesses. The other internet service providers use fixed wireless broadband technology only. Blueline offers the resale of mobile telephony, SMS and data service under the brand name BIP, and satellite communication services are also offered by Iridium Africa Services Corporation[4]. All mobile operators have deployed 3G and, following renewal of their licenses, deployed LTE mobile-broadband networks. Wireless broadband access networks are being rolled out, enabling converged voice, data and entertainment services as well as new services like mobile money which has taken a significant stride.

ANALYSIS OF SECTOR AND MARKET STRUCTURE

The mobile market is much more dynamic than fixed and internet services, and is dominated by three operators: Telma, Orange, and Airtel. Until 2006, Orange Madagascar was the leader in the market with 60 percent of shares. Growing competition with the launch of Telma Mobile in 2006, and Celtel (Zain) in 2006, boosted the sector. Both operators invested an estimated US$ 370 million between 2005 and 2009[5], and Telma has overtaken Orange as market leader (see figure 7). However, based on the author's calculations, the HHI, which measures competitiveness of an industry, indicates a high degree of market concentration[6].

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4   Other telecommunications services such as payment processing are offered by the "Centre de Traitement Monetiques de Madagascar" (CTMM). IRIDIUM mobile satellite service is provided by GLOBAL Mobile satellite communications of the type INMARSAT and IRIDIUM are offered by VIA SPACE MADAGASCAR.

5   World Bank policy note, "Le secteur de la communication" (2014)

6   The HHI for Madagasar is 3,094 percent, above the 1,8 percent value indicative of high market concentration. The Herfindahl-Hirschman Index (HHI) is calculated from the following formula: HHI = s12 + s22 + ⊠ + sn2; where n is the number of firms in the market and sn denotes the market share of the nth firm. Higher values of the index indicate higher market concentration and monopoly power as well as decreased competitiveness. The index decreases when a market is made up of a larger number of firms, each with a smaller market share. For the purpose of the report, the market share has been calculated in terms of the estimated number of subscribers for each of the operators (firm) operating in the telecom industry as at end 2018.

Revenues per operator and service (2015-2017, USD), and number of subscribers. Source: ARTEC
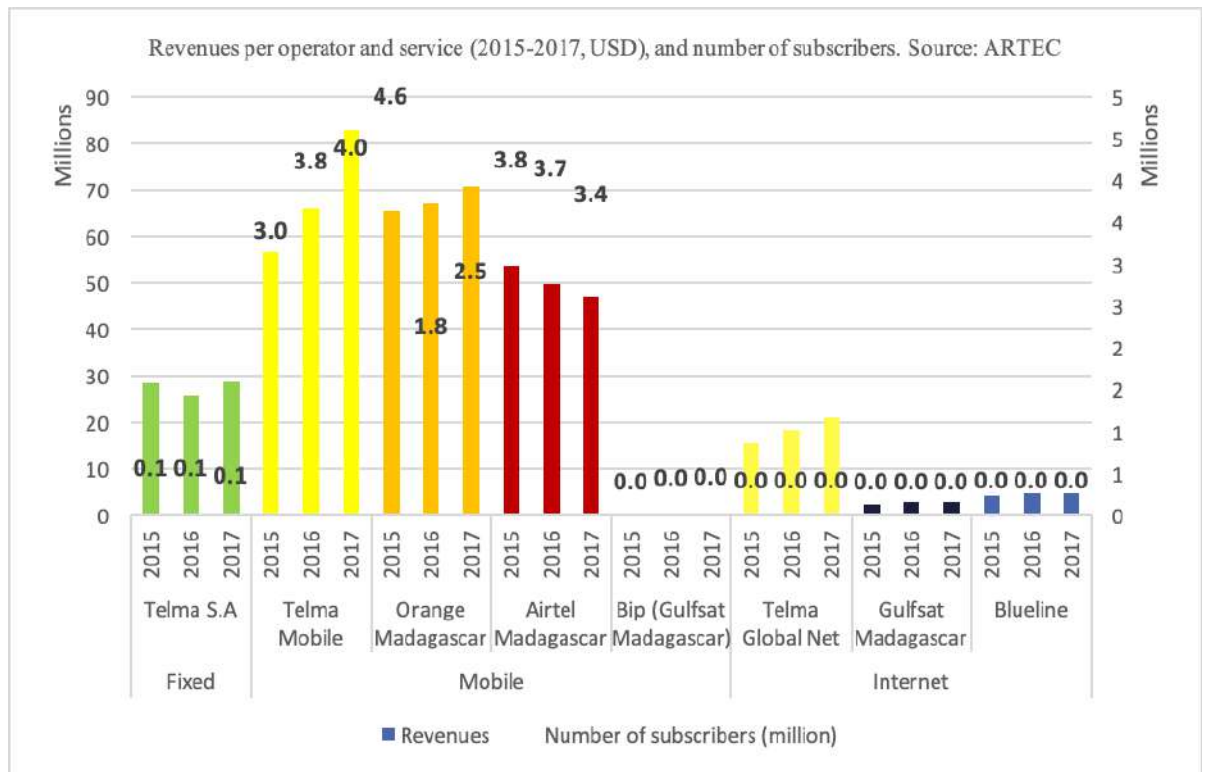
Figure 7: Revenues per operator and service (US$, 2015–2017), and number of subscribers (Source: ARTEC)

In 2017, mobile revenues generated close to US$ 200 million, a 10 percent annual increase. While mobile voice was the largest revenue-contributing segment in 2017 (US$ 126 million in revenues, 11 percent growth), mobile data was the fastest-growing segment (US$ 24 million in revenues, with 24 percent growth), driven by rapid proliferation of smartphones, expanding coverage and growing adoption of 3G/4G services. The launch of 4G and LTE mobile broadband services will allow more and more data services to be launched and the consumption of these high value-added services will enable the mobile operators to reverse their stagnating or declining average revenue per user per month (ARPU).

POLICY FRAMEWORK AND REGULATORY ENVIRONMENT

Pro-competition policies and interventions are the cornerstones of dynamic telecommunications and ICT sectors. They play a pivotal role in creating the conditions for the reduction of prices, ensuring that the efficiency gains of higher ICT adoption are partly passed on to customers, thus closing the virtuous circle. However, the regulator ARTEC[7] has not complied in the past its statutory duties, and the market mechanism is not currently operating at its op-

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7   The Regulation Authority for Communication Technologies for Madagascar (Autorité de Régulation des Technologies de Communication, ARTEC) was created in 2006 (Decree No. 2006-213), replacing the former regulator, OMERT (established in 1997, Loi n° 96-034).

timum in Madagascar[8]. In addition, while the basic legal and regulatory framework offers the necessary preconditions to initiate the process of liberalization of the ICT sector, it is insufficient to support the further development of a pro-competition environment. The law does not include for example any provisions to consider national monopolies for voice and data transmission exercised by the incumbent operator as "essential facilities", given that they were in part funded by the universal access fund (FDTIC, see below), and that it is too costly (and since 2014, banned) for competitors to build an alternative network given the weak ARPU. This allows the owners of backbone facilities to control the prices charged and to determine the priority given to the different requests it may receive, without any regulation. In the liberalized environment the policy objective would be to offer nondiscriminatory access to all those facilities for all operators with a view to enabling fair competition in retail markets.

The early phase of liberalization should also be characterized by a focus on regulation of wholesale tariffs and conditions (i.e. for access to network infrastructure and interconnection services) on operators with significant market power. This is needed to prevent abuses by those operators. But the Malagasy telecommunications legal and regulatory framework lacks a well-defined approach for regulating wholesale markets in such a way as to encourage entry of operators that progressively develop their own infrastructure and the licensing procedures have even restricted entry in some markets like the fixed, where the entry price to be paid is prohibitive.

There is currently no "unified license" for voice, data, TV, which is the international trend. Unbundled licenses increase the burden on the regulator and operators, who must follow procedures for the award of each individual license. Costs are said to be prohibitive (entry, renewal, and taxes), but no information is publicly accessible on costs and procedures to obtain a license from ARTEC. Prohibitive licensing costs creates a further barrier to investments in national infrastructure. While the licenses for Orange, Airtel and Blueline are available to the ARTEC's website, Telma's license is not publicly available and the licensing procedures applying to the operators, as a former SOE, are unclear.

According to the GSM association, the taxation on telecommunication has a major impact on the penetration rate. Combined taxes on ICT (VAT and excise tax) amount to 30 percent in 2016, one of the highest in SSA. Rwanda, Senegal and Kenya removed VAT on mobile phones. In Kenya, this led to an increase by 30 to 40 percent of penetration rates of mobile phone subscribers. The GTM has lobbied government for reduced taxes, and in particular to elim-

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8   ARTEC is tasked in particular with: (i) guaranteeing fair competition between operators; (ii) defining the notion of dominant position and establishing and publishing a list of operators in a dominant position; and (iii) avoiding abuses resulting from firms with a dominant position in the market (Law N°2005-023, Article 6). ARTEC is also responsible for awarding licenses, price regulation, setting technical and service standards, allocating and assigning radio frequency, and monitoring the quality of services (Decree N°2006-213).

inate excise and custom taxes on mobile phones and computers, in order to support their objective of doubling the penetration rate of mobile phone subscribers. Government partially acceded by reducing the excise tax from 20 to 18 percent on mobile phone in 2019.

The FDTIC has contributed to the expansion of Madagascar's backbone, but opacity in the management of funds have undermined confidence in the sector and its regulatory capacity. A well-defined and fair governance framework was designed in 2006, but a decree[9] adopted the following year introduces significant legal opacity and discretionary power to the Minister of Telecommunication in the adjudication of funding. Part of the FDTIC funds were to be allocated to the development of Telma's infrastructure during the 2004-2008 "priority development phase", due to its status as a new entrant. However, procedures for allocating the funds and corresponding investments were never published. In addition, subsidies were extended beyond 2008, even when Telma became the market leader[10]. The FDTIC is estimated to have received close to US$ 20 million between 2015 and 2018[11], and Telma reported subsidies amount approximately to US$ 18,4 million during the same period. While ARTEC publishes financial reports on its website, these provide no indication of how the funds were spent.

Constraints to High-Speed Internet Development

This section looks at the key component that shape internet access, affordability and quality:

▸ *First Mile: how internet enters the country.* Understanding how Madagascar is connected to international and regional networks (through undersea internet cables, or cross-border terrestrial links for land-locked countries).

▸ *Second, or Middle Mile: how internet passes through the country.* Looking at the national backbone, related regulation and business practices, as well as Internet Exchange Points (IXPs), datacenters/hosting etc.

▸ *Last Mile: how internet reaches end users.* Examining local access and mobile networks (2G, 3G, 4G), as well as related market dynamics and structures, regulation and business practices.

▸ *Invisible mile: state of hidden elements of the value chain.* Exploring policy, legal, and regulatory aspects related cybersecurity, spectrum, and data protection.

FIRST MILE: INTERNATIONAL CONNECTIVITY

The cost of access to international bandwidth is excessively high and unregulated in Mad-

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9   Decree N°2007-031

10   There are 4.5 million Telma Mobile subscribers, against 2.6 million for Orange and 2.6 million for Airtel in 2018 (Source: ARTEC).

11   This represents 2 percent of revenues from Telecommunication operators, based on revenue data obtained from ARTEC.

agascar, contributing to the high costs of internet. The cost of access to the international bandwidth from Madagascar to London is approximately US$ 60,000 for an STM-1 (equivalent to 155 Mbps). This price is more than 3 times higher than in other African countries. In Kenya, the price for 155 Mbps is US$ 15,500. The prices for international connection were set by the operators owning the facilities (Orange and Telma), submitted and approved by ARTEC, which did not conduct independent exercises to verify their reasonableness. These prices should be decreasing at the same rate the world over, given that the cost of 1km of undersea cable shrank from US$ 10.000 per km, to US$ 200 today. In addition, there are no cross-connect or open-access policies in Madagascar, preventing several cables from landing in the same landing station, and open access to the cables for any operator wishing to resell telecommunication and ICT services from.

SECOND MILE: BACKBONE NETWORKS

The cost of access to the backbone network is also excessively high and unregulated. The cost of access to Telma's backbone infrastructure is US$ 6,000 for an STM-1 over 250 Km: 3 to 4 times higher than in other African countries. According to ARTEC, this price was suggested by Telma and agreed to by the regulator without any further calculations.

ARTEC has not regulated the downstream wholesale markets for backhaul and last mile. Consequently, there is only one fixed service operator, enjoying full monopoly, with no scope for a new operator to get into this market segment due to the absence of a policy to unbundle the local loop (last mile) through proper downstream wholesale market regulation which entails fixing the prices for each unbundled network element, including the backhaul, and defining the technical standards for the mode of unbundling.

The Madagascar Global Internet eXchange (MGIX) was launched in May 2016, as the first Internet exchange point in Madagascar emanating from the voluntary collaboration between the four licensed national internet services providers (Airtel, Blueline, Orange, Telma) and other actors in the internet sector such as GOTICOM. Madagascar also became the 23rd African country to have developed its *Root Server*. The MGIX helps to reduce internet costs by shifting international internet traffic to local internet hosts. The value of an IXP is that it allows the operators to exchange traffic locally and avoid having to do so using expensive international bandwidth.

LAST MILE: INTERNET SERVICES

The cost of internet services, and in particular fixed broadband, remain high in Madagascar. This due in part to the high costs of interconnection between the networks of operators. There is no evidence that the regulator has determined the cost of interconnection across the

various networks and prescribed price caps and price floors. The interconnection charge between Fixed to Mobile, and Mobile to Mobile network is presently MGA 1.85 per second. According to the regulator, this rate for interconnection has been agreed by Telma and Orange (who jointly have the highest market share) on a commercial basis and approved by ARTEC, once again without making any determination on its reasonableness. This value is well above the rate practiced in Mauritius, for example, where the regulator fixed the price at an equivalent of MGA 1.0 per second. In addition, there is no policy for the application of pro-active and asymmetric regulation on the operator with significant market power, which are usually used to create a conducive environment for new operators to enter the market and compete with the historical incumbent in the long run.

INVISIBLE MILE: SPECTRUM MANAGEMENT, CYBERSECURITY & PRIVACY

In a liberalized market, fair and indiscriminate access to spectrum is of paramount importance[12]. ARTEC had confirmed that it had worked out a National Spectrum Plan for Madagascar[13], but the plan has not been shared. Moreover, during consultations held with Orange, it came to our knowledge that ARTEC had assigned spectrum to both Telma and Orange for their mobile services in equal amounts (which is admittedly equitable in terms of the band size); however, Telma was granted a contiguous block of frequencies while Orange was assigned various blocks scattered within the GSM band. This approach is discriminatory to the extent that a contiguous block owner has a lower operating cost, and constitutes poor spectrum management. Furthermore, with the digital switch-over of the broadcasting services in July 2015, the resulting digital dividend ought to have been reorganized for the purpose of optimizing the 4G network operations in the country. ARTEC has confirmed that no planning has been done in that regard thus far.

In 2014, Government adopted a legal framework on personal data protection[14], and on cybercriminality[15]. The texts are well drafted and in line with the SADC model laws. However, implementation is still lacking: Madagascar lacks a cyber-security operational framework, and has yet to create a Computer Emergency Response Team (CERT-MG).

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12   The spectrum is a scarce natural resource for telecom development (mobile services principally).

13   This is a legal obligation under decree 2006-213

14   Law N°2014-038

15   Law N°2014-006, updated by Law N°2016-031.

Recommendations

Recommendation 1: Devise and implement national broadband plans that contain concrete and realistic targets and timelines for increased internet penetration. This includes establishing priority areas for connectivity, building on national sectoral objectives in terms of digital governance, economic development, health, education, etc.

Recommendation 2: Reform the legal and regulatory framework to reflect the present laws and decrees and consolidate in terms of competition provisions. With the evolution in technologies and operators' business models, laws dating back to 2005/06 are no longer responsive to today's reality. In addition, there are clear gaps in the present laws regarding the regulation of competition. Furthermore, while the networked society is in the making, new laws on Data Protection, Cybersecurity, and Electronic Transactions will have to be enacted to build trust in using the ICT networks and services. Industry players will also require predictability in terms of the legal framework.

Recommendation 3: Promote the efficient and transparent use of the FDTIC. This implies legislative reform to remove opacity and discretionary power, implementing clear rules for the allocation of funds based on the national broadband plans (R1), adopting a detailed operational manual and calendar of activities, and ensuring the annual publication of financial and technical reports.

Recommendation 4: Review and reorganize the ARTEC structure and operations. This implies reinforcing its independence and human resources capacities, and promoting more proactive ante regulations. This would entail, inter alia:

▶ Assessing upstream wholesale markets, and setting wholesale prices.

▶ Undertaking market analysis and determining the Significant Market Power operators.

▶ Introducing asymmetric regulations, to allow new operators to enter the market and compete with the historical incumbent.

▶ Introducing the 'essential facilities' regulation framework coupled with open-access and regulate cross-connect at landing stations.

▶ Committing to effective spectrum allocation processes, ensuring transparent, accountable, time-efficient and fair allocation of spectrum to internet service providers.
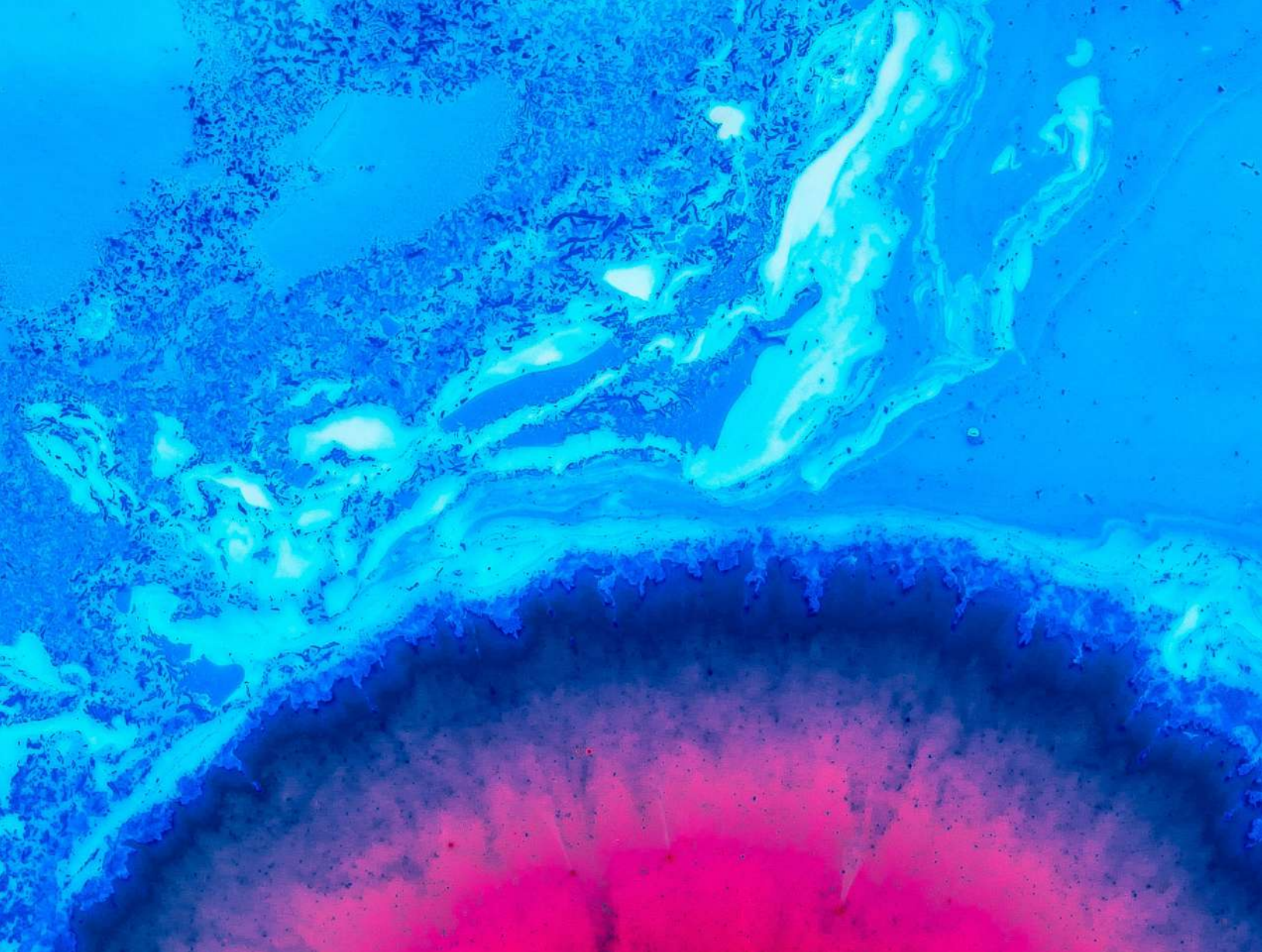
Digital Platforms
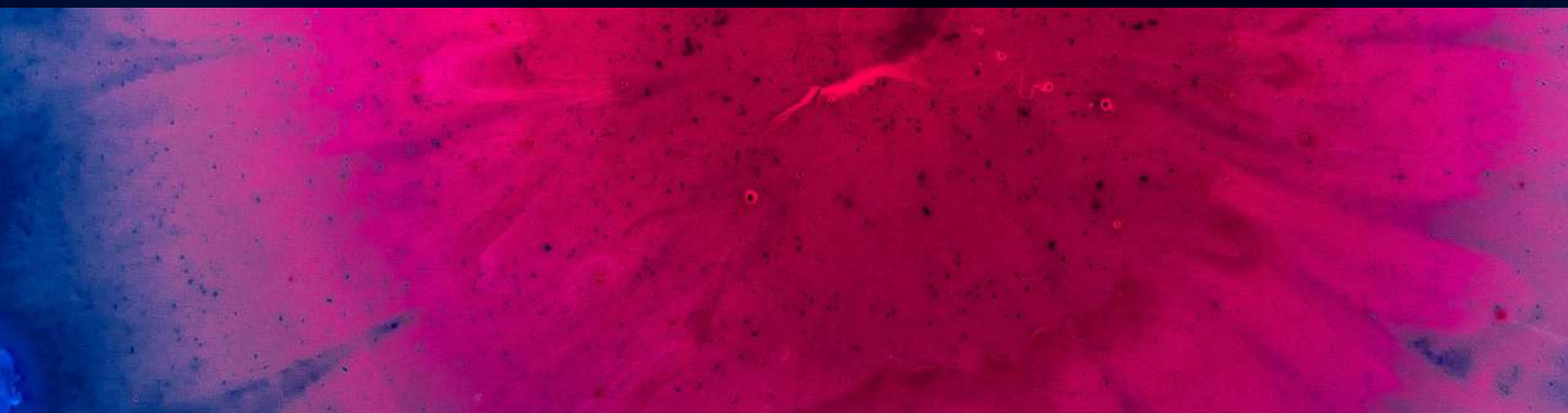
Digital Platforms

Importance of Digital Platforms

SOCIOECONOMIC RATIONALE FOR DIGITAL PLATFORM DEVELOPMENT

Digital platforms can transform the way governments function, generating significant efficiency gains and strengthening good governance. Digital government systems can help lift the constraints on the execution of government's most fundamental functions, from planning and policy development to service delivery. Furthermore, secured digital systems avoid the risks of mismanagement and prevent the loss of crucial government datasets. On the user side, interoperability can help reduce administrative burden by applying the "once-only" principle to service delivery, by reducing the possibility of human error or falsification of documents, and by lowering direct and indirect costs for users to interact with the administration. Instead of spending long hours queuing for services, these can be requested online or via SMS, and payments can be made through Mobile Money (see chapter 5). Digital technology can also help government understand its citizens better and achieve stronger outcomes through more informed policy decisions, find new innovative solutions to policy challenges, and ensure better contact with citizens – especially in remote or less densely populated areas. Improving digital government systems also involves effectively delivering needed information to citizens and businesses.

Platforms foster greater collaboration between private and public actors in solving societal problems. Through open access, private operators can build on existing platforms, provide new services, and contribute to growing uptake. This also allows Government to leverage external developments and private sector innovation for outside-in transformation. Some public services can even be commercialized, thereby helping to develop new sources of revenues for government. Such synergies also contribute to stimulating the digital economy, and creating high value jobs. The IT sector holds many prospects for Madagascar, given the availability of skilled labor force (see chapter 7) and a broadband speed comparable with advanced economies (see chapter 3).

ALIGNMENT WITH COUNTRY DEVELOPMENT STRATEGY & GOALS

Modernization of the administration, including through digitalization, has been declared a priority by the Malagasy Government. The "Modernization of Madagascar" is one of the 13 key objectives identified by the country's development plan, *Initiative Emergence Madagascar* (IEM), and "Digital innovation and good governance" is one of its seven strategic objectives. This strategic objective aims to restore trust in public ser-

vice, for more responsible and accountable civil servants. The country's digitalization is described as the basis of good governance, as well as an impulsion for economic, social and political development. Following discussions with the administration, key sectors identified for reforms include identity management, mobilization of tax revenues , decentralization of public services, land management, education (e.g. distance teacher training programs), health (e.g. E-health), security, financial services, and various frequently used government services (e.g. online legal and administrative certificate, such as the *Certificat de situation juridique* that is requested for many procedures).

Diagnostic Findings: Current State of Digital Platforms

CURRENT STATE OF DIGITAL GOVERNMENT SERVICES

The digital government agenda has recently generated renewed interest and leadership in Madagascar, but many challenges remain. For more than a decade, the country lacked a coherent strategy and coordination for digital governance, which led to an extreme fragmentation of initiatives. In addition, online government presence has not focused on user experience and services, and uptake remains weak. Of the top 500 websites receiving the highest average daily visits and pageviews in Madagascar, there are 56 local content websites, of which 17 are government websites. Of those 17, 7 are either internal websites, or used mostly to access subdomains for internal use (see annex 1). Yet, web analytics suggest that there is a strong demand for Government content, which would be boosted if supply was to be improved.
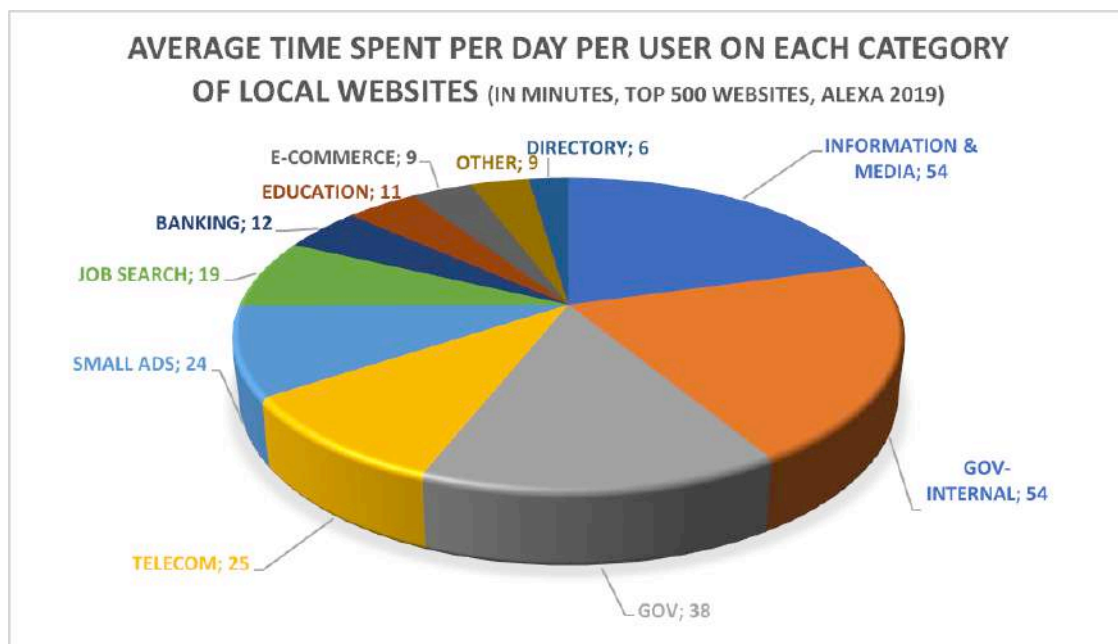
Figure 8: Average time spend per day per user on different categories of local website (Minutes, out of top 500 visited websites, Alexa 2019)

Service Delivery

Government websites offer limited information to users, with no integrated online presence. One of the most basic services to be offered by digital platforms refers to the provision of actionable information regarding the delivery of services, be them online or in-person. Yet, most menial activities such as consulting opening hours of a public service, or requesting a simple government form, need to be carried out in-person, as government websites are used mostly to publicize government activities. When actionable information is offered, it is not easily findable, due to a fragmented online presence and a plethora of websites that have sprung-up independently, with no standardized information architecture or design. For example, at the time of writing, there were three identical websites for the Ministry of Finance on three different webpages, each corresponding to the change in name of the Ministry of Finance (mfb.gov.mg, mef.gov.mg, and mefb.gov.mg).

There are four online services provided, two of which are provided under PPPs. With support from the World Bank, since August 2018, the DGI set up a website for online tax payments, which is the most visited and used government website. The CNAPS social security fund also offers two online services: one for employees allowing them to verify their compliance with CNAPS obligations, and one for employers providing an employee dashboard, and allowing them to register changes in staffing (although paperwork still has to be provided in person). This absence of end-to-end user experience ultimately affects uptake: less than 1 percent of the 500,000 affiliated employees use the CNAPS' online services. Customs transactions are entirely managed by GasyNet, of which the Malagasy administration and the company SGS are joint shareholders. Since the establishment of this 10-year contract, and combined with other customs reforms, there has been a net amelioration on risk analysis, revenue mobilization, and trade facilitation. Another successful PPP was implemented in the urban commune of Mahajanga as of 2014, in partnership with the Telecom operator Telma. The commune developed a local tax collection initiative through mobile money M-Mvola, with support from the World Bank's PGDI project and the French cooperation. Thanks to the program, a years-worth of taxes were collected in just one month, while users praised the system for its convenience.

Back-office systems

The most widely used back-office system in Madagascar is the Integrated Public Finance Management System (SIGFP, *Système Intégré de Gestion des Finances Publiques*) for budget execution, which was developed in 2008 and is run and entirely paid for by the Ministry of Finance. There are several systems used by different departments, including one for the Budget directory, and one for the Treasury directory. The SIGFP is used by every single Ministry and many

public institutions, as well as 110 communes at the district level for the Treasury system. It was initially developed with donor support, including the World Bank through the PGDI project. The SIGFP has played a significant role in securing the chain of expenditure and accounting. Upon enquiry at the time of writing, five Ministries assessed their satisfaction with the SIGFP as "average".

Other back-office systems include NIFONLINE, the SIGMP, and AUGURE. The NIFONLINE is a taxpayer registration system, which was developed internally and is managed by the Tax General Directorate (DGI) within the Ministry of Finance. It is connected to several other platforms, including SYDONIA++ used by customs, and the SIGFP since 2011. The SIGMP is the procurement management system used by every public institution, developed with support from the African Development Bank (AfDB). It is managed by the procurement regulator ARMP, and was deployed throughout Madagascar as of 2010. The SIGMP is connected directly to the SIGFP, and operators must be registered in the SIGFP as tax paying entities to enter the SIGMP system. However, the two systems do not operate fluidly, as they were developed with support from different donors and service providers that did not collaborate. AUGURE is the civil servants human resource management system launched in 2017. It was developed jointly by the Ministry of Finance and the Civil Service Ministry, with support from several donors. Data is entered into AUGURE by every Ministry, including 20 central Human Resource Directorates and 21 regional administrations, and consolidated within the Ministry of Finance. The system aims to centralize the identification of every single civil servant at all levels of government – information that was not previously shared across Ministries. It facilitated the verification of the civil servants' payroll and the identification of close to 10,000 "ghost workers" in 2017. AUGURE was suspended in 2018 as a result from pushback from the administration but is being relaunched with support from the World Bank and the European Union.

Since 2018, Government also began piloting its version of "X-Road", an interoperability system that allows different databases across multiple organizations and platforms to securely and freely exchange data. X-Road was originally developed by the Estonian Government. The pilot was implemented by a small group of IT specialists from the DGI, CNAPS, MID, Ministry of Justice, and ANRE, with support from the Estonian e-Governance Academy, Madagascar's National School of Informatics (ENI), and interns. They adopted an agile approach to technology deployment, and were able to install a functioning version by the end of 2018, which connected the CNAPS, DGI and MID databases. Data-matching between registries shows that out of the 700,000 individuals registered on the CNAPS database, only 400,000 were registered as taxpayers, thereby pinpointing to greater revenue mobilization potential. The pilot is supported by the World Bank's PAPSP project, which has provided resources for

the testing lab, estimated to have reached less than US$ 150.000. X-Road can support the real deployment of shared services across Government, and the incremental implementation of the once-only principle.

HURDLES TO DIGITAL PLATFORM DEVELOPMENT

Policy and Institutions

There is no unit coordinating and promoting ICT policies across government. There is currently no equivalent position to a Chief Digital Officer, who can elevate the discussion at the policy level with key decision-makers, coordinate efforts and challenge the status quo. While the Ministry of Finance had no official mandate in the digital governance agenda, it took on a proactive role, bolstered by its significant resources and influence. Today, the SIGFP developed by the MEF is the most widely used digital product across government. Initially available on the Government intranet, the Ministry of Finance made it available online, cutting out the need for the e-governance agency's (ANRE) intranet. The Ministry of Telecommunication has not played a prominent role in recent years, despite the fact that its official mission is to orient, coordinate and implement Government policy with regards to the digital development plan.

In the absence of clear leadership, digital governance has been thwarted in the last decades by a lack of coherent vision, strategy and coordination. Each Ministry, institution and sometimes department has its own IT Services Directorate (DSI) and has designed and implemented its programs in silo. Systems are conceived in an ad-hoc manner as a response to one internal problem – rather than focused on end-users needs (i.e. citizens) and economies of scale generated by interoperability of systems. The situation is exacerbated by fragmented and inadequate support from donors. An analysis of the various information systems within the Ministry of Finance concluded in 2013 that donor interventions had contributed to the emergence of a disintegrated financial management system, with more than 13 sub-systems that cohabited without any interoperability rules. This did not favor the emergence of a reliable and fluid PFM platform. More recently, a number of Government institutions have started to consider the utilization of biometrics identification for dedicated services (e.g. the MID for driver's licenses and the Electoral Commission for electoral cards). Nevertheless, no coordination has been established among any of these initiatives, reducing the opportunities for interoperability and economies of scale.

Since 2017 Government has made positive advances towards coordinated improvement of digital government services, further elaborating on a *National Strategy for Digital Governance* based on three strategic axes: interoperability of systems, digital identification, and digital government services. With support from the WB-financed Public-Sector Performance Proj-

ect (PAPSP), the Malagasy Government created an inter-ministerial group to work on digital government solutions, led by the President's Office (PREA) and the ANRE. Beyond the general coordination of emerging initiatives carried out by the government, this group has been playing an essential role with regards to: i) promotion of agile methodologies for software development; ii) focus on user-centric design of digital services; and iii) promotion of interoperability across government systems.

> ### Box 2: Better Coordination of Digital Government Services Through a Centralized Agency
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> A common denominator amongst the best performing African countries in digital government is the existence of a centralized agency with the authority and skills to coordinate efforts across government.
>
> This is the case, for instance, of the Department of Information and Communication Technology in the Seychelles (DICT), the Information and Communication Technologies Agency in Kenya (ICTA), the Rwanda Information Society Agency (RISA), and Namibia's Department of Public Service Information Technology Management (DPSITM). Placed under the authority of Namibia's Office of the Prime Minister, DPSITM has the following attributions:
>
> ▸ Promote and coordinate the implementation of digital government initiatives.
>
> ▸ Oversee and monitor the acquisition of software and hardware and entry into service level agreements.
>
> ▸ Promote and coordinate the development of sectoral and integrated information systems.
>
> ▸ Provide technical support across government ministries and agencies in the development, implementation, operation and maintenance of digital infrastructure in the public service.
>
> ▸ Facilitate specialized ICT training in the public sector.

Capacity and resources

Although several Ministries and institutions possess skilled – albeit understaffed – ICT services, these are not always provided the internal support needed to develop effective services. The country has an excellent pool base of developers and designers (see chapter 5), several

of which have been able to internally develop quality software and adequately manage the services[1]. However, most ICT staff do not feel valued vis-à-vis opportunities in the private sector, and feel left out by senior management (who lack the skills required) when it comes to most strategic projects. Staff does not receive enough training to stay up-to-date with the latest technologies (most ICT staff self-train on internet), and a common complaint is the time spent helping civil servants with basic tasks (e.g. how to use Office).

Simultaneously, across Government, there is a lack of capacity to effectively procure digital services or to establish partnerships with the private sector. In no other area there is such a level of knowledge asymmetry between governments and vendors as in the digital sector. And the limited set of digital in-house skills combined with their underuse by political leaders has led to unfortunate choices in terms of technological acquisition and partnerships. The PPP for the provision of biometric driving licenses is a good case in point. The initiative was negotiated by the MID and launched in 2016 with Cetis, a Slovenian company. In 2018, the MID terminated the partnership, on the grounds that the driving licenses were not biometric. A poorly drafted contract allowed the service provider to leave with all the equipment and the entire database (including biometrics). The Government could no longer deliver driving licenses, nor verify the authenticity of existing licenses. The MID launched a new biometric license in May 2019 with a new firm, but the terms of negotiations were not publicised, and the Ministry did not seek technical or legal support from its staff or donors. Another example is the PPP to collect registration fees for visas on arrival at the airport, which was launched in 2017 without DGI's involvement: the operator began collecting revenues, without making regular payments to the treasury.

User-centricity

The Malagasy government has limited capacity to identify and prioritize needs for citizens and businesses. No data is captured on usage of government services, and an ongoing assessment by the World Bank[2] reveals that Ministries are unable to list the number and type of services they provide, the number of users, let alone their satisfaction with these services. There is a significant knowledge and information gap to identify which digital government reforms would benefit end-users the most. This leads to governmental prioritization of services (e.g. biometric drivers' licenses) to be based on untested assumptions on which services are the most demanded by the Malagasy population.

An inward-looking approach to service design prevents the roll-out of user-centric digital government platforms and services. The design of well-performing digital services requires an

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1   Such as the MID, MIF, CNAPS

2   Assessment for the establishment of a "Catalogue of Services" by the World Bank Governance team.

exceptional level of understanding of the needs of public service users. Nevertheless, in most cases, the approach adopted by governments – and often encouraged by donors – follows an 'inward-looking' perspective. That is, the development of technologies that tends to privilege solutions aimed at reducing the transaction costs within administration (e.g. human resources, financial management), addressing internal needs. This partially explains the mushrooming of internal systems whose linkage to the provision of better services is often unclear.

Connectivity, interoperability and infrastructure

There is no coordination on government connectivity and interoperability. ANRE, through a subscription with Telecom operators, has been providing intranet services. However, this system is very costly, and given that the ANRE has been accumulating significant arrears, there is growing uncertainty over whether the service will continue in the future. The intranet is used largely by agencies that cannot afford internet services, given that it is "free"[3]. Other Ministries and institutions have individually negotiated their own internet connections directly with service providers. In many agencies, civil servants will use their own prepaid internet connections. There is no readily available information on how much Government as a whole spends on internet connections.

There is no operating infrastructure for the interoperability of government datasets and systems across government. There are promising – albeit incipient – measures to promote interoperability across government systems. The initial implementation of X-Road is a significant step towards the interoperability of systems, which must however be enforced by appropriate policy and investment. In a similar vein, the reforms in civil registration and identity management, which would lead to a unique identifier in the country, represent a significant opportunity for system interoperability. In a similar vein, it is the combination of a unique identifier with an interoperability system that allows for the implementation of the "once-only" principle, and the implementation of end-to-end digital services with secured authentication procedures.

There is no coherent vision regarding the management of data infrastructure. This partly explains the frequent data losses and leaks. There is also a proliferation of data infrastructure management projects and initiatives proposed by the private sector, contributing to a fragmented approach. Infrastructure mutualization remains a major challenge, and Government generally has too many servers and departments working in silos. The Ministry of Finance has begun establishing shared infrastructure accessible to the different general directorates, managed by the Information Systems Directorate (DSI). For the time being, the DSI provided

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3   Although Ministries are expected to pay for the service, in practice none of them do.

the initial investment, and each direction provides its servers and bears the operating costs of the data center. The notion of shared service remains limited to the use of common premises hosting some infrastructures and does not represent at this stage a broader attempt at mutualizing and optimizing infrastructure usage.

There is limited leveraging of the existing data infrastructure to inform decision-making. Limited interoperability amongst government datasets and low capacity on data analytics hampers the government's usage of data to better conduct its routing activities. Customs remains the most advanced data analysis service with the launch in 2016 of a mirror statistics analysis in partnership with the World Bank. The data extracted from Customs' systems are used to inform inspections, and to reduce the burden to private sector operators in the import and export sectors. This initiative is still at a relatively experimental stage and needs to be systematized and anchored in the organization's procedures. The idea of setting up a data exchange platform between Customs and the DGI has been raised by the new Director General of Customs. Yet, technicians lack training on business intelligence tools, and there is a lack of demand for such data at the decision-making level.

Security of the data and systems infrastructure is considerably low. According to the Cyber-security Index 2018 (NCSI 2018), Madagascar's digital government systems are amongst the most vulnerable in the world, with the country ranking second to last out of 100 countries. The NCSI 2018 also highlights that Madagascar has one of the greatest differences between its levels of digital development and cybersecurity. That is, despite the country's low levels of digital development, national cybersecurity is even less advanced, significantly exposing government systems and data to both domestic and external threats. An ongoing assessment by the World Bank reveals these weaknesses. For instance, key government datasets (e.g. budget) have no dedicated backup, with the only security measure being staff who copy data on personal compact disks and store them in their personal place of residency.

Recommendations

Recommendation 1: Create a Digital Government Services Unit

Drawing from the experience in both developed and developing countries, Madagascar's capacity to deliver digital services could be substantially boosted through the creation of a Digital Government Services Unit. Equipped with the necessary human and financial resources, such a unit should have the unambiguous authority to coordinate digital projects across government. To ensure interoperability and user-centricity, and to avoid the frequent mistakes related to government procurement and PPPs, this agency should have veto authority over spending on technology projects undertaken by other departments and Ministries. In this regard, the agency would also be responsible for developing guidelines and principles for insourcing and outsourcing of digital goods and services.

Recommendation 2: Strengthen support to ongoing Civil Registration and Identity Management Reforms

Necessary steps to build an identification management system, which can increase access to legal identification in the country and ensure that government systems are interoperable in a sustainable manner, should be taken. Dispersed efforts across government with an impact on identification systems (more precisely, those dealing with biometrics), should be coordinated and supported by individuals with the appropriate technical skills. Measures should be taken to ensure that all identification numbers (ID, Tax) are gradually phased out and replaced by a single number to be used across government.

Recommendation 3: Build a catalog of services, and start prioritizing which digital services are delivered

The government would benefit from developing a catalogue of public services. The catalogue of services should be periodically updated, and should ultimately enable monitoring of: the number of service users (online and offline), the cost of services per transaction, and the satisfaction of users with these services. Through extensive research with users, the government would select which services are to be prioritized for development. Only once those priority services are delivered would new services be prioritized for subsequent development.

Recommendation 4: Start to develop digital services according to Internet-era standards

The development of digital government services – both insourced or outsourced – should begin to follow standards that ensure that public services are faster, cheaper and better. This includes ensuring that services are developed with core objectives in mind, such as interoperability, user-centricity and economies of scale, and following internationally acknowledged service design standards.[4]

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4   The "design principles" initially developed the UK's Digital Government Services is widely accepted as the golden standard for service design, most of them applicable both to offline and online services. These principles are: i) start with user needs, ii) do less, iii) design with data, iv) do the hard work to make it simple, v) iterate. then iterate again, vi) this is for everyone, vii) understand context, viii) build digital services, not websites, ix) be consistent, not uniform, and x) make things open: it makes things better.

Digital Financial Services

Digital Financial Services

Importance of Digital Financial Services

SOCIOECONOMIC RATIONALE FOR DIGITAL FINANCIAL SERVICES DEVELOPMENT

Innovative technologies have transformed the economic and financial landscape worldwide by offering services at a lower cost and with greater convenience than traditional banking services, thereby helping to reach more people. Today most people and small businesses are not fully integrated into the formal financial system in Madagascar. They rely on cash for all their transactions, do not have safe vehicles for investing, and cannot access lending options beyond their personal networks. The development of digital financial services (DFS) or fintech in Madagascar can promote financial inclusion by expanding the delivery of basic financial services to marginalized and underserved populations, using notably mobile-phone-enabled solutions. Fintech not only encourages greater usage of financial services and provides new ways of raising funds, as well as reducing associated costs, it also enables access to new information services that help assess risks.

The banking and financial sector today remains quite limited in both scale and scope in Madagascar, with high sector concentration and a narrow product offering. Currently, only 18 percent of the adult population has a bank account or uses mobile money services, a figure which has doubled in the last 3 years. However, it is still well below the 43 percent average for sub-Saharan Africa (82 percent in Kenya and 42 percent in Senegal 42). The rapid expansion of mobile money services is an important opening for access to financial services in Madagascar and contributes to filling the gap toward financial inclusion and boosting the rate of financial access.

ALIGNMENT WITH COUNTRY DEVELOPMENT STRATEGY & GOALS

Digital Financial Services will play a prominent role in Madagascar's 2018-2022 Financial Inclusion Strategy. The strategy aims to increase the rate of financial inclusion from 29 percent in 2016 to 45 percent in 2022, and will promote basic financial services through mobile phones. The most common reason cited by Malagasy people for not having a bank account is that they do not have enough money to open one. Banking penetration levels are growing both through branch expansion and the "*bancarisation*" of civil servants: since 2013 the authorities have worked to pay government employees via bank accounts. Since October 2014, all such payments have been made through bank transfers, with only employees living in very remote areas of the interior of the country that are not serviced by bank branches being exempted from the requirement. The Ministry of Post, Telecommunication and Digital Development MPTDD also plans to digitalize the Postal Financial Services, which include elements of DFS.

Diagnostic Findings: Current State of Digital Financial Services

AVAILABILITY AND USE OF DIGITAL FINANCIAL SERVICES

Madagascar's financial system is dominated by banks, and is regulated by the *Banky Foiben'i Madagasikara* (Central Bank of Madagascar) and by the CSBF (Banking supervisor). So far, commercial banks have a low risk-appetite and an asset-heavy model, wider coverage and penetration has been limited, and 86 percent of the credit market is concentrated within 4 main banks[1]. Most commercial banks (10 banks out of 11) provide digital services to their clients. 8 are using internet banking, and most work with the three mobile money operators (M-Vola, Orange, and Airtel Money). The electronic connection between Banks and MNOs is operational, with the possibility of Bank to Wallet and Wallet to Bank.

The Baobab Bank offers fast credit to clients through agents equipped with smart phones and tablets. It also offers payment of emoluments backed by biometric identification features for risk management. It offers to its client a mobile wallet service in collaboration with the Mobile Operator Orange.

The Bank of Africa has invested since October 2018 in the development of a DFS platform, Smart Vista, to diversify its range of financial product and services. 17,000 clients (out of 750,000) are using the 'MyBOA' internet banking service. It has digitalized its network of 180 Automatic Teller Machine (ATM), with advanced features and services for the clients, such as, bank transfer, PIN modification, etc. BOA works with the three mobile operators to offer mobile money services, and payments can be conducted on the 'MyBOA' web interface.

The Société Générale Madagascar offers basic banking services over multiple channels including web portal and mobile apps. It is planning to launch a mobile wallet product under the brand name "YUP".

Box 3: Some examples of bank-led services

Recourse to formal savings and borrowing is still scarce and innovative services such as digital credit, (e.g. M-Shwari), have yet to appear. In 2017, the number of adults who saved in a formal financial institution actually reached 4 percent, while 44 percent declared having saved any money. Borrowing from friends or family is more popular (37 percent) than borrowing from a financial institution (4 percent), and is also higher than the SSA average (31 percent).

Financial inclusion initiatives have been predominantly led by mobile operators, with 'Mo-

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1   Banky Foiben'i Madagasikara, Financial Stability report, 2017

bile Money' services launched jointly with banks in 2010. There are currently three major providers of mobile money: Telma (M-Vola), Airtel and Orange Money. Together they have over 19,000 cash points within the island: 128 mobile money agents per 100 000 people, less than the 276 agents average in Sub-Saharan Africa. Bank branches serve even less customers with 2.3 agents for the same number of adults. Telma is far more developed in its mobile money offering with more than 10,000 agents across Madagascar.

Key figures	
Percentage of adults with a bank account (Global Findex 2017)	18%
Number of adults who saved in a formal financial institution	4%
Active mobile money users	1.2 million
Active mobile money agents for 100.000 adults	128
Active adult mobile money users for 1,000 mobile money users (IMF survey on financial access)	Less than 100

Table 1: Key DFS figures

Demand for mobile money has increased steadily, but the potential for expansion remains significant[2]. The total number of subscribers rose from 2.3 million in 2013 to over 4.6 million in 2016. The number of active subscribers[3] reached 1.3 million people in June 2018 (up from 760,000 in 2015). This represents about 10 percent of the adult population, much lower than the low-income country average of 35 percent. This is however much higher than for debit and credit cards, which respectively have 3.2 percent and 1 percent adoption rates. Use of digital payments remains low: 15 percent of adults made or received a digital payment in 2017, and only 1 percent paid a utility bill digitally or made online payments. Furthermore, less than 1 percent said to have used their debit or credit card to make a purchase, which shows that merchant payments are highly under-developed. As to remittances, there are more people using cash (12.3 percent) to transfer money than people using an account (7.5 percent), which shows low adoption of digital means of payments. Compared to its peers, Madagascar has one the lowest usage of digital payments (Table 3 in Annex).

MFIs, which specialize in providing financial services to low income and poorly documented customers, can play a key role in bringing credit to the poor through digital technologies. MFIs have developed alternative business models to offer account, credit and other financial services to poorly documented and low-income customers (including in-depth face-to-face client screening interviews, group lending schemes, micro and short-maturity credit, increased focus on financial education to generate customer demand). There are now 4.6 MFI branches per 100,000 Malagasy – a bigger network than Malagasy banks (2.2). There are

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2   Nearly 2.62 million adults own a mobile phone, without access to transaction account.

3   Activity is defined as a subscriber having initiated at least one transaction of the past 90 days

55.6 MFI depositors and 16.8 borrowers per 1,000 adults[4]. Given a business model focused on small loans to the poor, outstanding loans remain small at 0.8 percent of GDP.

There is significant opportunity to increase the digitization of government payments. As of mid-2017, cash payments were received by around 11,000 active civil service teachers, 11,000 retired civil service teachers, 15,000 active auxiliary "FRAM" teachers and 90,000 scholarship recipients[5]. In rural areas, teachers sometimes need to travel for days to collect their cash salary, contributing to teacher absenteeism. Teachers, students and taxpayers are potentially those who could to receive and make government payments through an e-money transaction account. Some pilots of digitalization of Government tax services have been initiated since 2016 both at the Central and local level. In 2016, the Commune of Mahajunga began collecting taxes via MVola. The operation was considered a success, and paved the way toward the digitalization of the commune's receipts and expenditures operation. In 2017, the Central Tax Directorate launched an online tax payment service with two mobile money operators, Orange Money and MVola.

ENABLING ENVIRONMENT FOR DIGITAL FINANCIAL SERVICES

The central bank has adopted an enabling environment for DFS. The legislation on electronic money was introduced in December, 2016. The Malagasy Parliament adopted Law No. 2016-056 on e-money and electronic money institutions (EMI), which regulates the issuance of electronic money and defines the regime of issuers of electronic money.[16] The enactment of the e-money law, putting the sector on an improved legal footing, has sown the seeds for further expansion. The regulator (CSBF) has taken the lead in coming up with the proper structure to enable mobile money to evolve as a very popular DFS. CSBF has also confirmed that its next actions will be to enter into consultation with other sector regulators, the Central Bank and the ICT regulator, ARTEC, in order to consolidate the regulatory provisions for mobile money and DFS in general. This is a good regulatory approach in the digital environment and the natural course of action in the organic growth and convergence of the ICT and financial sectors.

The microfinance legislation has been revised to further promote stability. The revised legal and regulatory framework seeks to introduce: (i) resolution powers for the financial sector; (ii) the principle of a deposit guarantee fund for MFI clients; (iii) more stringent prudential and non-prudential measures such as minimum capital requirements, consumer protection; (iv) simplified categorizations of MFIs; and (v) enhanced risk-based supervision for the CSBF, including tools derived from the "CAMELS" approach, and above all extending authorized MFI activities to the issuance of e-money. Currently 7 MFI are requesting a single e-money license to be soon issued by the CSBF.

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4   IMF FAS 2017

5   Based on data provided by the authorities.

CONSTRAINTS TO DIGITAL FINANCIAL SERVICES DEVELOPMENT

Market Development

The DFS market is only interoperable between mobile money wallets. There is room to improve interoperability, with the objective of achieving full interoperability, from bank accounts to e-money accounts. The Central Bank is working with the financial sector stakeholders to design and implement a National Payment Switch project to address the issue of interoperability.

There is a lack of adequate financial education to help the population become more DFS-savvy, and demand for such services is lacking. The culture is very "liquid", meaning that the majority of the Malagasy population is more comfortable with tangible rather than virtual money. The country's geography also makes full service coverage difficult in the present economic circumstances.

Policy & Regulation

The legal and regulatory framework is somehow limitative[6] and not up to date with the trends and digitalization development. The current legislation is not fit to supervise the Fintechs for example. While the law on electronic money is considered a laudable initiative, falls short of addressing the emergence of new business models where platforms that act as a payment intermediaries have been developed. Vanilla Pay and Teknet are example of private initiatives that require a proper legal framework for Payment Intermediary Service Provider or simply fintech. This could very well be a lost-opportunity for their businesses and for the DFS ecosystem.

Revenue sharing models for DFS are impacted by the monopoly of the telecommunication industry. With regards to mobile money, the mobile operators dictate the revenue sharing and the commission level in the absence of proper regulations and determinations of the regulators to that effect. This situation does not fully embrace the principle of financial liberalization.

Financial service delivery to marginalize populations and in rural areas is hampered by regulation and technical limitations of MNO availability. There is no specific agent banking regulation that allows non-banks to deliver financial services remotely. From a banking perspective, there are no clear laws which govern agent banking. All these factors limit the growth of the sector and hamper outreach to a non-traditional population segments. Technical limitations of the availability of MNO services in rural areas have been reported, leading to continued preference for OTC providers and credit unions. Know Your Customer (KYC)[7] requirements are unfavorable: there are no provisions for tiered KYC for low value accounts. AML regulation

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6   Example, the current foreign exchange code doesn't fully comply with total liberalization of the current account

7   Know Your Customer (KYC) is the process of identifying and verifying the identity clients.

requires presentation of identification at point of account opening. However, 33 percent of the population do not hold any form of ID hence are not be able to access formal financial service.

Market Entry

Cost of entry into the market is considered high. Many of the potential DFS suppliers, including the ACEP and Vanilla Pay, have reported that they find the regulatory requirement in terms of the security deposit and entry fee required to become a recognized mobile money enterprise (EME) too high. As such they are not able to modernize their activities and become a fully-fledged DFS provider. Many players also reported that the telecom costs are too high for them to make a sound business case for a DFS. While quality of the service is reasonable and available, and the three mobile money operators are interconnected[8], the intermediary cost offered by MNOs to Financial Institutions are excessively high for Financial Institutions to fully scale up in DFS. The telecom operators charge normal retail tariffs instead of making wholesale offers. The upcoming postal DFS service is expected to drastically contribute to the reduction of these tariffs.

Managing Risks of Digital Finance

Madagascar's legal framework does not adequately provide for the protection financial product consumers. Strengthening consumer protection in Madagascar is important, both because the country lags behind for the protection of disclosure, financial contracts and advertising, but also because the growth of digital financial services poses new risks to previously unfunded consumers. Innovative tools and approaches should be adopted to adapt consumer protection to the needs of digital finance consumers in Madagascar. These could include for appropriate disclosure mechanisms for digital credit products; rules on digital marketing, including cooling-off periods during which consumers can rescind a credit offer with no penalty; data protection and privacy laws and regulations to create a balanced approach to innovation and consumer protection. Many jurisdictions around the world are grappling with these issues. They are critically important in Madagascar where digital finance products are starting to take off, and where many consumers first interaction with formal finance will be through products delivered via mobile phones.

The emphasis on consumer associations in the regulatory approach to financial consumer protection should also be reviewed to ensure that these associations are in a position to play a meaningful role. These associations seem to have a broad mandate in support of consumer protection and related outreach and communication to the public, but lack specific expertise

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8   Madagascar is the second country in Africa where te three mobile money operators are interoperable among themsekves.

in finance. Moreover, these associations have very limited funding, as well as limited staff and outreach capabilities. They also have some level of government involvement / oversight which may influence their independence. It would be worthwhile, however, to see if some of these limitations can be reduced through technical assistance, support in developing a stream of income from public donations, and possible consolidation of the 3-5 existing associations into just one or two.

Financial capability in Madagascar is low, both because of the low levels of financial inclusion and the low literacy and numeracy levels. Boosting financial capability will help strengthen the ability of Malagasy citizens to make sound financial decisions and to use financial products responsibly, including new digital financial services. This goes beyond simply providing information and developing knowledge about financial products and services, but also building the skills, attitudes and behaviors needed to sustainably and responsibly use formal financial services. A behavioral approach to financial capability activities is recommended that leverages knowledge of psychology, behavioral economics, social marketing and communications to conduct effective interventions that are more likely to lead to behavioral changes and the desired financial results.

Alongside improved Internet performance, Madagascar has seen the emergence of various forms of cybercrime, varying in their severity. These include computer-related fraud (in particular on social media platforms or related to mobile banking), cyber harassment, hacking, Distributed Denial of Service attacks (DDoS) and website defacement.[9] Madagascar adopted a number of laws relating to cybersecurity in 2014 and 2015.

Financial Infrastructure

Retail Payments Infrastructure

The National Payment System in Madagascar is based on the RTGS[10] (for large-value and systemic transactions) and teleclearing systems, which are owned and operated by the Central Bank. The transactions cleared and settled in the two systems are denominated exclusively in Ariary, the local currency. Participants are credit institutions holding an account on the Central Bank books, the Public Treasury, and all other institutions as accepted by the Central Bank. While the majority of checks and bills of exchange are dematerialized and treated within teleclearing, the use of modern payment instruments is still limited. There are 1.71 ATMs per 100,000 inhabitants (an extremely low number compared to 6.9 in Mozambique, 4.4 in Malawi, and 4 in Uganda).

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9   ARTEC

10   RTGS (Real Time Gross Settlement) is an electronic payment system that allow individuals to transfer funds between banks. The transmission takes place on a real time basis.

Payments (including, in many cases, of large values) are mostly cash-based, including the government salaries and payments. Checks are widely utilized, but more as credit instruments and can be endorsed. The infrastructure for cards and electronic payments acceptance (ATMs, POS) is clearly underdeveloped. There are no cards switch infrastructures and international cards (Visa, Mastercard) are processed outside of Madagascar at a high cost. While mobile network operators (MNOs) supplying mobile payment services have set up interoperable solutions, there is no interoperability for proprietary cards. This results in overlapping or limited coverage, sunken investment costs, and overall inefficiency. The Central Bank is working collaboratively with the private sector on a national switch that will provide full interoperability, from bank accounts to e-money wallets, and provide other services to increase the acceptance of electronic payments (QR code scheme).

The forthcoming national switch is expected to service all electronic payments, including ATMs/POS networks, Internet banking, proprietary cards, mobile payments, and any new instruments that would become available at a later date. The objectives are to: i) attain complete interoperability through a neutral and seamless working platform; ii) achieve greater network and scale economies, thus reducing the service cost for users; iii) overcome dependence on foreign entities; and iv) use the infrastructure for the existing and future payment instruments. The switch will provide the following services: a platform for driving shared ATMs, Point of Sale (POS), mPOS devices and Merchant Acquiring services; a full card personalization and processing centre for processing payment cards and the clearing and settlement of all card transactions initiated at relevant ATM and POS acceptance infrastructures; a shared mobile banking and Internet Banking Platform; an efficient fraud management & dispute resolution platform along with AML safeguards; a smart card management module.

Credit Infrastructure

Access to finance has been hampered by weak credit infrastructure, but the new and first private credit bureau gives hope of including more borrowers. Madagascar ranks at the 124th place (out of 190 countries) in terms of "Getting Credit" in the 2018 World Bank Doing Business report. Some evidence suggests that credit constraints are particularly acute for micro enterprises, women entrepreneurs and exporters. Barriers to access to formal credit (and the limited size of informal loans within small local communities) prevents high-potential Malagasy MSMEs from growing sufficiently to develop economies of scale and to create employment opportunities, and households and businesses struggle to mobilize funds. For every 1,000 adults, there are only 28.8 borrowers at commercial banks (IMF FAS 2017) in Madagascar. The legal framework for setting up a private credit bureau was enacted in 2018. A new private credit bureau (CRIF), compliant with international quality standards and the local legal framework, was licensed in 2018, and will manage credit information sent by local

organizations through an advanced technology platform, which will integrate and consolidate all data on the reliability of a credit applicant into a single report. The local entity will operate under the supervision and control of the Central Bank.

Recommendations and Next Steps

Recommendation 1: Establish a fintech legal framework and development strategy.

A preliminary diagnostic to identify existing fintech initiatives as well as their needs should be conducted. The results of this study will inform the adequate approach for a new legal framework, funding and development strategy.

Recommendation 2: Develop regulations for the implementation of the Banking Act, including for financial consumer protection.

This is a good opportunity to strengthen the framework for consumer protection including through the development of protocols, manuals and approaches to be used for the supervision and enforcement of consumer protection of financial products. Consumer-facing tools should also be developed and strengthened including surrounding complaints handling which can be valuable for both consumer protection and as a mechanism to highlight systemic issues which can even have stability and integrity dimensions.

MARKET LEVEL SUPPORT

Recommendation 4: Support the Central Bank in the effective implementation of full interoperability.

This could include three key components: 1) Improve infrastructure (switch implementation already planned under IPF); 2) Improve the regulatory framework and define systems rules and standards; and 3) obtain stakeholders engagement.

Recommendation 5: Provide advisory services to existing and potential DFS providers.

This includes providing knowledge and benchmarks to boost product innovation and fintech, and assistance on pricing and transparency. IFC could help obtain the market insights to ensure the Central Bank incorporates providers' needs while preserving risks.

Digital Entrepreneurship

Digital Entrepreneurship

Background and Importance of Digital Entrepreneurship

Digital entrepreneurship is a key pillar of the digital economy and is linked to continued economic growth, wealth creation and higher standards of living. Digital entrepreneurship, seen to encompass the launch of new ventures in the digital sector, also including digital private sector platforms, brings the digital economy to life. Digital ventures offer new products and services, leverage new technology and business models, and open new markets. They can contribute to net employment growth, and help enhance competitiveness and productivity of the economy. Vibrant digital entrepreneurship ecosystems are needed to help digital entrepreneurs flourish and encompass support organizations (such as accelerators, incubators, innovation hubs and co-working spaces) and early stage financing (such as seed, angel, and venture capital and grants). Furthermore, vibrant ecosystems require specific skills (both technical and business ones), access to markets, and an overall conducive business environment that motivates the creation and use of novel digital technologies.

Madagascar possesses some strengths when it comes to digital entrepreneurship. These include: (i) a government and emerging policy with strong commitment to the ICT sector's development (through the "*Initiative Emergence Madagascar*" or IEM) and entrepreneurship more broadly (through the "*Fihariana*" entrepreneurship program); (ii) availability of a pool of strong technical skills (computer engineers) at a competitive cost despite being well above the new minimum wage of MGA 200k, e.g. around 3 times that in the case of fresh TVET graduates getting into the top firms (see skills chapter); (iii) high-speed internet availability – although price remains a keen issue; and (iv) an established and growing BPO/KPO sector.

Yet several important weaknesses inhibit digital entrepreneurship in the country. These include: (i) infrastructure, notably access to energy and the cost of internet access (treated in detail in the infrastructure chapter), although some co-working and other spaces are being provided (such as Ivotech by the AUF); (ii) weakness of support provided to early stage entrepreneurs, particularly on product-market fit and business fundamentals; (iii) the business environment for startups specifically (as a very particular sort of SME); (iv) low levels of early stage finance: grants (quasi-inexistent) and early stage financing (angel and seed); and (v) the dispersion of actors, with few informal or formal connections (through joint events, etc.), meaning there is no real 'ecosystem' and therefore no networking and agglomeration effects. The following section details these findings in further detail.

Diagnostics Findings: Current State of Digital Entrepreneurship

POLICY FRAMEWORK AND BUSINESS ENVIRONMENT FOR DIGITAL ENTREPRENEURS

There are numerous policy and action areas relevant to digital entrepreneurship in the government's IEM strategy, although they currently lack a clear implementation plan. The IEM document suggests ten actions (with many related sub-actions) in the ICT sector, of which several are of important to digital entrepreneurship, including, among others , the creation of a digital entrepreneurship incubator.

A national program for entrepreneurship was just created, but implementation details must be clarified. The « *Fihariana* » was officialized by the Council of Ministers in February 2019 with a US$ 55 million fund, to facilitate the creation of new, and expansion of existing, companies through both soft loans and leasing. It is focused on agribusiness, tourism, handicraft, and all other sectors "that create value". Details are still forthcoming in terms of the management of the fund, although *SONAPAR* (*Société Nationale de Participation*), the government shareholding agency, will be possibly one of the Fund managers. Business development services may be made available through "specialized partners", though this remains to be clarified. Eligibility to the fund includes revenue generation, job creation, fiscal compliance and company formalization, and participation in the reduction of rural exodus, with a priority on youth-led/young projects. The creation of the fund is indeed intended to respond to the fact that 70 percent of unemployed Malagasy are youth, and that between 400-500 000 youth are entering the job market every year, with few perspectives of employment. It is unclear at this point if and how the ICT sector can benefit from this fund.

State of the Domestic E-Commerce Industry

E-commerce has already seen recent legislative improvements, but is confronted with other key bottlenecks, including the efficiency and security of digital infrastructure and transactions, and transport logistics, while real market potential remains to be proven, though some analyses see significant growth and job potential[1]. A Steering Committee for the Development of Electronic Commerce (CPDCE) was created in 2012, and contributed in 2014 to the adoption of e-commerce laws. However, the country still lacks an national e-commerce assessment. Logistics are one of the main bottlenecks: the country's sheer size, its geographical isolation, and the degraded transport infrastructure hinder online shipping sales, both on the domestic market and internationally. Delivering products domestically in a secure and reliable way is difficult without the cost being too high. Other constraints include the lack of secure servers, and the fact that payments cannot currently be made online in Madagascar[2]. Websites currently offer payment solutions through mobile money, Paypal and wire transfers, but consumer trust in online payment remains low, and consumer protection organization are extremely weak. There is only one Malagasy e-commerce website, of the 500 most consulted websites in Madagascar[3], and most online commerce is done informally via Facebook.

Box 4: State of the Domestic E-Commerce Industry

The overall business environment for digital entrepreneurs in Madagascar remains poor, and digital sector-specific bottlenecks need to be addressed. Madagascar ranks very low overall (161/190 in *Doing Business*), better on starting a business (81/190) and protection of minority investors, but access to energy and contract enforcement are pain points, as confirmed by interviewees, and there is no tax provision for young digital startups as in some successful countries. Digital sector-specific policy and regulatory issues should also be addressed to improve the environment for digital entrepreneurs. These include regulation for data and privacy rules, open data, the cost of data, and high import duties on imports of digital equipment. E-commerce has already seen recent legislative improvements, but is confronted to other key bottlenecks, including the efficiency and security of digital infrastructure and transactions, and transport logistics, while real market potential remains to be proven, though some analyses see significant growth and job potential.

SUPPORT ORGANIZATIONS

Ideation and early stage entrepreneurs receive little support, and later stage support suffers from lack of early-stage pipeline. The rapid mapping and meetings conducted reveal that, despite several initiatives, there are no real business incubation programs that provide

a structured set of quality services to digital entrepreneurs in a rigorous program, with support of business and technical mentors. Such programs exist in many other African countries (CTIC in Senegal, iHub in Nairobi, BongoHive in Zambia, mLabs Southern Africa, etc.) and would help early stage entrepreneurs launch and structure their business. In particular, there is very little orientation of entrepreneurs to a defined 'market', with most organizations in this space being more technically focused. This is typically done through a "minimum viable product" support stage, where an entrepreneur is encouraged to go as quickly as possible to gauge the market, prior to building out their product/company. Quality of support seems quite low overall, e.g. in terms of mentoring, as many "mentors" have little entrepreneurial or business experience themselves. Later stage support exists, including new initiatives from large players (Orange, Axian) are coming up in the later (digital) entrepreneurship stage space, but they suffer from the weakness of the pipeline.
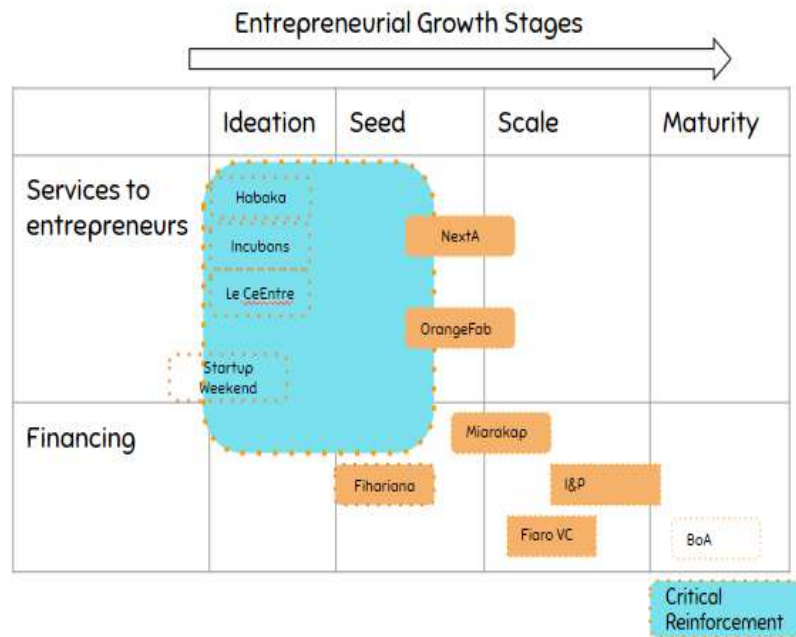
Figure 9: Entrepreneurial growth stages (Source: authors) Source: authors

Support is highly geographically concentrated in Antananarivo. Although spatial concentration and geographic agglomeration are a very good thing for digital entrepreneurs generally and should be further encouraged, this does also pose the question of support to digital entrepreneurs in other areas (for example the National School for Computer Science, ENI, in Fianarantsoa). This is further exacerbated by poor road and transport infrastructure, which makes it difficult, costly and time-intensive to travel to the capital. This would plead for some forms of trainings and programs to be delivered to entrepreneurs in the Regions virtually, such as those conducted by mLabs in South Africa for example.

Taking the 'Silicon Savannah' to the next level

In Kenya, the quantity of startups or of its ecosystem support infrastructure, such as hubs, is not an issue, but the quality of those startups and the quality of services offered by that infrastructure, can be. To address this, the government of Kenya identified a program of actions to help the ecosystem address existing failures.

The Kenya Industry and Entrepreneurship Project (KIEP), expected to be launched mid-2019, was designed to 1) support hubs to achieve a more sustainable business model and improve the services they offer to startups, which should in turn help improve the quality of the startups that benefit from those services; 2) support providers of rapid technology skills expand the reach of their services, to increase the pipeline of local talent that can feed into startups; 3) establish a program to link local traditional industries with startups, to open up the local market for startups, and increase the capacity of local industries to absorb innovation and technology, bringing them into the digital economy; 4) establish a program to link local industries with students, to have an alternative rapid way of coming up with and testing new market approaches and products, help the industry scout local talent, and help students better understand the private sector and their opportunities there, including as entrepreneurs.

The project has a strong gender focus, with built-in mechanisms to increase the number of women beneficiaries. In addition, it also incorporates a program to connect to international networks of mentors and funding.

Box 5: Taking the 'Silicon Savannah' to the next level

ENTREPRENEURSHIP CULTURE AND TALENT

General entrepreneurial activity is quite high in Madagascar, at 22 percent or 7/54 in the 2017 Global Entrepreneurship Monitor report, and entrepreneurship is seen as a good career choice by 84 percent of respondents. In contrast, perceived opportunities for entrepreneurship are low (24 percent), competencies are perceived as a key constraint (55 percent), fear of failure is high (42 percent), and entrepreneurial intentions are low (40 percent). This leads to many detected opportunities not to be pursued, despite international evidence that business success requires significant trial and error. It is therefore essential to change the discourse on failure, and to create an environment for rapid entry and exit of firms.

A multiplication of startup competitions is rapidly becoming detrimental to Digital Entrepreneurship. Challenges and competitions are a valuable way to motivate students and improve their attitudes to entrepreneurship and enhance their skills and are provided in most countries. However, a multiplication of startup competitions with no effective outcome, as is the case in Madagascar, can create and entertain skepticism about digital entrepreneurship, whether with would-be entrepreneurs or with policy makers. Indeed, it seems that the ecosystem in Madagascar is unable to provide effective follow-on support to turn ideas from those competitions into businesses, so that the events end up being more like a PR exercises, rather than motivational tools for a larger audience. Many do question the motivations of the "entrepreneurs" applying to these competitions, see the 'winning' startups quickly disappear, and cannot recall any successful stories from several years of competition. Entrepreneurs themselves were also gaining in skepticism, as it seemed that prizes were attributed to the most media-worthy entrepreneurs, not necessarily to those that had product-market fit.

Madagascar does relatively well on gender entrepreneurship in general, but much more is needed in the digital space. Madagascar has an overall high percentage of firms with female participation in ownership (42 percent in the most recent enterprise survey). However, anecdotal evidence from interviews points to low female participation, in line with most countries, in the digital entrepreneurship space in particular, which is male dominated. There are initiatives, such as Django Girls Antananarivo (DGA) which trains girls from 16 years of age in Django (an open-source web programming tool). These aim to explicitly boost female participation in this space. That being said, and beyond skills building coding bootcamps, it would be useful to have a gender-sensitive incubation program that actively sources and supports female digital entrepreneurs to boost female participation in digital entrepreneurship specifically.

Technical skills for the digital sector are of high quality, but there is a skills shortage overall in the sector, due in part to brain drain. The issue of digital skills is treated in depth in a separate chapter. In short, the opinion of interviewees as well as findings from the GEM and other reports available find that digital (technical) skills, particularly the top end computer engineers, are of very high quality generally, as demonstrated by the growth of the Artificial Intelligence outsourcing and gaming sectors. There is however a perceived growing skills gap, with not enough graduates coming into the market each year to satisfy local demand, both from TVETs and from universities. There is fierce competition in particular for the high-end, computer engineering skills, as the best graduates from both TVETs and universities try to go internationally (France, Mauritius), or to the large BPO/KPO firms in Madagascar, as this offers significantly better prospects (e.g. 3 times minimum wage for TVET graduates going to top local firms, vs. 1.5 times on average). Thus, to find highly skilled staff, smaller digital startups and companies are having to recruit staff at very early stage (directly in schools) and train their graduates. It was surmised that brain drain would get

worse, particularly in light of visa facilitation by France targeting this sector (FrenchTech Visa). This "hot topic" of brain-drain was recently discussed at Vivatech in Paris.

Entrepreneurship skills are perceived to be significantly less strong, so crossovers between technical and business trainings need to be increased. Although there are entrepreneurship courses embedded in some of the well-reputed higher business education institutions in Antananarivo (INSCAE; ISCAM, etc.), some of which are open to external participants, there is little cross-over between the digital technical side (*Ecole Nationale d'Informatique de Fianarantsoa*, or the private IT schools in Antananarivo) and the business side for the time being. Thus, a lot of startups that are seen in digital startup competitions are technically interesting, but founders lack the business skills to build a company, which can be seen anecdotally by the fact that very few create companies beyond a Facebook page. This is compounded by the lack of early stage support for technical founders, to either matchmake them to a business co-founder (through meetups etc.), or increase their business skills. Another way to improve entrepreneurial attitude could be the use of Personal Initiative (PI) training, an innovative, psychological-entrepreneurship training that has been tested in several developing countries with World Bank support, and shown interesting results compared to traditional "business training". In Madagascar, the training has been piloted under the first phase of the World Bank-financed PIC2. PI training is also being tested as a way to improve the absorption of financial skills training under the recently-approved Madagascar Financial Inclusion Project, which notably plans for the digitalization of government payments and of Micro Finance Institutions (MFIs), and a related financial education campaign.

MARKETS

The domestic market for digital products and services holds promise, but few linkages are currently being made to key economic sectors and local demand. Due to the technical rather than business background of many founders, some entrepreneurs believe the domestic market to be small to nonexistent. However, although there is low internet connectivity, mobile connectivity is higher. Thus, the market for mobile-enabled services is not negligible, as can be seen by the growth in mobile money / banking sector. For example, some sectoral applications of digital could hold significant (market) promise. An example of how a Malagasy startup is tackling the waste management sector through digitally enabled services is included below by way of an example. Other sectors with high potential for digitally enabled services potentially include the tourism and agricultural sectors. This may point to weaknesses in support provided to entrepreneurs at the early stages (guiding entrepreneurs on market opportunities; supporting local tailoring of solutions to local conditions), and match-making (through meet-ups, competitions) between technical (digital) skills and sectoral talent.

> ## Government procurement as a tool to foster innovation and support digital entrepreneurs
>
> Public procurement has the power to create new markets for innovation and in many countries the government is the biggest procurer of goods and services, which makes them an attractive client for smaller companies, including digital entrepreneurs. However, public procurement is often an ignored and untapped source to promote SME development, and several constraints inhibit SMEs' participation in public contracts, including complex legal and regulatory frameworks or payment delays. Cities like Philadelphia have piloted programs like FastFWD to engage SMEs and digital startups. Policy-makers could consider the 2017 public procurement for innovation framework from OECD or lessons from the 2017 review of the Small Business Research Initiative (SBRI) in the UK that usefully outline the importance of public procurement, and how to improve the public sector's role to support innovation and develop better services. Other country examples of public procurement successfully targeting smaller companies includes Chile (Chile Compra's eProcurement), Prompye in Peru. Insomuch as concerns Madagascar, some type of payment guarantee facility would likely need to be instituted to facilitate transactions with digital companies and entrepreneurs, owing to mistrust and perceived payments issues and delays in transacting with government.

Box 6: Government procurement as a tool to foster innovation and support digital entrepreneurs

Government procurement could potentially give a boost to the sector. In view of the new government's focus on e-government and e-services in its strategy; as well as ed-tech and other public sector digital services, there is a potential that public procurement for these initiatives could work as strong market catalyst for the private sector, notably digital entrepreneurs. However, there is high skepticism and reticence from the private sector to work with the public sector, notably in terms of public procurement (corruption, favoritism), delays, payment issues. This could potentially be solved through a neutral party involved (such as the World Bank) playing a brokering role. Examples of government procurement geared towards SMEs and entrepreneurs exists in Kenya (AGPO – https://agpo.go.ke/), although the Kenyan government is currently working on this to improve the process further. The planned digitalization of government payments under the World Bank-financed Madagascar Financial Inclusion Project would also help.

International market access for digital entrepreneurs is problematic. The BPO/KPO sector is almost exclusively turned towards the international market, and notably France, seeing also that they are often subsidiaries of French or international BPO/KPO companies (see above

table). However, young digital startups access to international markets is much more difficult: there are no fora that facilitate access, and startups often by definition have weak external networks. Several interviewed entrepreneurs were working with client aggregators that source and aggregate clients for them based in France or elsewhere, but this client prospection is done on a very ad-hoc basis. There is currently no support through intermediaries or government to help with market intelligence for access to foreign markets. Facilitating international market access for local digital entrepreneurs once they have gained a sufficient size and market traction could have a large positive effect, seeing the price differential and market size differences, as well as the maturity of markets for digital products and services internationally. That being said, international payments remain an issue that would need to be resolved for this to happen (See DFS chapter; UNCTAD). This would have to be a prior action, as no business pipeline can be built if firms have no certainty that they can scale internationally on electronic transactions.

FINANCIAL CAPITAL

Access to credit is extremely difficult in Madagascar in general, and for younger firms and startups in particular. A 2016 FinScope survey found that 41 percent of households were fully financially excluded. Only 12 percent of Malagasy households had access to banking services, 17 percent had access to other non-bank institutions and 29 percent only had access to informal mechanisms to manage their finances. Lack of access to basic formal financial services, starting from transaction accounts and credit for micro, small and medium-sized enterprises (MSMEs), has severe repercussions on the life of the Malagasy. Madagascar only ranks 124 out of 190 in the 2019 *Doing Business* ranking for access to credit, though this is an improvement from 133 in 2018. Some evidence suggests that credit constraints are particularly acute for micro enterprises, women entrepreneurs and exporters. Lacking access to formal credit (and given the limited size of informal loans within small local communities), many high-potential Malagasy MSMEs cannot grow sufficiently to develop economies of scale and to create employment opportunities. Even when there is potential access, banks offer credit only at high interest rates, especially for smaller firms and startups.[1] This seems to be due both to macroeconomic factors, such as the high cost of refinancing with the central bank and low deposit rates, and to a particularly high level of risk aversion among Malagasy banks, which otherwise show a high level of profitability.[2]

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1   A 2016 interest rate study in Madagascar (financed under the World Bank-financed PASEF I project) found spreads for effective loan interest rates between 11% and 127%. Spreads were even higher and more variable among MFIs. The financial sector supervisor has not put in place interest rate caps or restrictions. Interest rates are set at market-determined rates.

2   IMF Country Report No. 16/377, December 2016

Early stage access to risk capital is also currently highly constrained: Grants, apart from the few that are given for entrepreneurship competition prizes, are virtually nonexistent[3]. There is anecdotal evidence on business angels making investments in early stage companies, but there is of yet no formal or structured angel network in Madagascar. One interesting avenue for later stage, more mature companies is acquisition. Anecdotal evidence points to a few companies (for example Nelli-Studio) that are being bought out by the larger BPO/KPO sector firms. These are done mainly to buy specialized skills/products that don't exist currently in the larger companies. There are also some prizes from entrepreneurship competitions, with the strong caveats given earlier.

Organizations providing seed+ and growth stage funding do exist. On the equity side, Miarakap started in 2017, and has now invested in 3 companies (out of 127 applications), with targeted tickets of US$ 30,000-300,000. Fiaro Venture Capital is a VC fund associated with the Orange Fab incubator. Investisseurs & Partenaires (I&P) targets growth stage ventures, for US$ 300k-3m ticket sizes, and made their first investment in 2012, with now 7 in their portfolio. All 3 funds are part of an association of Malagasy venture capitalists, the *AMIC*[4]. On the debt side, the new government soft loan and leasing program announced in February should help greatly, although details on its operationalization are missing. Eligibility criteria for the fund have been announced, but are still to be further details (together with its operationalization). Existing guarantees (SOLIDIS, or ARIZ backed by the *Agence Française de Développement*) also seem to be somewhat functioning, though they tend more to facilitate increases in deal sizes than a "GO/NO-GO" decision to invest in new ventures.

Fintechs are starting to enter the market and (timidly) disrupt business as usual. Two notable examples of Malagasy fintechs include Vanilla Pay / ariary.net (which is working on integration of payment solutions for ecommerce platforms) and PAYPITE, which is building a blockchain / cryptocurrency solution for international money transfers between Madagascar and France (for a 1 percent fee, significantly less than Western Union or Bank transfer fees), and is looking at francophone Africa expansion. Jamaa funding, an international crowdfunding platform that targets (social) entrepreneurs in Francophone Africa, has made a few timid inroads for crowdfunding in Madagascar. Issues around regulation and specific policy recommendations for fintechs are included in the chapter on Digital financial services.

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3   The World Bank-financed PIC2 government project has an entrepreneurship support component, which includes the provision of matching and small grants to entrepreneurs in agriculture and tourism, but it is focused on three regions of Madagascar outside of the capital, and is not focused on digital entrepreneurs.

4   Association Malagasy des Investisseurs en Capital, http://www.amic.mg/index.php/annuaire-des-membres

Recommendations

Recommendation 1: Carefully design operational and implementation details for the numerous planned policy interventions to support digital entrepreneurship.

This should be conducted in partnership with relevant private sector organizations, and learning from and adapting successful experiences abroad, such as those from Kenya. A special attention should be given to (anti-)competition issues, in the context of new firms challenging existing players, in terms of data provision and the electronic transactions environment more generally, where market power is currently unregulated, and in terms of access to international markets. The establishment from the outset of clear M&E systems would also help pilot and adapt the large range of new initiatives as they are launched.

Recommendation 2: Strengthen cohesion, quality, and reach of the digital entrepreneurship support system.

Support to platforms can help reinforce linkages within the ecosystem: between existing incubators and other entrepreneurship organizations so they share skills and resources, attain scale and better coordinate start-up competitions and events; between technical and business universities so that tech entrepreneurs become more sensitive to markets; and between local and foreign and diaspora networks to open markets, facilitate the provision of mentorship services and transform brain drain into eventual brain gain. This could be usefully complemented by targeted training of trainers programs for the different stages of the life cycle, for existing or new structures that could develop as part of an Enterprise Supplier Development program, as successfully done in South Africa. Finally, it is critical to find ways to expand support geographically, leveraging on technology (e.g. virtual programs like mLabs in South Africa) and existing institutions (e.g. the Computer Science university in Fianarantsoa and the regional Business Development Centers supported by the World Bank-financed *PIC2* project[5]).

Recommendation 3: Enhance access to funding.

An important step to develop the deals pipeline would be supporting the creation of business angel networks, with linkages to the diaspora and formal agreements with their host states

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5   The Second Integrated Growth Pole and Corridors (PIC2 in French) series of projects (SOP), totalling $120m, aims to contribute to the sustainable growth of the tourism and agribusiness sectors by enhancing access to enabling infrastructure and services in the Target Regions of Madagascar: Diana in the North, Atsimo-Andrefana in the South West, Anosy in the South East, and the island of Sainte-Marie in the East. As part of the entrepreneurship support component, the SOP has already led to the establishment and reinforcement of Business Development Centers in Tulear, Diego and Fort Dauphin, and the training and financing with up to $10,000 grants of 120 young entrepreneurs.

for tax incentives comparable to those given for other charity investments. International electronic transaction costs and restrictions should be also re-examined with the financial industry, so that funds can be more easily raised, including through crowd-funding.

Recommendation 4: Boost support to inclusiveness and gender-sensitivity for digital entrepreneurship. This notably means boosting tailored programs for women digital entrepreneurs, as well as possible outreach into poorer neighborhoods in Antananarivo and in secondary cities.

Digital Skills

Digital Skills

Importance of Digital Skills

SOCIOECONOMIC RATIONALE FOR INVESTING IN DIGITAL SKILLS DEVELOPMENT

Digital skills and literacy are essential ingredients in building an inclusive digital economy. Greater use of ICT further increases the demand for digital skills required to seize new opportunities and be competitive on the labor market. This is true both for basic digital skills (user skills) and for more advanced skills (from work on software applications and systems to e-business development). In 2013, 13 percent of firms in Madagascar experienced difficulties in finding employees with computer or general IT skills, but the majority of companies do not allocate resources for professional training on basic ICT skills. In fact, on-the-job training is largely non-existent. Wider use of technologies will also be changing the working environments, raising demand for complementary skills such as information processing or communication, which is already an issue in Madagascar according to employers. The inability of the general population to effectively use information and communication technology (ICT) further hampers a government's ability to reach all citizens through novel service delivery tools. As governments across the world, including in Madagascar, strive towards digitalization and 'eGovernance', a lack of the basic skills required to effectively use and engage with these new platforms could potentially exclude the neediest segments of the population. For example, in the UK digital skills correlated strongly with income[1], a correlation which is likely to be even stronger in a poor country, such as Madagascar.

Yet digital skills development, as well as technology adoption more broadly, are constrained by the low level of basic literacy and numeracy skills. About 29 percent of people aged 15 and above are not literate[2]. In 2015, only 19 percent of the 2nd grade students in public schools could read at a 'sufficient level'. Many children from disadvantaged backgrounds are "churning" in the early grades, attending infrequently, repeating grades and eventually leaving the education system with few cognitive skills. Only six out of ten children in primary school reach the last grade. Therefore, without complementary investments in basic numeracy and literacy in addition to digital skills, new technologies could exacerbate inequality rather than promote greater opportunity and shared prosperity.

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1   Youth Employment UK, 2017

2   World Bank, 2019

Given its young population, with 41 percent of the population aged 14 and under in 2017[3] and the fastest broadband internet in Africa (Cable, 2018), Madagascar is well placed to benefit from technological advancements. The Malagasy government has recognized this opportunity and has been promoting the use of ICT since 2004 with its first national ICT policy, which identifies education and health as key sectors, and subsequent strategy papers, such as the Madagascar Action Plan of 2007-2012, which encouraged the expansion of ICT infrastructure and access, including the establishment of ICT centers in schools (Isaacs, 2007). This process of emphasizing ICT usage and skills has culminated in the Malagasy government declaring the integration of technology in the educational cycle a priority for the Ministry of National Education and Technical and Vocational Training (MEN), resulting in the launch of a new policy initiative on ICT integration in education and training. "

Digital skills development is also aligned with the priorities of the government's "*Initiative Émergence Madagascar*", with its focus on institutional development, including a movement towards e-governance, human capital, and entrepreneurship. Strong digital skills are necessary requirement for assuring the inclusiveness of the government's development plan, allowing citizens to interact with digital government service, and providing opportunities for entrepreneurship.

Diagnostic Finding: Current State of Digital Skills

DIGITAL SKILLS DEVELOPMENT

Basic Education

Despite having the fastest broadband in Sub-Saharan Africa, access to electricity remains a binding constraint on the country's ability to benefit from digital educational tools and build digital skills. In the latest yearly school census (2017-18), only about 2 percent of public primary and secondary schools have at least one electrified classroom, with the majority located in the capital region. In 14 out of the 22 educational regions, less than 1 percent of schools have at least one electrified classroom (see Table A3.1 in annex). These regional disparities in school infrastructure are also visible when considering the share of schools having access to digital technologies, such as computers or tablets: Almost 4 percent of schools in the capital region having access to a computer, while in some regions, not even a single school can boast such technology (Figure A3.1 in annex). Insufficient access to digital tools in schools is also evident from global surveys, such as the global competitiveness survey. A sample of 68 local

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3   World Bank, 2019

businesspeople rated internet access in schools at 3.7 out of 7, placing Madagascar 92nd out of 137 assessed economies worldwide (World Economic Forum, 2018).[4] The low availability of digital tools is further reflected on the administrative side of the educational system, with 82 percent of national education directorates at the regional (DREN) and district (CISCO) level using outdated software packages (such as Windows XP or Windows 7).

Partner initiatives and cooperation with the private sector have aimed to distribute computers and tablets to children and youth (see Table A3.3 in annex for examples). The MEN is further embracing the usage of digital tools for learning, through piloting programs such as Mahiratra, a tablet-based application for preschoolers focusing on early literacy and numeracy and school readiness.[5] The government has further recognized the need to teach basic computer science to students in their final two years of high school and is running a pilot programs in 214 public and private high schools in the Analamanga region, teaching initiation, software use, and internet use. A curriculum reform is planned as part of the Education Sector Plan for 2018–2022 refocusing the curriculum on skills and competences rather than rote learning and providing an opportunity to integrate ICT and socio-emotional skills. The revised curriculum is expected to include algorithm and coding classes. However, given the previously described constraints in terms of access to digital tools, it remains to be seen to what extent the government's new curriculum plans can be realized.

Technical and Vocational Training

Technical and professional education and training in Madagascar was led by the Ministry of Technical and Vocational Education (METP), which has recently been integrated into the Ministry of National Education and Technical and Vocational Training. The development of ICT skills in technical and vocational training (TVET) is one of five priority areas in Law 2015/040 on the orientation of the national employment and professional training policy. The METP worked in close collaboration with the private sector in re-defining competences and certifications and in adapting the curriculum, through committees composed of private sector representatives. The reorientation of TVET included financing through a training fund, which will collect 2 percent of payroll taxes from firms to be spent on training for existing employees. It has been established in March 2019. This relatively narrow focus

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4   The indicator is based on a survey of 68 local businesspeople. Given the large geographic disparities observed, it is likely that this sample does not have a representative impression of schools and overestimates true internet availability in schools.

5   The Mahiratra program, Smart in Malagasy, started in 2018, introducing 60 tablets in 8 preschools in the Analanjirofo, Alaotra Mangoro, and Analamanga regions; it is set-up as a randomized controlled trial but has yet to complete a full cycle. The Digital School program, in partnership with Orange, placed digital kits into 42 primary and 117 high schools, the impact on the public at large remains negligible considering more than 25,000 public primary and secondary schools in the country.

could potentially be extended to a larger training fund, though tax collection remains low, at about 11 percent of GDP (IMF, 2017). The Education Sector Plan for 2018–2022 envisages the development of TVET along three axes: 1) centers for the development of competences, public or privately funded, targeting students who completed at least primary education; 2) technical high schools, public or private, that offer qualification certificates (Technical Baccalaureate) and are open to those with 9 years of general education; 3) centers for the development of competences that also offer initial training to those who did not complete a formal educational cycle. Table A3.2 in annex shows that despite regional differences, most technical training centers have access to electricity, computers, and the internet and many offer a computer science track ("informatique").

Higher Education

Madagascar's tertiary education system is composed of both private and public institutions that operate in the "License, Master, Doctorate" (LMD) system (Bachelor, Master, PhD programs). Within this system, the Bachelor takes three years (L1 through L3) and the Master 2 years (M1 and M2). As of February 2019, there were 120 officially recognized private and 21 public institutions (subordinated to the Ministry of Higher Education, with another 5 attached to other public institutions), most of which are concentrated in Antananarivo. An approximately equal share of each—one third of public and one third of private higher education institutions—offer degrees in ICT. In addition, three doctoral schools offer programs related to ICT. A large share of students is enrolled in private universities, which have sprung up in Madagascar since the early 2000s. Further, a few highly specialized private institutes have emerged more recently, focusing on subfields, such as graphic design and multimedia (examples are E-media or the *Ecole Supérieure du Multimédia*). While the Ministry of Higher Education intends to inspect private universities to assure their quality (through the "centre national d'habilitation") due to lack of funds, no inspections were carried out in 2018. Interviews with the directors of one of the best public universities (the Ecole Nationale d'Informatique, founded in 1983) and private universities (the IT University)[6] illustrated a similar curriculum, focusing heavily on foundations, such as advanced mathematics, in the Bachelor's program which is in line with international programs, while also fostering links with potential employers through internships and employers' feedback on course content. Both interviewees stressed the importance of following the scientific track in high school to be able to complete the studies.

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6 ENI selects students based on a written 'concours', while IT University uses on high school grades, especially in mathematics and sciences. Admission rates at ITU, a private university with high tuition fees, are 75 percent; ENI, admits about 25 percent.

Life-long learning

In addition to universities, the National Centre of Tele-Teaching of Madagascar (CNTEMAD) provides higher education through distance learning. CNTEMAD operates 36 regional distance learning centers for 16,000 students annually, with plans to open two new centers in the upcoming year and a goal of establishing centers in all 119 districts in Madagascar. A second distance learning institution, the Distance Learning Center, was set up to provide short courses in select topics, such as communication and technologies, to government agencies and the private sector. However, due to a lack of demand at the fees requested, this center is not currently performing its intended functions. Founded in 2016, Women in Tech Madagascar encourages women to pursue careers in the ICT sector through leadership development, exchanging technological knowledge, and increasing participation of women in media and technology.

SKILLS SUPPLY: THE STATE OF DIGITAL SKILLS IN MADAGASCAR

Despite recent leapfrogging in broadband speed and the government's focus on the digital economy, skills vary tremendously between the average citizen and a small group of developers. Due to the lack of recent surveys[7], the chapter relies on proxies of skills, classified into user, digital specialist, and e-business skills.

Basic digital skills

User or basic digital skills refer to the lowest level of digital skills; they commonly capture an individual's ability to use ICT tools, systems, and devices. This includes being able to manage information (e.g. a search engine); communicating (email, or personnel messaging services); transacting, buying goods or services online or using mobile money services; problem solving, for example with a device using online help; and creating new content, such as completing online application forms (Youth Employment UK, 2017). In 2017 less than 10 percent of the Malagasy population was using the internet through any device type and connection (up from less than 1 percent 10 years prior) (World Bank, 2019). Mobile phone subscriptions have tripled over the last 10 years but remain at only about half the regional average in 2017.

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7   The last household survey (ENSOMD) was conducted in 2012–2013, the latest labor force furvey (LFS) in 2012, and the enterprise survey dates from 2013. Neither the ENSOMD nor the LFS contain informative questions about (digital) skills. While the enterprise survey deals with employer's perceptions of skills availability and quality it is likely that the information is outdated.
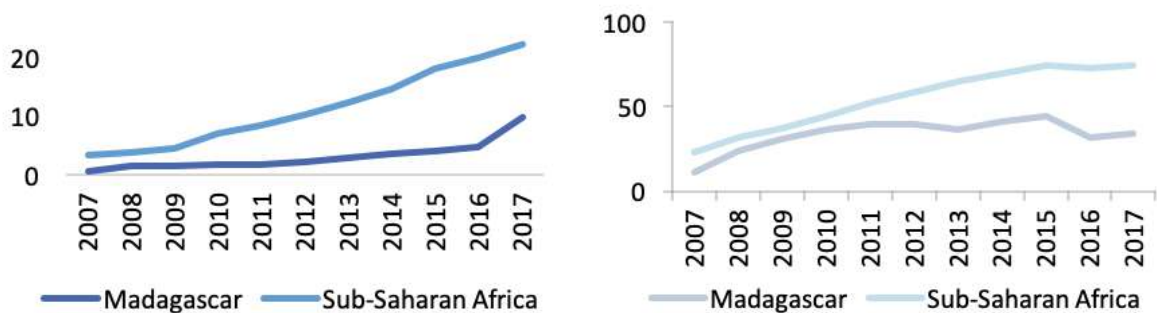
Panel A: Individuals using the internet (% of the population)   *Panel B: Mobile cellular subscriptions (per 100 people)*

Figure 10: Internet users and mobile phone subscribers in Madagascar benchmarked to the region
(Source: World Bank, 2019)

Despite relatively low access, those with access increasingly use digital tools, such as mobile money, as is evidenced in the sharp increase in the share of adults having a mobile money account and making or receiving digital payments with that account (see chapter 5). In 2017, about 11 percent of individuals used their phone or the internet to access an account (the SSA average is 21 percent) and about 12 percent had a mobile money account (up from 4 percent in 2014, but still below the SSA average). The likelihood of making or receiving mobile payments has been increasing between 2014 and 2017 and increases with educational attainment: in 2017, 35 percent of Malagasy with secondary education or above made or received mobile payments, but only 11 percent of those with at most primary education. While this could also relate to educational attainment correlating with income and hence the ability to afford a mobile phone, lack of available income does not present a barrier to using mobile money. Instead of buying a phone, customers can buy a SIM-card and use the mobile phone owned by a mobile money agent for cash-in/cash-out services (World Bank, 2018b). A bigger constraint is the level of basic literacy and numeracy skills: About 29 percent of people ages 15 and above are not literate, restricting their ability to effectively use digital tools.

Specialist skills

Specialist level digital skills refer to the ability to research, develop, design, manage, maintain ICT tools and systems and can for example be acquired in TVET courses, offered by TVET centers. Table A3.4 in annex illustrates that not all training centers offer a computer science track; among those that do, enrollment (as a share of total enrollment in TVET courses) is on average slightly below 10 percent (with a maximum of 30 percent of students in Itasy region). Madagascar has increasingly become a destination for francophone business processing and outsourcing (BPO), with services offered including customer service calls, website adaptation, and app testing. Apart from French language skills, Malagasy empathy has been particularly highlighted as key for the sector's success.

E-business skills

E-Business and technology skills refer to the ability to identify new business opportunities or ways of doing business for digital technologies. E-business has a lot of potential in Madagascar, however, current uptake remains low (in 2017, only 10 percent of sampled internet users had conducted a purchase online, but 54 percent reported to be ready). These advanced digital skills can amongst others be acquired in the university system. Over the last 10 years, Madagascar has seen an increase in both, the share of students currently enrolled in ICT programs and the share of graduates from ICT programs (Figure 11). In 2016, about 6 percent of all students were enrolled in an ICT program and 6 percent of graduates did so from ICT programs. The share of female students in ICT compared to all female students has increased over the last 10 years from about 1 percent in 2007 to 3 percent in 2016. However, due to a larger increase in male students in ICT programs, the share of women among ICT students has decreased from 32 percent in 2007 to 23 percent in 2016. Looking at share of female students in informatics only in the academic year 2016-2017 (Figure 12) shows that about 20 percent of students enrolled in informatics are female. This share is similar across the different study years, suggesting that women do not seem to opt for shorter programs.
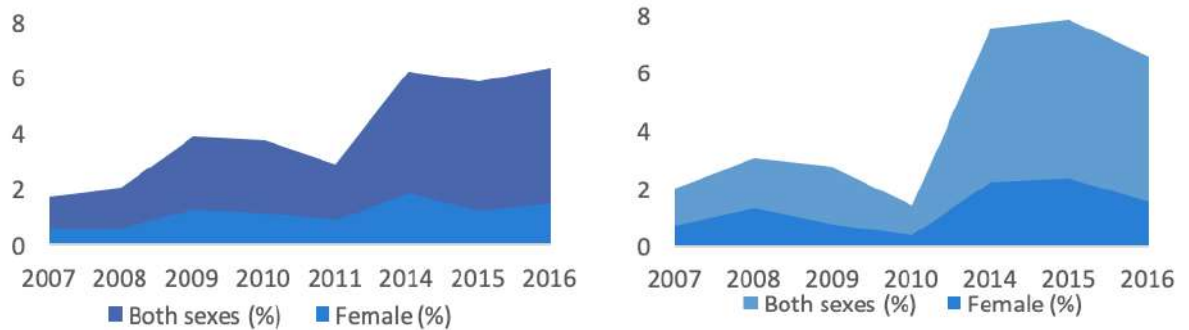
Panel A: Percentage of students enrolled in ICT programs   *Panel B: Percentage of graduates from ICT programs*

Figure 11: Students and graduates from ICT programs in tertiary education, % of all students or graduates (Source; World Bank EdStats). Notes; Break in both series due to data availability.
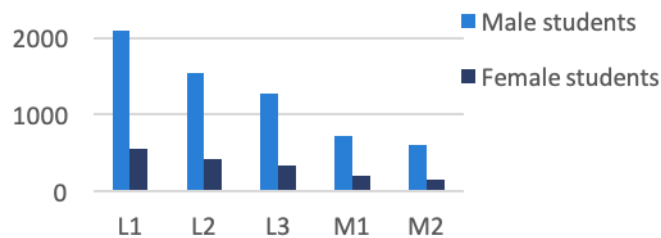

Figure 12: Number of male and female students enrolled in ICT programs; 2016-2017. (Source: Own calculations using data from Ministry of Higher Education in Madagascar)

DEMAND FOR DIGITAL SKILLS

In 2013 (latest year available), 13 percent of sampled firms mentioned the difficulty of finding employees with computer skills as their primary concern related to skills. Finding employees with the right socio-emotional skills (work ethic and commitment or interpersonal and communication skills) or technical skills (related to technical and job-specific skills or ability to work in both French and English) presented a greater challenge to companies than the availability of general IT skills (see Figure 13). Firms active in tourism and those located in regions that have a larger tourism industry are more likely to express difficulty to find employees with the appropriate computer and IT skills. Still, even among firms active in tourism only, more firms responded that it is easy for them to find an employee with computer / general IT skills (26 percent) than difficult (21 percent). Firms do not engage in employee training in computer skills or general IT skills, but sampled firms are generally not engaging in any kind of employee training. The exception to this is firms interviewed in the business process outsourcing (BPO), and software development sectors, who provide training ranging from basic typewriting to high-end software development.

On present evidence, Madagascar has an unusually strong supply of software development talent, which is revealed through interviewees from medium and large firms working on the data processing and software development sectors. Yet, this supply is unstable and may be at risk. Conversations with a member of the ICT committee and with executives of companies active in the digital sector suggested declining quality of teaching personnel and brain drain as main constraints (particularly due to the new "tech-visa", facilitating emigration to France); the share of employers with difficulty finding digitally skilled workers could be bigger in newer surveys.
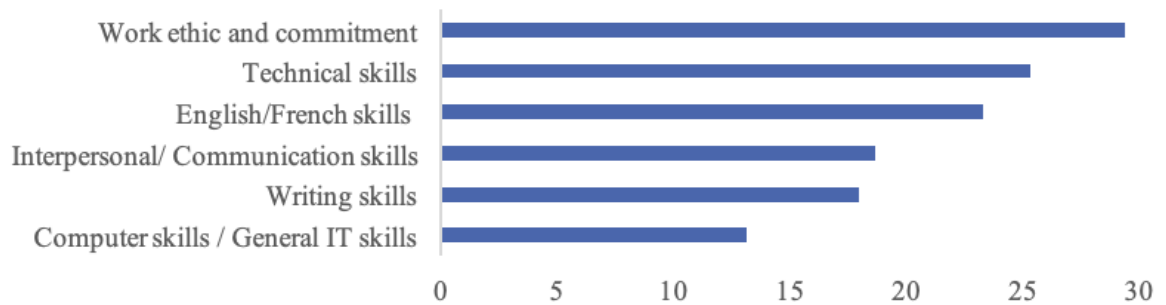

Figure 13: Share of employers who express difficulty in finding employees with the following skills (Source: World Bank Madagascar Enterprise Survey, 2013)

CONSTRAINTS TO DEVELOPING AND ATTRACTING DIGITALLY SKILLED LABOR

Given proper teacher training and good integration into the curriculum, ICT can complement teachers and improve learning. In Gujarat, India, for example, a computer-assisted learning program improved learning especially for the worst-performing students by adding to teaching and learning time. In Kenya, teachers received tablets to support instruction, leading to an increase in reading performance. Madagascar is planning a curriculum reform to integrate ICT into schools. Programs that were not well integrated into the curriculum did not improve learning and only fostered basic computer skills, which might not be what employers require. In Honduras, replacing paper-based with electronic textbooks did not affect reading ability, but improved basic digital skills. Providing basic laptops in Peru made children more proficient in the use of these laptops, without being able to transfer skills to other operating systems (e.g. Microsoft Windows) (World Bank, 2018c). For the effective development of digital skills, it is important to first focus on the foundations (literacy and numeracy), to integrate ICT into the school curriculum, to train teachers in the usage of ICT, to use ICT as complements to teachers rather than substitutes, and to include foundational computer training in the curriculum to develop skills beyond basic processing.

Box 7: Using ICT to support education

Numeracy and literacy: Functional literacy and numeracy form the base for the development of even basic digital skills. The low literacy rates in the country are constraining digital skills development.

Access to electricity and usage of connectivity and ICT equipment in schools: Gaps in access to electricity, connectivity, and ICT equipment in schools as identified in the previous sections, are likely to fundamentally constrain the development of basic and more advanced digital skills.

Teacher capacity and teacher shortages: In addition to the lack of digital infrastructure, Malagasy schools suffer from insufficiently trained teachers. In Madagascar, nearly 80 percent of teachers have no formal teacher training and just under half of all primary teachers (45,000 out of 108,000) are community teachers hired by parent-teacher associations (World Bank, 2018). Teachers oftentimes lack basic skills, such as language skills: The 2016 Service Delivery Indicator (SDI) survey suggests that only 3 percent of teachers were able to correct the sentence "L'accident avait vu par trois personnes" even though the correct alternative ("a été vu") was given (World Bank, 2017). Teacher training programs delivered through mobile tools could be a promising way forward to improve the quality of education; however, current programs are subject to connectivity constraints and fail to adapt to the level of teachers' skills

(in particular with regards to French skills). Table A3.2 (annex) provides an overview of mobile teacher training programs, their methods, and results (if available).

Among university teachers, the issue is equally a lack of qualified teachers due to the expansion of the ICT subsector, increased student numbers, and significant brain drain. Interviews with the directors of one public and one private university revealed that a significant share of students (approximately 50 percent according to interviewees) would like to emigrate upon graduation. Both interviewees suggested that the current number of teachers is not sufficient to cope with increased student numbers and that it is difficult for teachers to teach, update the curriculum to include newer developments in the area, and conduct high quality research given the limited funds available. Because of the lack of teachers, IT University now collaborates with universities in France and regularly hosts guest teachers for select courses. Further, Malagasy students oftentimes complete their PhD abroad due to better learning conditions and do not return upon graduation. This raises questions concerning the expansion and quality of the current higher education system in ICT.

Curriculum alignment with industry needs: Collaboration between employers and training institutions at the TVET and university level remains informal with infrequent curriculum updates, questioning the relevance of content taught. No regular tracer studies or labor market observatory exists, hampering planning.

Recommendations

Recommendation 1: Invest in literacy, numeracy and digital skills.

This includes investing in teacher quality, the evaluation of effectiveness of the use of tablets for teacher training and student learning, and investment in basic infrastructure, such as electricity and connectivity, severely restricts the country's ability to benefit from digital tools, requiring further investment, for example, in solar panels.

Recommendation 2: Establish a system for the collection, analysis, and dissemination of information on labor market outcomes of graduates (tracer studies) and vacancies and skills needed by employers (labor market observatory).

This will facilitate the interaction between the educational system and the labor market. The regular collection of these data should inform labor market policies and curriculum adaptation. Further, institutions report difficulties of retaining and recruiting qualified teaching staff. Specialized higher education staff surveys covering staff characteristics and decision making would enable better faculty development.

Recommendation 3: Educate secondary school students about the entry requirements for tertiary-level ICT studies.

This includes for example the importance of following the 'scientific track'. Awareness raising could help more students to meet the requirements. Women in particular are less likely to follow the scientific track.

Recommendation 4: Increase funding for public universities to cope with larger student numbers and make funding based on results (employability) of graduates.

This could make ICT studies more affordable and provide incentives for training providers to offer relevant content.

Recommendation 5: Provide merit- and means-tested scholarships to select universities.

This could help counteract the income- and gender-imbalance in the sector. Many private institutes have sprung up which are not subject to regular quality control, which should be implemented (and their students' employability should be assessed regularly).

Recommendation 6: Invest in household, tracer, or employer-based surveys. This will provide a more nuanced and comprehensive overview of the state of digital skills across the country. Surveys could also help understanding the extent of brain drain in the country, which was mentioned as one of the biggest challenges but is poorly understood in terms of general equilibrium effects.

Conclusion: A Way Forward

Conclusion: A Way Forward

The Madagascar Digital Economy Assessment comes at an opportune time given the Government's political will to implement a digital transformation agenda, for a more effective administration and responsive public service. Recent investments in the digital infrastructure, led by a dynamic private sector, have expanded both the reach of the telecommunication network and the speed of internet, with Madagascar harboring the fastest broadband in Africa, and one of the fastest in the world. In addition, universities annually produce small cohorts of highly skilled software development talent. These combined factors have helped attract significant investments in BPOs and software development firms, have supported the growing expansion of digital financial services, and have helped create skilled government IT units.

In spite of this optimistic outlook, many challenges prevail. The telecommunication infrastructure remains poor outside of the country's major cities, and internet is unaffordable for a large majority of the population. Extremely low rates of basic digital skills constrain demand for public and private digital services, and the supply of specialized digital skills is unstable and could be at risk of depletion due to brain drain. Overturning these trends is essential to prevent further entrenching the digital divide, and to promote more inclusive growth. Improving accessibility and affordability of mobile services and broadband is a pre-requisite, and can be achieved through adequate policy and legislation, including a pro-competition framework, and strategic and transparent funding from the Universal Access Fund.

Fostering dynamic digital platforms, which are able to provide innovative solutions that meet the needs of the population, will help increase the quality of services that are offered both online and offline. This will also require user-centered approaches, and new models of technology development, that focus less on digital and more on service design, leading to services that are user-friendly whether they are offered digitally or in-person.

Such an objective also requires boosting digital skills, which are the cornerstone of a digital economy. Increasing the number of graduates that Madagascar produces yearly, while helping women and marginalized populations access ICT education, will support the strong projected growth of ICT, promote a more dynamic digital public sector, and help reduce the digital divide. This can be achieved in part by supporting the sustainability of digital skills.

In a similar vein, an adequate development strategy should be devised to support digital financial services and digital entrepreneurship. This could include boosting innovation through access to international insights and benchmarks, facilitating access to funding, and strengthening the digital entrepreneurship support system. Linkages could be created be-

tween existing incubators and other entrepreneurship organizations; technical and business universities; and local and foreign and diaspora networks to open markets.

Finally, in sectors where the public sector plays a direct role – such as the delivery of digital services – an ever-growing amount of leadership and in-house digital skills is required. In areas where the private sector and civil society drive the agenda, the government still holds a unique position as a convener, regulator and facilitator. If governmental commitment and capacity are essential qualities of a performant public administration, they become particularly salient when it comes to the promotion of the digital economy.

References

AFD, MEN, and Agence Universitaire de la Francophonie (2018) « Formation à distance des enseignants du primaire à Madagascar. Rapport de suivi » Policy Report.

Cable (2018) "Worldwide broadband speed league 2018". Retrieved 18.04.2018 from : https://www.cable.co.uk/broadband/speed/worldwide-speed-league/

CNUCED, Madagascar - Évaluation rapide de l'état de préparation au commerce électronique, 2018

IMF (2017). "Madagascar – Selected Issues."

International Telecommunication Union (2018) "Percentage of Individuals using the Internet – by Country".

Isaacs, Shafika. 2007. "Survey of ICT and Education in Africa : Madagascar Country Report." *InfoDev ICT and Education Series.* World Bank, Washington, DC

Ministry of Education Madagascar (2019) "Annuaire Statistique: FPE 2017-2018"

RATSIMBAZAFY, C., *Enjeux et défis de l'entrepreneuriat à Madagascar en 2017,* Global Entrepreneurship Monitor, Rapport de Madagascar, 2018

RAZAFINTSALAMA,G., Les nouveaux enjeux du numérique dans le développement de Madagascar, 2019

MIHARISOA RAHARISON, L., *L'Atelier I.T. by Django Girls,* Essentielle Magazine, No78, Fevrier 2019, pp. 52-53

OIF, Guide Pratique de la Cybersécurité et de la Cyberdefense, 2017

Repoblikan'i Madagasikara, Initiative Emergence Madagascar - Stratégie de Croissance Accélérée, 2019

Repoblikan'i Madagasikara, Initiative Emergence Madagascar - Rattraper le Retard de Développement de Madagascar, 2019

SONAPAR, Guide pour les TPME, accessed at https://www.sonapar.mg/index.php/fr/nos-services-5/demande-de-financement

WORLD BANK GROUP, Doing Business 2019 - Training for Reform - Economy Profile Madagascar, 2019

World Bank (2017) "Education Service Delivery in Madagascar Results of 2016 Service Delivery Indicator Survey." World Bank: Washington, DC.

World Bank (2018) "Madagascar - Basic Education Support Project (English)" Washington, D.C. : World Bank Group. Available at : http://documents.worldbank.org/curated/en/517281522548048451/Madagascar-Basic-Education-Support-Project

World Bank (2018b) "Madagascar Economic Update. Fostering Financial Inclusion". World Bank: Washington, DC.

World Bank (2018c). "World Development Report 2018: Learning to Realize Education's Promise." Washington, DC: World Bank

World Bank (2019) "World Development Indicators", available at databank.worldbank.org

World Economic Forum (2018) "Global Competitiveness Report 2017-2018".

Schéma Directeur Informatique (SDI) 2017-2021

https://www.entrepreneur.com/article/288769

https://www.cbinsights.com/research/startup-failure-reasons-top/

https://hbswk.hbs.edu/item/why-companies-failand-how-their-founders-can-bounce-back

https://stileex.xyz/echec-start-up-malgaches/

https://www.fastcompany.com/3003827/why-most-venture-backed-companies-fail

https://jereoato.com/economie/fihariana-programme-national-d-entrepreneuriat-pour-les-jeunes-malagasy-3619/

Digital Skills

Youth Employment UK (2017) "Benchmarking the digital and financial capability of consumers in the UK". Available at: https://www.youthemployment.org.uk/basic-digital-skills-uk-survey-results/

Annexes

Annex 1

Core indicators for the five DEA pillars

Pillar 1: Digital infrastructure

Core Indicators: Digital Infrastructure	Current Status		Previous Status		Trend & Benchmark	Observations
	Year	**Value**	**Year**	**Value**		
Mobile broadband Internet subscriptions per 100 population	2016	6.1	2012	0.07	16.7 (SSA)	Source: Global Information Report, 2016
Fixed broadband subscriptions (per 100 people)	2017	0.1	2007	0.0	0.6 (SSA)	Source: WDI
Mobile network coverage, % pop.	2016	92.16	2012	23.0	82.5 (SSA)	Source: Global Information Report, 2016 Data specific to 3G is not available.
Average monthly wholesale price of international E1 capacity link from capital city to Europe (2 megabits per second, in US$)	2015	442	2007	10,000	200 (Kenya, 2016) 300 (Burundi, 2014)	Source: WB APL project, Oct 2017
Average monthly retail price of high-speed internet service (1 megabits per second per month, in US$)	N/A	N/A	N/A	N/A		

Pillar 2: Digital Platforms

Core Indicators: Digital Infrastructure	Current Status		Previous Status		Trend & Benchmark	Observations
	Year	Value	Year	Value		
E-Government ranking (and score) in global survey (UN, 2018)	2018	170 (0.28)	2008	135 (0.31)	(0.33) (SSA)	
Number of online transactions for government services (per year)	N/A	N/A	N/A	N/A		
Value of online transactions for government services (US$, per year)	N/A	N/A	N/A	N/A		
Number of digitally-enabled unique identity proofs issued (per 100 people)	N/A	N/A	N/A	N/A		
Country Rank (and value) in the UNCTAD B2C E-Commerce Index, Index (0-100) (UNCTAD)	2017	118 (29)	2015	137(13)	(27.4) (SSA)	
ICT use for Business-To-Business Transactions, 1-7 (Best) (INDEX (1-7)) (WEF)	2016	4.24	2013	4.39	4.20 (SSA)	

Pillar 3: Digital Financial Services

Core Indicators: Digital Infrastructure	Current Status		Previous Status		Trend & Benchmark	Observations
	Year	Value	Year	Value		
% of adults with a transaction account	2017	17.9	2011	5.5	42.6 (SSA)	Source: Global Findex
% of firms with a transaction account	2013	78.6	2009	94.1	85.6 (SSA)	Source: Enterprise Surveys (world bank 2013).
% of adults making or receiving a digital payment in past 12 months	2017	15.0	2014	5.4	34.4 (SSA)	Source: Global Findex.
% of adults who used the internet to pay bills or to buy something online in the past year	2017	1.7	2014	0.0	7.6 (SSA)	Source: Global Findex
% of firms accepting digital payments	N/A	N/A	N/A	N/A		
# of retail electronic/digital transactions per capita	N/A	N/A	N/A	N/A		

Pillar 4: Digital Entrepreneurship

Core Indicators: Digital Infrastructure	Current Status		Previous Status		Trend & Benchmark	Observations
	Year	Value	Year	Value		
Performance: Number of registered firms in ICT sector per 100,000 people in the working age population – (based on firm–level census or registered firms)	N/A	N/A	N/A	N/A		
Performance: Number of green field FDI (ICT & internet infrastructure, R&D, Business Services) per 100,000 people in the working population	N/A	N/A	N/A	N/A		
Policy: Doing Business distance to frontier (DTF)	2019	48.89	2010	45.21	51.61 (SSA average)	
Infrastructure & Supports: Number of tech hubs & accelerators in the country per 100,000 people in the working age population.	N/A	N/A	N/A	N/A		
Infrastructure & Supports: % of firms with access to email or website	N/A	N/A	N/A	N/A		Percent of firms using e–mail to interact with clients/ suppliers: 62 % in 2013 Percent of firms having their own Web site: 30 % in 2013 (Enterprise Survey)
Financial Capital: Venture Capital deal flow by country (Number of deals, Capital Invested (USD))	N/A	N/A	N/A	N/A		Venture capital availability [1=extremely difficult; 7= extremely easy]: 2.3 in 2017 Source: Global Competitiveness Index
Markets: ICT service exports (% of service exports, BoP)	2016	11.1	2007	35.7	14.7 (SSA)	Source: WDI, November 2018
Culture: Risk taking index (Global Preferences Survey)	N/A	N/A	N/A	N/A		

Pillar 5: Digital skills

Core Indicators: Digital Infrastructure	Current Status		Previous Status		Trend & Benchmark	Observations
	Year	Value	Year	Value		
Educational system						
Internet access in schools – as score from 1 to 7 in Global Competitiveness Index (WEF, 2018)1	2017	3.7	2007	2.0	3.3 (SSA)	Source: Global Competitiveness Index
Quality of math and science education – as score from 1 to 7 in Global Competitiveness Index (WEF, 2018)2	2017	3.9	2007	3.7	3.4 (SSA)	Source: Global Competitiveness Index
Local availability of specialized training services – as score from 1 to 7 in Global Competitiveness Index (WEF, 2018)3	N/A	N/A	N/A	N/A		Availability of research and training services, 1-7 (best): 4.2 in 2017 (4.0 in SSA) Source: Global Competitiveness Index
Adaptation of the Education System to the labor market, (Index, 0-4)	N/A	N/A	N/A	N/A		The exact expression cannot be found in the GCI. Below is what exist in the latest IPD database
Do any formal or informal institutions link the education system with the needs of firms on the labor market? (Index, 0-4)	N/A	N/A	N/A	N/A		Question present in the 2009 IPD but not in the next (2012 and 2016) version. Suggest using the indicators below
% of firms identifying inadequately educated workforce as the biggest obstacle	2013	10.5	2009	17.0	19.1 (SSA)	Source: Enterprise survey, 2013
Tertiary education enrollment (% of population at tertiary education level)	2016	4.8	2012	4.1	9.0 (SSA)	Source: UNESCO Institute for Statistics. Benchmark here is from UNESCO estimation for SSA
Availability of Skilled Labor						
Availability of scientist and engineers (1-7, best)	2017	3.7	2007	4.4	3.4 (SSA)	

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1   The Global Competitiveness Report 2017-2018. See: http://www3.weforum.org/docs/GCR2017-2018/05FullReport/TheGlobalCompetitivenessReport2017–2018.pdf

2   Ibid

3   Ibid

Core Indicators: Digital Infrastructure	Current Status		Previous Status		Trend & Benchmark	Observations
	Year	Value	Year	Value		
Researchers in R&D (per million people)	2016	79.4	2011	108.7	482 (SSA)	Source: UNESCO Institute for Statistics ("Researchers per million inhabitants(HC)".
Brain drain: capacity to retain and attract talented people (1–7, best)	N/A	N/A	N/A	N/A		Indicator split into two indicators shown below
Country capacity to attract talent, 1–7 (best)	2017	3.1	2013	3.0	3.3 (SSA)	Source: Global Competitiveness Index
Country capacity to retain talent, 1–7 (best)	2017	2.8	2013	3.0	3.2 (SSA)	Source: Global Competitiveness Index
Perceived capabilities (% of 18–64 population who believe they have the required skills and knowledge to start a business)	2017	55.4			39.9 (South Africa)	No previous data available.

Annex 2: Digital Financial Services Supplementary information

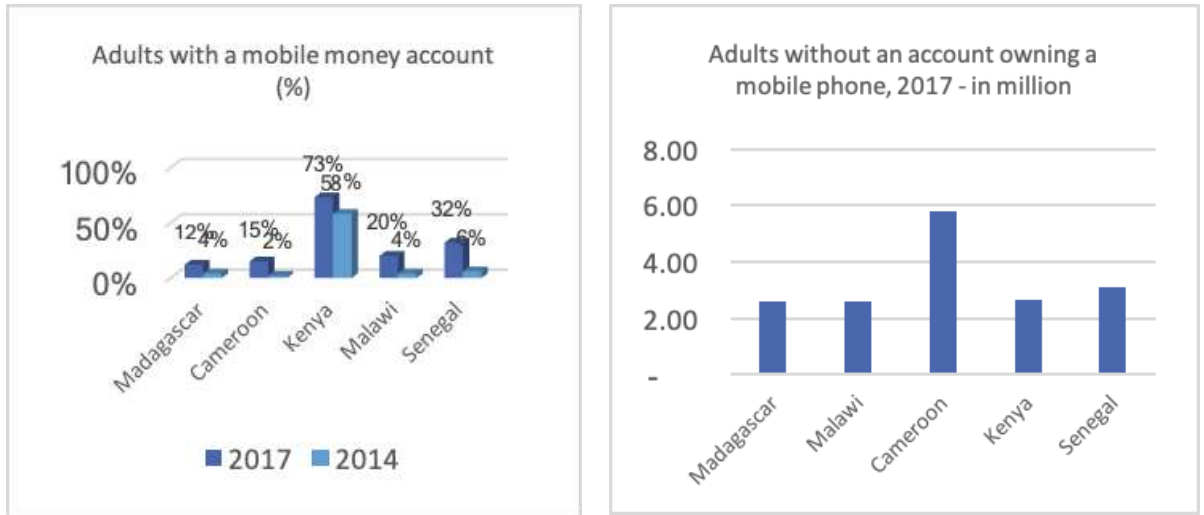## Potential for financial inclusion

Figure 14: Potential for financial inclusion | Source : Global Findex

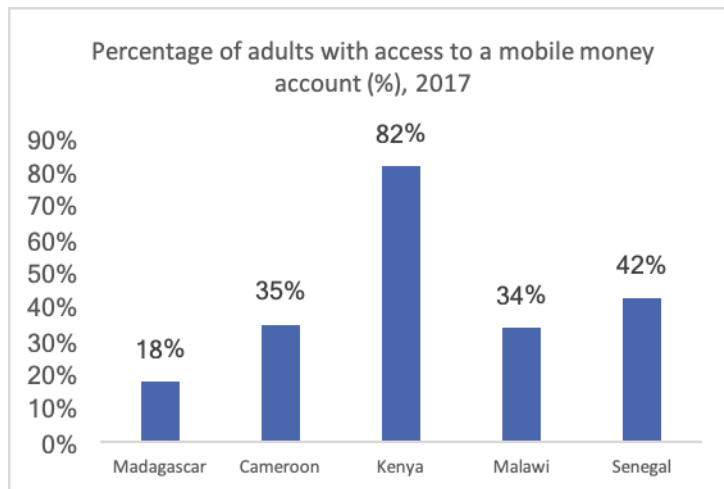## Percentage of adults with access to a mobile money account

Figure 15: Percentage of adults with access to a mobile phone account (2017) | Source : Global Findex

The Modernization Strategy of the Malagasy National Payment System 2017-2021 in a Nutshell

The CBM has defined preliminary principles and objectives for the NPS strategy, based on the Payment Aspects of Financial Inclusion framework.[1]

STRATEGY PRINCIPLES AND PILLARS

The strategy framework includes two key quantifiable objectives, four basic principles, five priority pillars and a number of specific indicators and targets. The two objectives, to be reached by 2021, are:

▸ Increase the financial inclusion ratio from 8.6% to 25%, and

▸ Expand access to electronic money instruments by lowering tariffs and increasing the points of service, and reduce the use of cash by 30%.

BASIC PRINCIPLES

Principle 1: Active engagement of the public and private sector

The strategy requires the engagement of the NPS stakeholders and will involve all relevant public and private sector actors. Such an engagement must be explicit, strong and continued over time, and each entity involved must dedicate the resources necessary to ensure strategy implementation. Furthermore, in order to sustain implementation progress, the strategy must be supported by concerted and coordinated actions and by a calendar that is to be agreed among all parties concerned.

Principe 2: Clear and balanced legal and regulatory framework

Successful implementation of the strategy depends on the clarity, balance and comprehensiveness of the legal and regulatory framework. Such framework must contribute to creating an environment that is conducive to the expected developments, cover all risks inherent to the systems, promote competition, and protect the consumers.

Principle 3: A robust and safe infrastructure

The strategy rests on the establishment of robust, safe, efficient, and largely accessible infrastructures. The infrastructures must be compliant with international standards. They

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1   *Payment aspects of financial inclusion*, report by the Committee on Payments and Market Infrastructures and the World Bank Group, (PAFI report), April 2016.

must support optimal service provision, incorporate innovations, and allow for the execution of cross-border transactions.

Principle 4: Effective communication and education

This principle involves the implementation of an effective and sustained public awareness and education campaign aimed to promote financial education and communication on payment system issues.

Priority pillars

The essential pillars for payment system development are the following:

▸ Pillar 1: Development of payment products and services that match the needs of users
▸ Pillar 2: Promotion of use of payment products and services
▸ Pillar 3: Improvement of communication and financial education
▸ Pillar 4: Development of cross-border transactions and regional integration
▸ Pillar 5: Effective oversight of payment systems

Actions and indicators

The actions to be taken within the context of the strategy are reported in Section III below. They are grouped based on the strategic pillars to which they refer. The indicators are assigned specific targets to be reached by 2021:

▸ Rate of financial inclusion: 25%
▸ Rate of reduction of use of cash: 30%
▸ Number of ATMs per 100,000 inhabitants: 2,5
▸ Number of POS per 100.000 habitants: 10
▸ Number of subscribers to mobile money services: 7,500,000, of which 2,500,000 active
▸ %of adults having a debit card: 6%
▸ % of adults using a debit card to make payments: 2%.
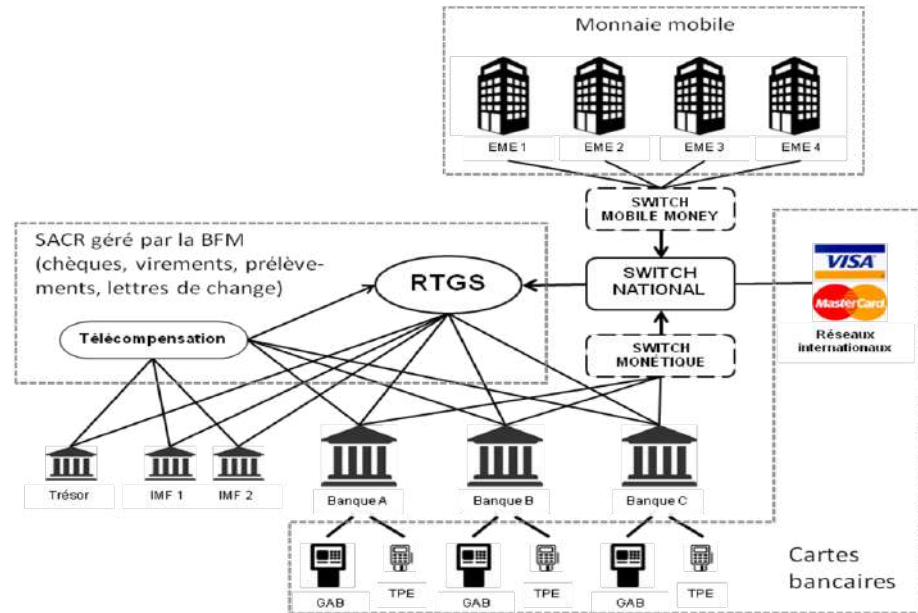
The Current state of Digital Financial Service in Madagascar (Figures and Table)

Table 1. Madagascar DFS Market, 2017 IFC		Figure 3. Mobile money market share, GSMA
Registered MM Accounts	4.2 M	
MM transaction volume	48.3 M	
MM Transaction Value	3.1 B	
Number of cards (debit + credit)	33.9 M	
Card payments trans. Value (credit + debit)	3.1 B	
Internet banking transaction volume	28.8 M	

Financial Access Points
Registered MM agents (#) [1]   19,328
Bank branches [1]   339
ATMs, Total (#) [1]   422
POSs, Total (#) [2]   253

Sources: [1] IMF FAS 2018:2017, [2] IFC:2014

Source: GSMA Intelligence

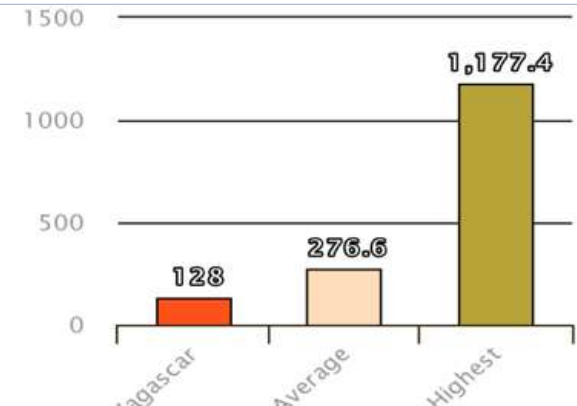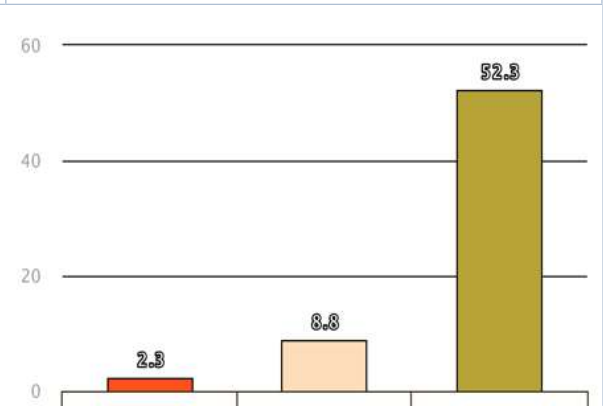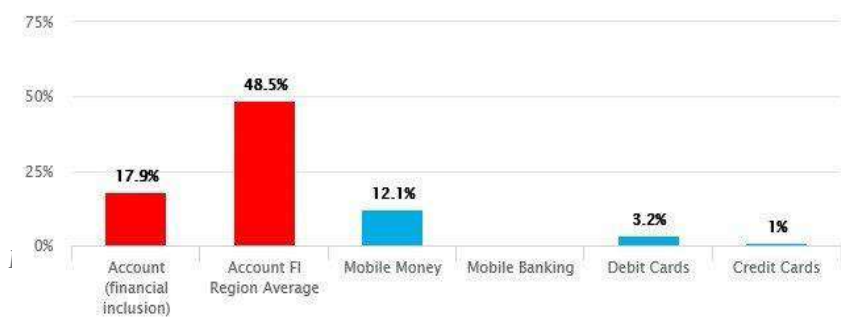| Figure 4. Mobile money agents per 100,000 adults, IFC	Figure 5. Bank branches per 100,000 adults, IFC

DFS Penetration: % of Adults who use...

⬇ Export

Source: Findex:2017

Table 1: Determining Current State of Digital Financial Services, 2017 Global Findex Survey

Indicators	Cameroon	Kenya	Madagascar	Malawi	Senegal	Sub–Saharan Africa
Digital payments in the past year (2017)						
Made or received digital payments	28.6%	79%	15%	27.6%	39.5%	34.4%
Used an account (% paying utility bills)	5.2%	35.5%	1%	4.5%	7.4%	7.5%
Used an account to pay private sector wages	4.2%	17.2%	2.6%	4.9%	3.8%	5.7%
Used an account to receive government payment	– – –	14.7%	– –	4.4%	7%	7.3%
Used the internet to pay bills or to buy something online	5.6%	26.1%	1.7%	8.3%	10.4%	7.6%
Used the mobile phone or the internet to access an account	15.6%	71.8%	10.7%	20.1%	29.4%	20.8%
Use debit card or credit card to make a purchase	2.9%	12.7%	– –	2%	5.1%	7.5%
Domestic remittances						
Sent or received domestic remittances through an account	20.4%	59%	7.5%	15.1%	23.9%	22%
Sent or received domestic remittances through an OTC account	22.1	6.6%	6.9%	8.9%	17.5%	11%
Sent or received domestic remittances through Cash only	8.9%	1.3%	12.3%	3.3%	4.3%	9.4%
Savings						
Saved at a financial institution	10.9%	26.8%	4%	8.8%	7.3%	14.9%
Saved at a financial institution. 2014	7.7%	30.2%	3.3%	7.1%	6.6%	15.8%
Saved using a savings club or person outside the family	31.9%	34.7%	3.6%	31%	23.8%	25.3%
Saved any money	57%	70.3%	44.3%	51.8%	45.1%	54.4%
Credit						
Borrowed from a financial institution or used a credit card	7.7%	19.2%	3.8%	8.6%	7.8%	9.8%
Borrowed from a financial institution or used a credit card, 2014	2.1%	16%	2%	6.9%	4%	10%
Borrowed from Family and friends	32.7%	45.2%	36.9%	31.2%	29.9%	30.4%
Borrowed any money	52.7%	64.4%	47.9%	52%	45%	42.9%
Outstanding housing loan	5.9%	8.4%	2.4%	5.6%	4.3%	5%

Table 2: Credit and savings in selected countries. Source Findex 2017

	Cameroon	Kenya	Senegal	Malawi	Madagascar	Sub–Saharan Africa
Saved at formal Institution, 2017	10.9%	26.8%	7.3%	8.7%	4%	11.1%
Saved at formal institution, 2014	7.7%	30.2	6.6%	7.1%	3%	8.9
Borrowed from formal Institution, 2017	7.7%	19.2	7.8%	8.6%	3.8%	7.9
Borrowed from formal institution, 2014	2.1%	16	4%	6.9%	2%	6.1%

Source : WB global Findex

Table 3: Indicators for Digital Financial Services

Assessment dimensions and measures/indicators	Data Source
4 Digital Financial Services	
4.1 Uptake & Usage of Digital Financial Services	
4.1.1. % of adults with a store-of-value transaction account	17.9%
4.1.2 % of firms with a store-of-value transaction account	n/a
4.1.3 % of adults using internet or mobile phone to access transaction account	10.7%
4.1.4 % of adults making or receiving a digital payment in past 12 months	n/a
4.1.5 % of adults who used the internet to pay bills or to buy something online in the past year	1.7%
4.1.6 % of agricultural payments made via digital channels	n/a
4.1.7 % of domestic remittance senders/receivers using digital channels	7.5%
4.1.8 % of wage earners receiving wage payments via digital channels	2.6%
4.1.9 % of Firms accepting digital payments	n/a
4.1.10 # of retail electronic/digital transactions per capita	n/a
4.1.11 Volume of electronic/digital transactions per capita	n/a
4.2.1 Market Entry	
4.2.1.1 % of retail electronic/digital transactions per capita facilitated by nonbanks	n/a
4.2.2 Delivery Channel & Product Innovation	
4.2.2.1 % of G2P social transfers disbursed via digital channels	n/a
4.2.2.2 # of non-branch access points per 100,000 adults (e.g. agent, PoS, ATM)	2.32
4.2.2.3 % of accounts opened via remote channels	n/a
4.2.3 Managing Risks of Digital Finance	
4.2.3.1 % of consumer complaints linked to digital financial services	n/a
4.3 Financial Infrastructure	
4.3.1 Retail Payment Systems	
4.3.1.1 Volume of transactions processed by retail payment systems	n/a
4.3.1.2 Value of transactions processed by retail payment systems	n/a
4.3.2 Credit Reporting Systems / Secured Transactions	
4.3.2.1 Strength of legal rights index (selected components, tbd)	2
4.3.2.2 Depth of credit information index (selected components, tbd)	6
4.3.2.3 Credit registry coverage (% of adults)	6.3
4.3.2.4 Credit bureau coverage (% of adults)	0

Annex 3: Digital Skills Supplementary information

Table A3.1: Share of electrified classrooms by educational region

	% schools with at least one electrified classroom	Total number of schools
ALAOTRA-MANGORO	1.61	1,240
AMORON'I MANIA	0.3	1,002
ANALAMANGA	13.02	1,659
ANALANJIROFO	0.58	1,371
ANDROY	0.37	1,355
ANOSY	0.39	767
ATSIMO-ANDREFANA	0.92	1,847
ATSIMO-ATSINANANA	0.15	1,336
ATSINANANA	1	1,696
BETSIBOKA	0.59	511
BOENY	2.43	740
BONGOLAVA	0.35	571
DIANA	2.15	836
HAUTE MATSIATRA	1.53	1,112
IHOROMBE	0.32	618
ITASY	3.09	648
MELAKY	0.22	448
MENABE	0.93	535
SAVA	0.86	1,281
SOFIA	0.44	2,295
VAKINANKARATRA	2.41	1,327
VATOVAVY FITOVINANY	0.04	2,345
Total	1.69	25,540

Source: Own calculation using Statistical Yearbook 2017–2018, Ministry of Education Madagascar

Figure A3.1: *Share of schools per DREN having at least one computer, tablet, or solar panel, 2017–2018*
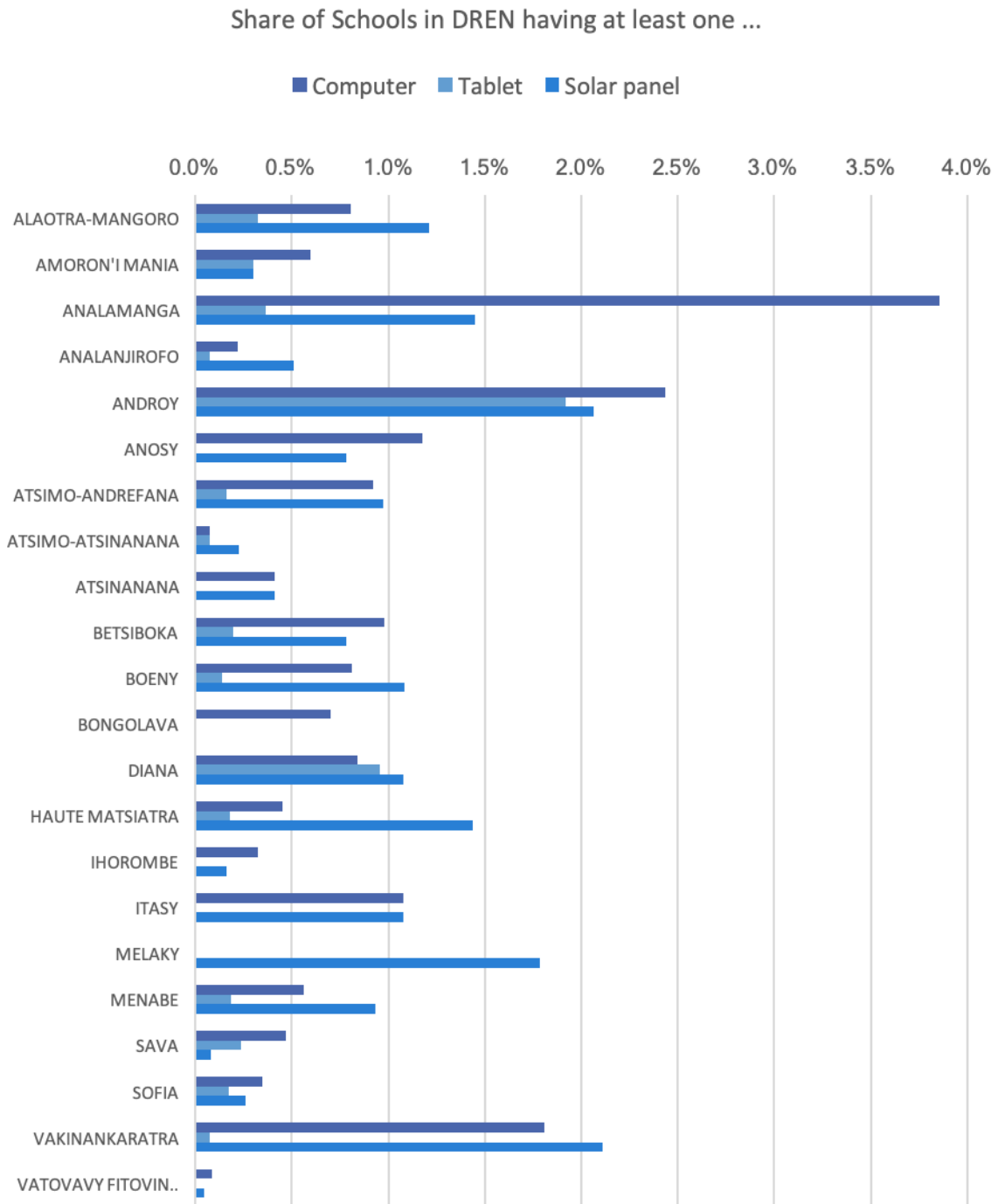
Share of Schools in DREN having at least one ...

■ Computer ■ Tablet ■ Solar panel

Source: Own calculation using Statistical Yearbook 2017–2018, Ministry of Education Madagascar

Table A3.3: Examples of additional programs aiming to teach ICT skills to children and youth

Name and time period	Program
Digital School Program, MEN in partnership with Orange	The Digital School Program was implemented in Madagascar in 2015 and placed digital kits into 42 primary and 117 high schools. In addition to the school kit (consisting of 50 tablets, 2 Raspberry Pi servers, and 1 video projector each), the government partnered with Orange to establish WIFI zones for schools but has been unable to do so. Instead, schools are using the Raspberry Pi or local servers to access a digital library with information such as the national school curriculum, Khan Academy, and Wikipedia in Malagasy.
One Laptop Per Child France and the French organization Gducoeur	Laptops to 140 children between 5 and 15 in Nosy Komba, Madagascar. The laptops (with WIFI antennas) were given to the children for use at school and at home. A number of educational applications were pre-loaded onto the laptops including digital and writing books in French and Malagasy.
World Computer Exchange (WCE) partnered with US Peace Corps Volunteers and students and staff from the University of Maryland/ Baltimore County Training Centers (UMBCTC)	130 computers shipped to the University of Antsiranana and 235 computers were distributed to schools in villages where Peace Corps volunteers were stationed. In all, the computers were expected to connect nearly 70,000 youth.
Coderbus, a mobile computer lab designed to teach computer skills to children ages 7 to 17	The bus is connected to the internet and visits locations around the capital. According to the Director of Coderbus, 80% of the children they serve have never touched a computer before and 60% are between 7 and 10 years old. Since its inception in 2015, nearly 1,000 children have benefitted from the program. Additional funding from the Organisation Internationale de la Francophonie (OIF) has facilitated putting in place a second bus and expand services to three additional cities (Mahajanga, Moramanga, and Toamasina).

Table A2: Examples of teacher training programs in Madagascar using digital tools

Name and time period	Sample	Methods	Results
Francophone Initiative for Teacher Training (IFADEM), 2012/2012	500 rural teachers in Amoron'I Mania region	Teachers received mobile phones and technological support in addition to workbooks and in person training in French. The mobile part of the program consisted of 1) free communication with tutors and peers; 2) a daily quiz question; and 3) pre-installed teaching resources (songs, short stories, pronunciation guides).	Increased peer to peer contact and positive impacts on teaching methods, but no improvement in the level of French.
Madagascar School Project	Recent high school graduates often with no formal teacher training and minimal experience in leading children, who receive a two-year teacher training	Trainees work alongside current teachers and receive mentoring, monitoring, and food. In addition to learning pedagogy, trainees must learn French and English and become proficient in the use of computers to seek out resources.	n.a.
Formation à Distance des Enseignants du Primaire à Madagascar (FADEP) Started in 2017	Ca. 1000 teachers in 8 regions	Pre-service teacher training; Teachers received a tablet and SIM card for their personal phone. The program has 3 components: self-instruction (through the tablet/phone), tutors (available via phone), and in person group work.	Preliminary program evaluations do not show an increase in teachers' skills. The is attributed to the high level of content delivered (e.g. text books that often had close to 200 pages), which was further mostly delivered in French, a language that many of the teachers in the program were not fluent in (AFD et al. 2018)

Table A3 : Number of technical training centers and technical schools and their digital infrastructure

	Number of Training Centers/Schools	With electricity (%)	With computer (%)	With internet (%)
ALAOTRA–MANGORO	31	90	84	48
AMORON'I MANIA	18	83	83	56
ANALAMANGA	207	98	86	52
ANALANJIROFO	11	82	55	45
ANDROY	1	0	0	0
ANOSY	12	75	92	83
ATSIMO–ANDREFANA	24	92	88	58
ATSIMO–ATSINANANA	8	63	50	38
ATSINANANA	27	100	93	41
BETSIBOKA	1	100	100	100
BOENY	36	100	75	47
BONGOLAVA	4	75	75	0
DIANA	29	90	72	55
IHOROMBE	3	100	100	33
ITASY	12	92	75	58
MATSIATRA AMBONY	31	100	97	61
MELAKY	1	100	100	100
MENABE	15	100	80	87
SAVA	14	79	71	64
SOFIA	14	64	79	57
VAKINANKARATRA	38	92	97	45
VATOVAVY–FITOVINANY	5	80	100	20

Source: Own calculation using Statistical Yearbook 2017–2018,

*Ministry of Technical and Vocational Education, Madagascar*

Table A4 : Number of students in technical training centers (FPI, FPQ, FPG) and share of students in the computer science track ("informatique")

	Total	Total female students	Total computer science	Share CS/ Total students (%)	Total female CS students	% of female CS (of female students)	CS students in private centers
ALAOTRA–MANGORO	2074	611	255	12	146	24	146
AMORON'I MANIA	2604	1025	7	0			7
ANALAMANGA	27163	11725	3107	11	2912	25	1410
ANALANJIROFO	1123	151		0			
ANDROY	36	11		0			
ANOSY	814	345	106	13	55	16	51
ATSIMO–ANDREFANA	3907	1507	460	12	383	25	260
ATSIMO–ATSINANANA	526	152	5	1			5
ATSINANANA	4007	1788	74	2	74	4	48
BETSIBOKA	104	42		0			
BOENY	4594	1745	447	10	347	20	233
BONGOLAVA	450	164		0			
DIANA	7364	2327	189	3	126	5	125
IHOROMBE	240	114	71	30	71	62	39
ITASY	1141	459	335	29	319	69	182
MATSIATRA AMBONY	1897	884	290	15	290	33	171
MELAKY	110	32		0			
MENABE	790	255	19	2			8
SAVA	1348	413	172	13	172	42	112
SOFIA	1530	431	190	12	190	44	120
VAKINANKARATRA	3888	1619	168	4	168	10	75
VATOVAVY – FITOVINANY	446	88		0			
TOTAL	66156	25888	5895	9	5253	20	2992

Source: Own calculation using Statistical Yearbook 2017–2018, Ministry of Technical and Vocational Education, Madagascar

Figure A3.2: Mobile money agent outlets registered in Madagascar per 100,000 adults
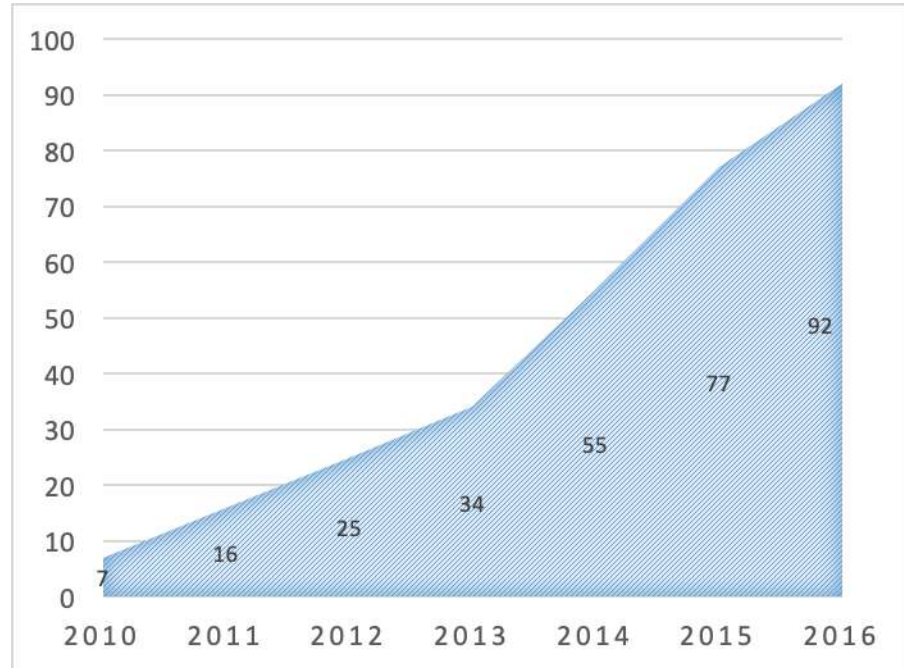
Source: IMF Financial Access Survey

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