

The Mobile Economy Sub-Saharan Africa 2018

Copyright © 2018 GSM Association



The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with more than 300 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai, Mobile World Congress Americas and the Mobile 360 Series of conferences.

For more information, please visit the GSMA corporate website at **www.gsma.com**

Follow the GSMA on Twitter: **@GSMA**

GSMA Intelligence

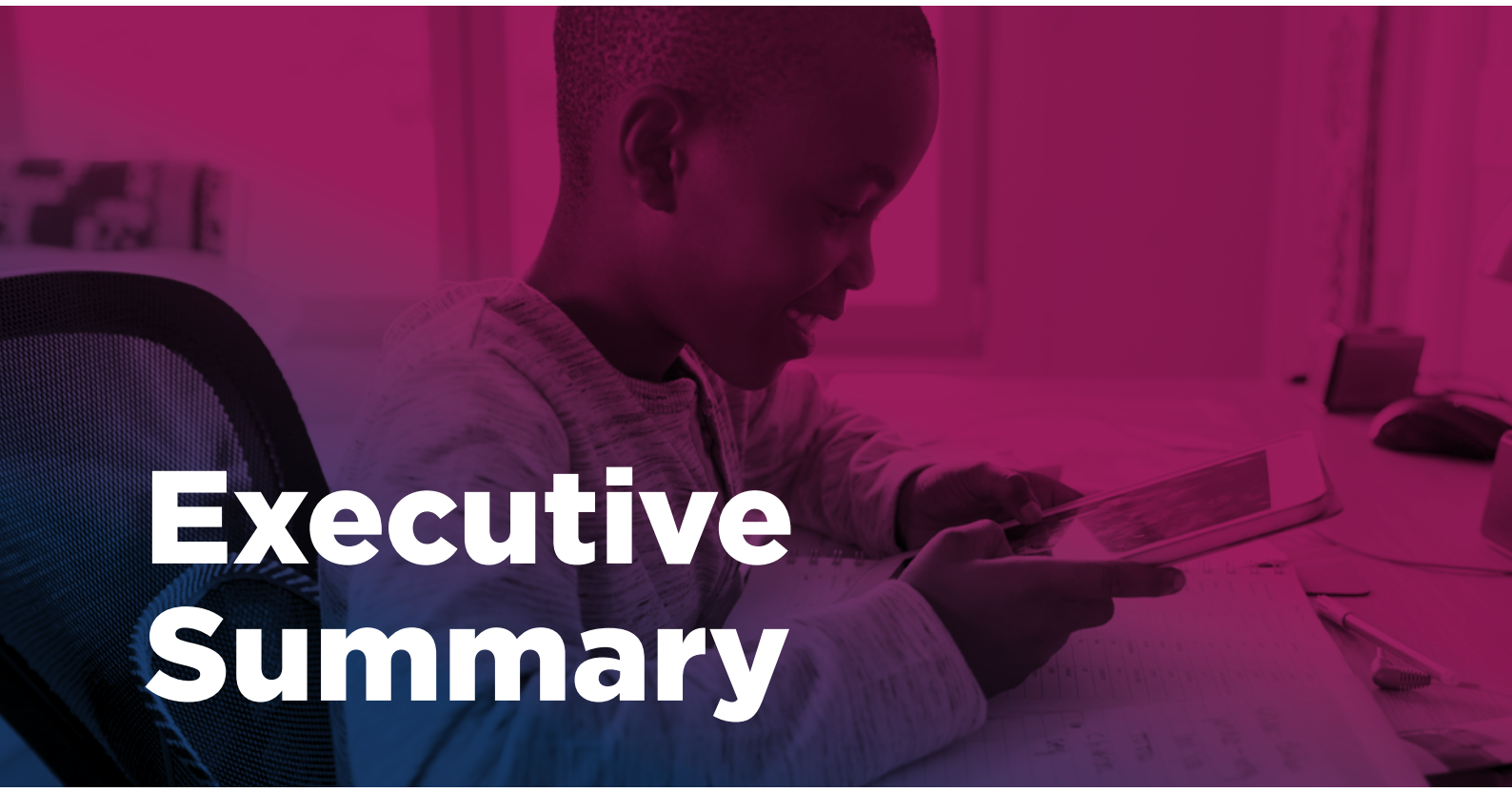
GSMA Intelligence is the definitive source of global mobile operator data, analysis and forecasts, and publisher of authoritative industry reports and research. Our data covers every operator group, network and MVNO in every country worldwide – from Afghanistan to Zimbabwe. It is the most accurate and complete set of industry metrics available, comprising tens of millions of individual data points, updated daily. GSMA Intelligence is relied on by leading operators, vendors, regulators, financial institutions and third-party industry players, to support strategic decision-making and long-term investment planning. The data is used as an industry reference point and is frequently cited by the media and by the industry itself. Our team of analysts and experts produce regular thought-leading research reports across a range of industry topics.

www.gsmaintelligence.com

info@gsmaintelligence.com

Contents

EXECUTIVE SUMMARY		**2**
1	**INDUSTRY OVERVIEW**	**8**
1.1	Subscriber growth slowing as affordability challenges mount	9
1.2	Smartphone adoption still growing strongly	11
1.3	Ongoing shift to mobile broadband: 5G on the horizon	12
1.4	Revenue trends recovering and capex stable	14
2	**MOBILE CONTRIBUTING TO THE ECONOMY AND JOBS**	**16**
2.1	The direct economic contribution of the mobile ecosystem	17
2.2	Indirect and productivity impacts of mobile technology	18
2.3	Employment	19
2.4	Public funding	20
2.5	Outlook and trends for the next five years	21
3	**MOBILE ENABLING THE DIGITAL ECONOMY**	**22**
3.1	Mobile as a platform for innovation	23
3.2	Mobile enabling life-enhancing digital services	27
3.3	Mobile support for the SDGs	34
4	**POLICY MEASURES TO SUPPORT MOBILE ECOSYSTEM DEVELOPMENT**	**38**
4.1	Spectrum for mobile broadband	39
4.2	Tax reform	44



Executive Summary

Slowing subscriber growth, despite low penetration levels

Subscriber growth in Sub-Saharan Africa has slowed in recent years as the industry confronts the challenges of affordability and a youthful population. Growth rates in the region have fallen well below the double-digit annual rates seen in the first half of the decade, and the compound annual growth rate (CAGR) for the next five years is around half the level recorded over the preceding five years. Future growth opportunities will increasingly be concentrated in rural and low-ARPU markets, as well as younger demographic groups. World Bank data indicates that around 40% of the population in the region are under the age of 16, a demographic segment that has significantly lower levels of mobile ownership than the population as a whole.

Unique mobile subscriber penetration in Sub-Saharan Africa stood at 44% at the end of 2017, still well below the global average of 66%. The subscriber base in the region totalled 444 million, equivalent to around 9% of subscribers globally. The regional subscriber base will grow at a CAGR of 4.8% for the period 2017–2022, more than double the global growth rate over the same period. The penetration rate is forecast to reach the 50% level by the end of 2023, and 52% by 2025.

Transition to mobile broadband: 5G on the horizon

Sub-Saharan Africa is seeing an accelerating migration to mobile broadband capable connections. The next couple of years are a key tipping point as 2G connections become a minority of the region's total connections base. 3G will emerge as the dominant technology in the region over the next few years, accounting for 60% of Sub-Saharan Africa's connections by the end of 2025. GSMA Intelligence forecasts the first commercial 5G services to be launched in the region by 2021, with 5G connections accounting for 2.6% of the total connections base by 2025.

Meanwhile, smartphone adoption continues to see rapid growth in the region, albeit from a relatively low base and despite affordability challenges. The total number of smartphone connections stood at 250 million at the end of 2017, equivalent to around a third of the total connections base. Smartphone adoption is helping to drive strong growth in data traffic across the region, although mobile operators will face challenges in monetising the ongoing data traffic growth amid regulatory moves to reduce out-of-bundle charges and ongoing competitive pressures.

Mobile contributing to economic growth

In 2017, mobile technologies and services generated 7.1% of GDP across Sub-Saharan Africa, a contribution that amounted to $110 billion of economic value added. By 2022, the mobile economy in the region will generate more than $150 billion (or 7.9% of GDP) of economic value added as countries continue to benefit from improvements in productivity and efficiency brought about by increased take-up of mobile internet in particular.

The mobile ecosystem supported almost 3 million jobs in 2017. In addition to the impact on the economy and labour market, the mobile sector also makes a substantial contribution to the funding of the public sector, with almost $14 billion raised in 2017, taking into account general taxation as well as sector-specific levies on the consumption of mobile services.

Mobile enabling the digital economy

For many consumers across the region, mobiles are not just a communication device but also the primary channel for getting online and a vital tool to access life-enhancing services. This is particularly true in rural areas, where around half the population live and where the provision of these services by conventional means is constrained by acute funding, skills and infrastructure gaps. Mobile network assets and services, such as APIs, cellular IoT, mobile money and billing platforms, are enabling sustainable business models for key services across verticals in the region.

The number of mobile internet subscribers in the region has quadrupled since the start of this decade; the technology is the only available platform for the majority of the population to get online. Over the period to 2025, nearly 300 million people will come online, the majority of them connecting via high-speed mobile broadband[1] networks. Across the region, mobile money plays a key role in extending financial services to people with limited access to traditional financial institutions, particularly women and rural populations. There were 135 live mobile money services across the region at the end of 2017, with 122 million active accounts.

Policies supporting mobile ecosystem development

As mobile operators edge towards full coverage of the more densely populated conurbations within the region, the remaining unconnected populations are primarily located in rural areas where the economics of network rollout are more challenging. To extend connectivity to underserved areas and ensure long-term industry sustainability requires the establishment of relevant regulatory frameworks and investment-friendly policies to facilitate multi-year capex programmes.

Two key policy enablers that can help support the continued growth of the mobile ecosystem are the implementation of the appropriate spectrum management framework, and tax reform to improve the affordability of mobile technology for consumers, especially those in low-income segments. Spectrum below 1 GHz has strong propagation characteristics and can be key to delivering universal broadband access, bringing socioeconomic benefits to people in cities and remote areas. Similarly, tax reform can enhance digital inclusion in the region, with positive knock-on effects for productivity and the wider economy.

1. 3G or 4G network services



Sub-Saharan Africa

Unique mobile subscribers

2017

444m

44% PENETRATION RATE (% of population) 52%

CAGR 2017–25

634m

2025

4.6%

SIM connections

Excluding licensed cellular IoT

747m

2017

1bn

2025

75% PENETRATION RATE (% of population) 84%

3.7%

CAGR 2017–25

Accelerating moves to mobile broadband networks and smartphone adoption

Mobile broadband connections

38% 2017

87% 2025

of total connections

690m

Smartphones by 2025

Growth of **440m** from the end of 2017

Data growth driving revenues and operator investments

Operator total revenues

$40bn

2017 — 2025

$44bn

1.2%

CAGR 2017–25

Operator capex of up to **$31 billion** for the period 2017–20

Mobile contributing to economic and social development across the region

DIGITAL INCLUSION

300 million

additional people to come online

BY 2025

FINANCIAL INCLUSION

Delivering financial inclusion to the unbanked populations

135

live mobile money services in 39 countries

as of December 2017

INNOVATION

Delivering innovative new services and apps

Cellular IoT connections

44m

BY 2025

Mobile industry contribution to GDP

7.1% **$110bn** 2017

7.9% **$150bn** 2022

Public funding

Mobile ecosystem contribution to public funding (before regulatory and spectrum fees)



2017 **$14bn**

2022 **$16bn**

Employment



Jobs supported by the mobile ecosystem

2017 **3m**

2022 **3.45m**

01

Industry overview



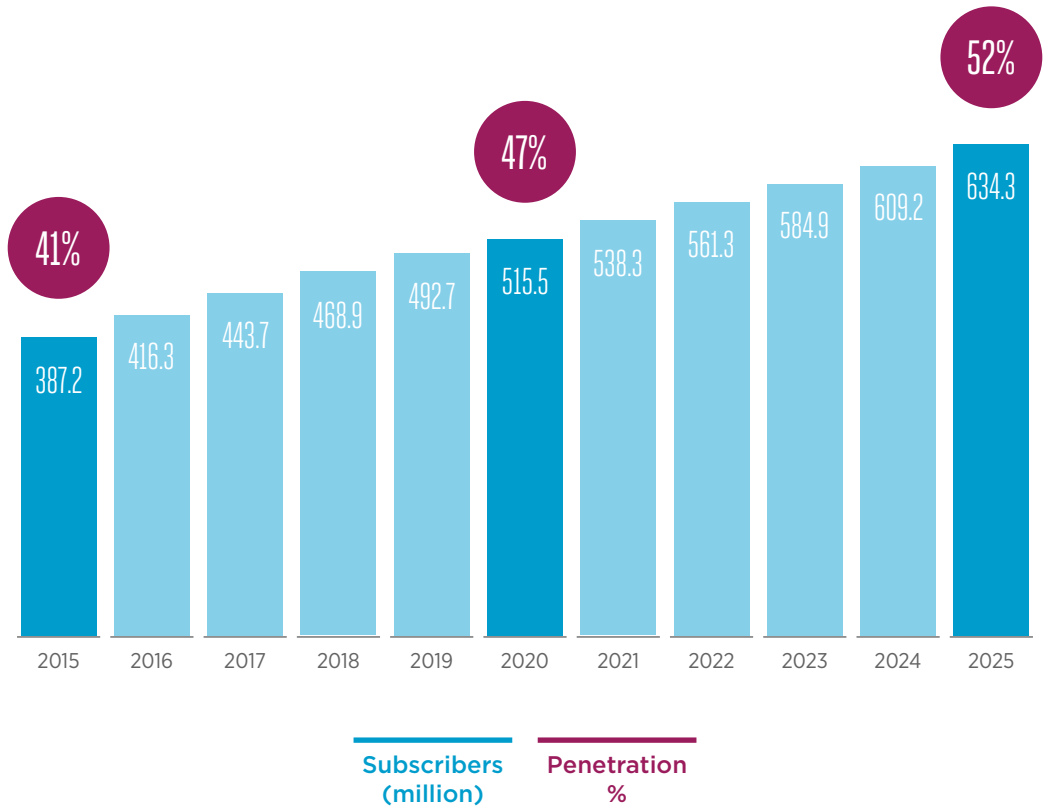
1.1
Subscriber growth slowing as affordability challenges mount

Unique mobile subscriber penetration in Sub-Saharan Africa stood at 44% at the end of 2017, well below the global average of 66%. The subscriber base in the region totalled 444 million, equivalent to around 9% of total global subscribers. Subscriber growth has slowed in recent years as the industry confronts the challenges of affordability and a youthful population, but growth rates remain well ahead of global averages.

The regional subscriber base will grow at a CAGR of 4.8% for the period 2017–2022, more than double the global growth rate over the same period. However, growth rates in Sub-Saharan Africa have fallen well below the double-digit annual growth rates seen in the first half of the decade, and the CAGR for the next five years is roughly half the level recorded over the preceding five years. As a result, penetration rates will see only modest increases from current levels. The penetration rate is forecast to reach 50% by the end of 2023, and 52% by 2025.

Figure 1 Source: GSMA Intelligence

Sub-Saharan Africa unique mobile subscribers



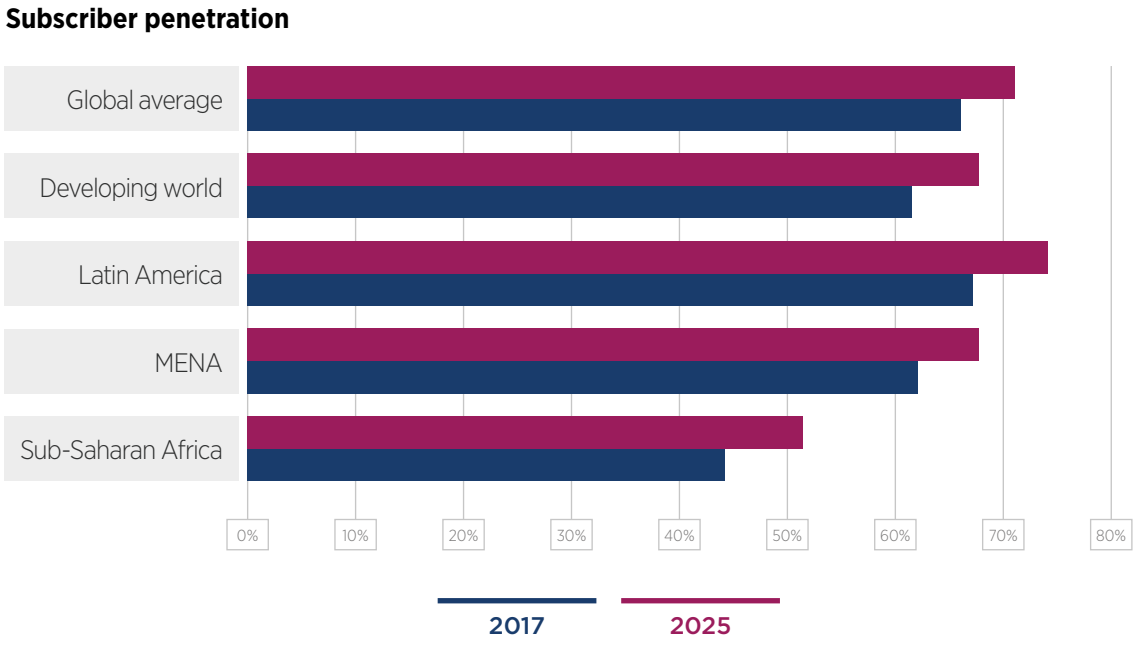
The issue of slowing subscriber growth at a time when less than half the population have a mobile subscription highlights both the opportunity and the challenge that the mobile industry faces in the region in terms of connecting new subscribers. Future growth opportunities will increasingly be concentrated in rural and low-ARPU markets, as well as younger demographic groups. World Bank data indicates that around 40% of the population in the region are under the age of 16 – a demographic segment that has significantly lower levels of mobile ownership compared to the population as a whole.

The industry is also facing challenges in terms of affordability as it attempts to connect incremental subscribers, with economic volatility and political instability in a number of countries potentially exacerbating challenges around purchasing power and low disposable incomes. Network economics can also prove challenging for mobile operators looking to connect populations in rural and remote regions.

As a result of these issues, Sub-Saharan Africa will remain the least penetrated region out to 2025, with the gap compared to global average figures reducing only modestly over the forecast period.

Figure 2 Source: GSMA Intelligence

Sub-Saharan Africa remains underpenetrated



There were around 747 million SIM connections in the region at the end of 2017 (excluding licensed cellular IoT, which represented a further 16 million connections). This figure will increase to just over 1 billion by 2025, taking connections penetration in the region from 75% to 84% by 2025. Levels of multi-SIM ownership have declined in recent years and will continue to fall modestly. This reflects a range of factors, including more stringent regulations on SIM registration, improving network quality and reduced opportunities for price arbitrage.

The new unique subscriber and connections figures detailed in this report are based on the results of a large-scale consumer survey conducted by GSMA Intelligence across 50 countries in developed and developing markets between June and August 2017, and incorporate the results of our previous surveys during 2012–2016.

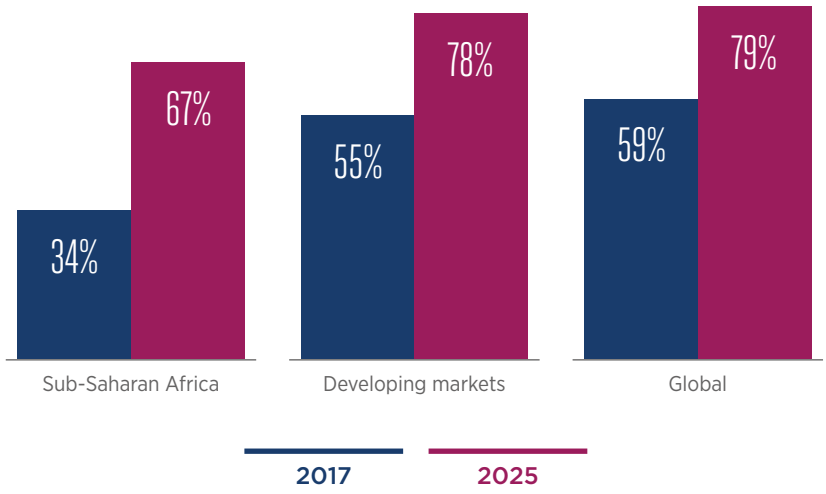
1.2
Smartphone adoption still growing strongly

Smartphone adoption continues to see rapid growth in Sub-Saharan Africa, albeit from a relatively low base and despite affordability challenges. The total number of smartphone connections stood at 250 million at the end of 2017, equivalent to a third of the total connections base. The adoption rate will double by 2025 to reach two-thirds of total connections, equivalent to an installed base of around 690 million. Rapid growth in the number of smartphones in the region means the adoption gap compared to the developing market average will close materially over the forecast period.

Figure 3 Source: GSMA Intelligence

Smartphone adoption

Percentage of connections



A key driver of smartphone adoption is the growth of entry-level devices at affordable prices, often from more price-focused brands including the likes of China's Shenzhen Transsion Holdings. The company sells phone in the region under the Tecno and other brands, with its sales accounting for close to a third of the region's total market. Chinese players have traditionally dominated the featurephone market in Africa but are now increasingly active in the smartphone market, though Samsung remains a leading player in this market segment.

Smartphone adoption is helping to drive strong growth in data traffic across the region. For example, Vodacom in the first quarter of 2018 reported 65% year-on-year growth in data traffic across its international operations in the region. MTN reported a 56% increase in group data traffic for the same period, which drove a 27% increase in data revenues. Mobile operators will, however, face challenges in monetising the ongoing traffic growth, including regulatory moves to reduce out-of-bundle charges and ongoing competitive pressures.

Data prices in some markets remain relatively high, with the additional barrier of low income levels. Developers are responding by producing less data-intensive apps and services, such as the recently launched Google Go. This app is quick to download, while advanced compression algorithms allow it to display search results using 40% less data than the standard application.

1.3
Ongoing shift to mobile broadband: 5G on the horizon

Sub-Saharan Africa is seeing an accelerating migration to mobile broadband capable connections, with the next couple of years a key tipping point as 2G connections become a minority of the region's total connection base. Six new 4G networks have been launched in the first half of 2018 alone, taking the total across the region to 120. Ongoing investment in new 4G networks will help drive the proportion of 4G connections from just over 4% at the end of 2017 to almost a quarter by 2025.

Despite the number of 4G network launches, 3G will emerge as the dominant technology in the region over the next few years, accounting for 60% of Sub-Saharan Africa's connections by the end of the forecast period. Despite advances in LTE and efforts to improve network economics for 4G deployments, a number of operators in the region are continuing to invest in both expanding 3G network coverage and launching new 3G networks. Airtel, for example, in the second half of 2017 announced a major investment to expand its 3G network coverage in the 900 MHz band into rural areas, while the Ghanaian regulator encouraged licensed operators to offer 3G services in the 900 MHz band.

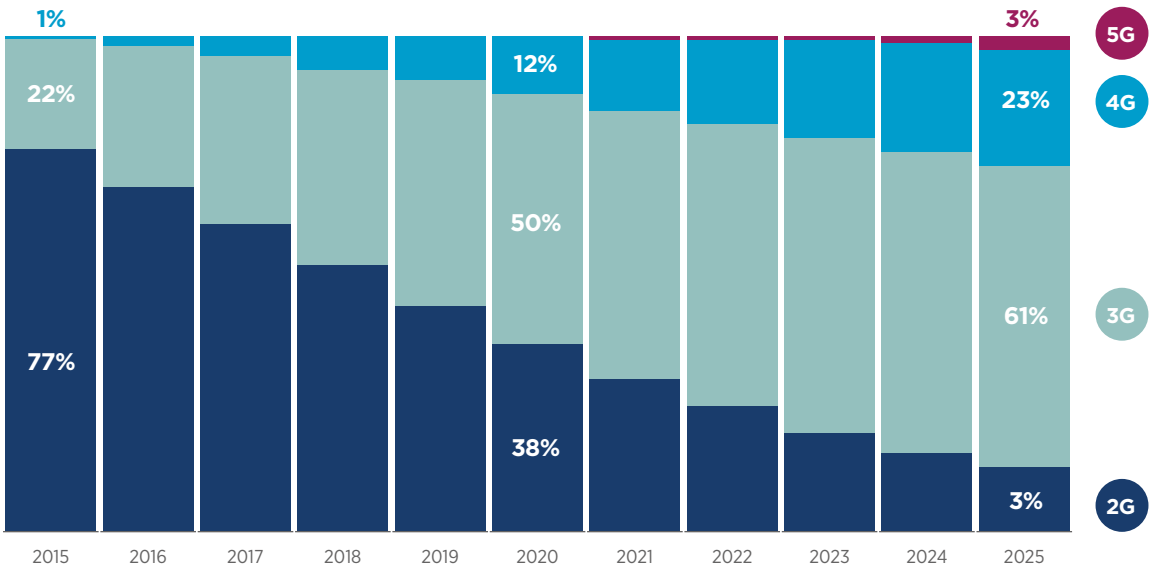
Operator support for 3G in the region appears to be driven by two key considerations:

- The ongoing prevalence of featurephones means 3G networks can support both voice services on these more basic devices as well as data services on smartphones. Unlike markets such as India where operators such as Reliance Jo have invested heavily in 4G (and the associated need to support smartphone adoption), operators in Sub-Saharan Africa are taking a more cautious view on the move to 4G.
- The second factor is the relative scarcity of mobile broadband spectrum in the region. Operators are therefore choosing to refarm 900 MHz spectrum to offer mobile broadband services over 3G, rather than waiting for new spectrum auctions to build LTE networks.

Figure 4 Source: GSMA Intelligence

Accelerating transition to mobile broadband

Percentage of connections





GSMA Intelligence forecasts indicate the first commercial 5G services will be launched in the region by 2021, with the number of 5G connections set to grow from 400,000 at the end of 2021 to almost 12 million by 2025 (2.6% of the total connection base). A small number of operators are already undertaking 5G trials and evaluations, mainly those based in South Africa, which reflects the country's status as one of the wealthiest and most technologically advanced in the region. Sub-Saharan Africa will be the last region to see 5G service launches, with operators seeing little incentive to participate in the race for 5G leadership. They are likely to take time to allow the technology to mature and for costs to fall before committing to commercial launches.

MTN has announced partnerships with both Huawei and Ericsson, while Vodacom has signed an MOU with Nokia. Comsol Networks has also announced it is collaborating with both Verizon and Samsung to launch 5G fixed wireless trials in South Africa. 5G is likely to have use cases in providing both enhanced mobile broadband services and fixed wireless access in the region, with the latter likely to dominate in earlier phases of deployment.

MTN trialling 5G in Africa

MTN and Ericsson signed a memorandum of understanding in 2017 to collaborate on the development of 5G services in South Africa. MTN has tested a range of 5G use cases and applications in its Test Lab as it looks to prepare for commercial services.

MTN recently undertook what the company claimed to be the first 5G field trial in the region, using Huawei's 5G 28 GHz millimetre-wave technology. The trial focuses on the fixed wireless use case, a key potential opportunity for 5G in urban areas in South Africa (and some of the broader region's more affluent urban areas) given the lack of fixed broadband connectivity.

MTN and a number of other operators appear set to focus initially on this fixed wireless opportunity. As well as low levels of fixed broadband infrastructure in the country, investment to increase fibre backhaul as a replacement for microwave has resulted in significant capacity at cell sites for backhaul. With 5G, there is the opportunity to address the last-mile opportunity and connect households more cost-effectively – a similar argument that is driving Verizon, for example, to focus on fixed wireless in the US.

The use case around enhanced mobile broadband is likely to be a longer term play in the region, given challenges around the affordability of smartphones and subscription-based content plays. Other use cases such as in the enterprise space or massive IoT deployments may also take some time to realise.

1.4
Revenue trends recovering and capex stable

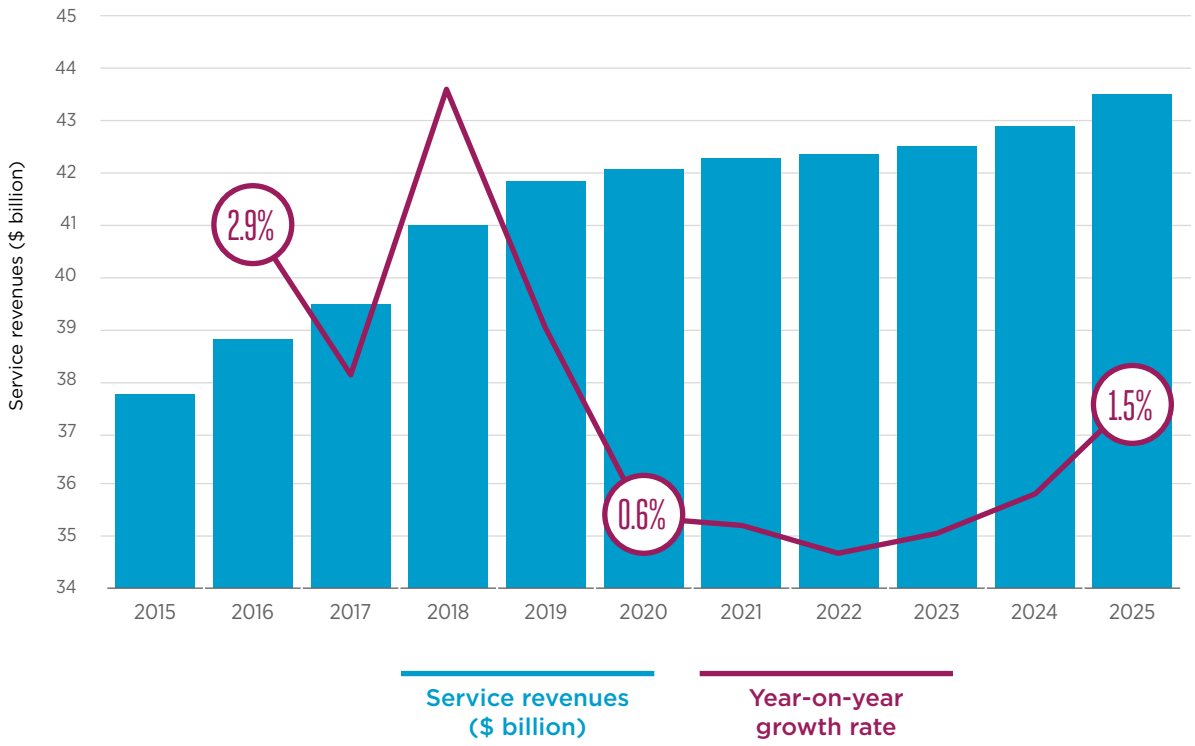
Revenue growth has been trending downwards in recent years, reflecting the general trends of slowing subscriber growth and ongoing competitive pressures in key markets. There has also been macroeconomic weakness in key resource-rich markets such as Angola, Nigeria and South Africa. The near-term outlook, however, is now more positive, with the macro-environment overall more supportive.

As a result, mobile service revenue growth for the region is expected to be around 4% in 2018, following the acceleration in growth rates seen in a number of markets in the second half of 2017. Growth is forecast to slow gradually over the following years. Data traffic growth remains strong in many markets and is a key driver of service revenue growth, though constraints around smartphone affordability and a lack of interest in data services in certain market segments may act as a cap on growth in the medium term. This could raise the possibility of operators in some major markets starting to subsidise handsets in an effort to drive medium-term growth.

Revenues are forecast to see some improvement towards the end of the forecast period, reflecting the impact of ongoing migrations to 4G networks and the initial impact of 5G network launches and associated new revenue streams.

Figure 5 Source: GSMA Intelligence

Sub-Saharan Africa mobile revenue growth



EBITDA margins have stayed relatively stable in recent years, despite competitive challenges, inflation-driven cost pressures and regulatory action in a number of markets.

Operators have used strategies familiar from developed markets to manage costs, including the use of machine learning and the digitisation of key services. For example, Vodacom has developed services and platforms in South Africa that it then rolls out to its other operations in the region. These include the use of chatbots to improve customer service and reduce the pressure on call centres.

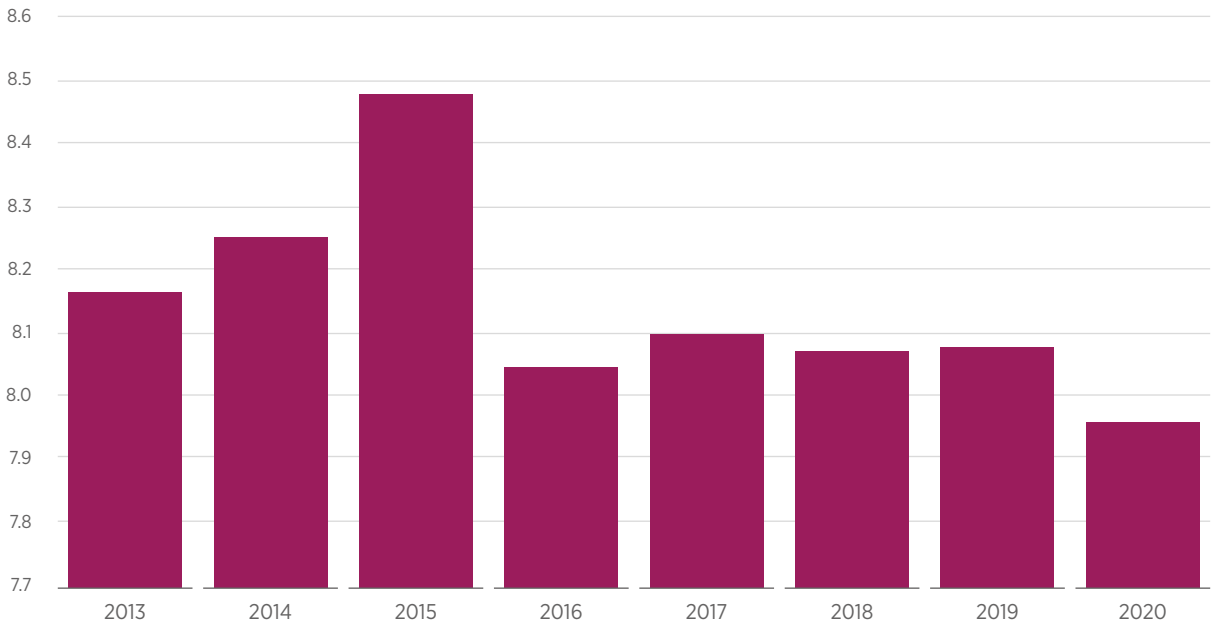
Competitive pressures have eased in a number of countries across the region, including key markets such as Nigeria. Ongoing consolidation has also played a role. For example, Airtel has made a number of consolidation moves in recent years, including the agreement with Millicom to acquire Tigo Rwanda. This followed an agreement in 2017 with Millicom to merge the two companies' operations in Ghana.

Mobile operators across the region invested a total of around $33 billion in capex over the four years to 2016. Investments grew over the period to 2015 as operators invested in network build-outs, with a decline in 2016 (in dollar terms) that in part reflected the impact of foreign exchange factors. Going forward, total capex levels are forecast to remain relatively stable out to 2020, after which a gradual increase is likely as operators continue to invest in mobile broadband capacity as well as the initial phases of 5G deployments.

Figure 6 Source: GSMA Intelligence

Sub-Saharan Africa mobile capex

$ billion





02

Mobile contributing to the economy and jobs

The mobile ecosystem makes a significant contribution to the economy in Sub-Saharan Africa, with an economic value added of $110 billion, equivalent to 7.1% of the region's GDP in 2017. This includes the direct impact of the mobile ecosystem as well as the indirect impact and growth in productivity brought about by the increased use of mobile services and technologies.

2.1
The direct economic contribution of the mobile ecosystem

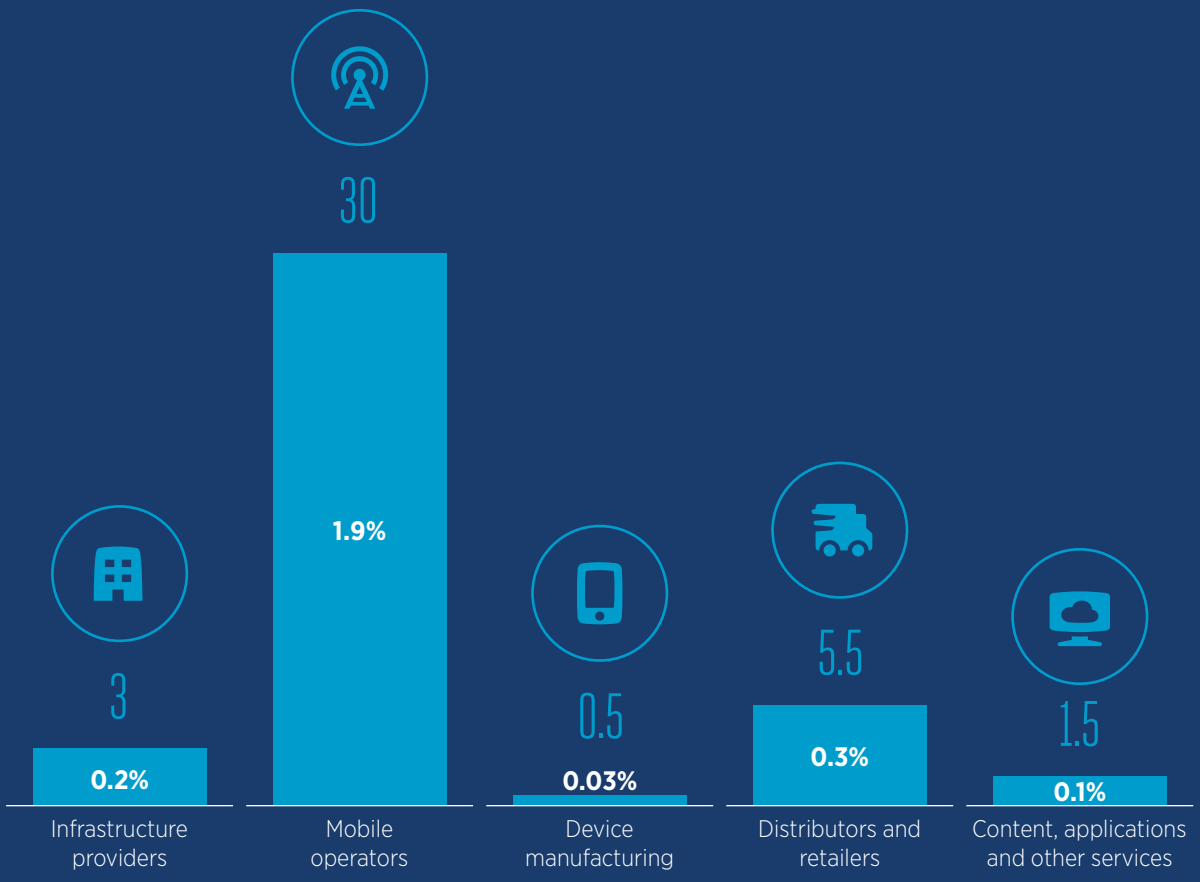
The mobile ecosystem in the region consists of mobile operators; infrastructure service providers; retailers and distributors of mobile products and services; mobile handset manufacturers; and mobile content, application and service providers. The direct economic contribution to GDP of these firms is estimated by measuring their value added to the economy, including employee compensation, business operating surplus and taxes.

In 2017, the total value added generated by the mobile ecosystem in Sub-Saharan Africa was $40 billion (or 2.5% of GDP), with mobile network operators accounting for around 75% of this.

Figure 7 Source: GSMA Intelligence

Direct contribution of the mobile ecosystem to GDP

$ billion, % 2017 GDP



Note: totals may not add up due to rounding.

2.2
Indirect and productivity impacts of mobile technology

In addition to their direct economic contribution, firms in the mobile ecosystem purchase inputs from their providers in the supply chain. For example, mobile operators purchase inputs from the energy sector; distributors and retailers require transport services; and mobile content providers require services from the broader IT sector. Furthermore, some of the profits and earnings generated by the mobile ecosystem are spent on other goods and services, stimulating further economic activity in those sectors. We estimate that in 2017, this additional economic activity generated a further $10 billion in value added in the region, equivalent to 0.7% of GDP.

The use of mobile technology also drives economic growth by improving the productivity of an economy. Mobile infrastructure lowers search and information costs, thereby allowing workers to be more productive, and enabling firms to use and organise their capital more efficiently. Mobile infrastructure can also encourage economic activity by creating more marketplaces, improving borrowing and lending, and spurring labour market opportunities.

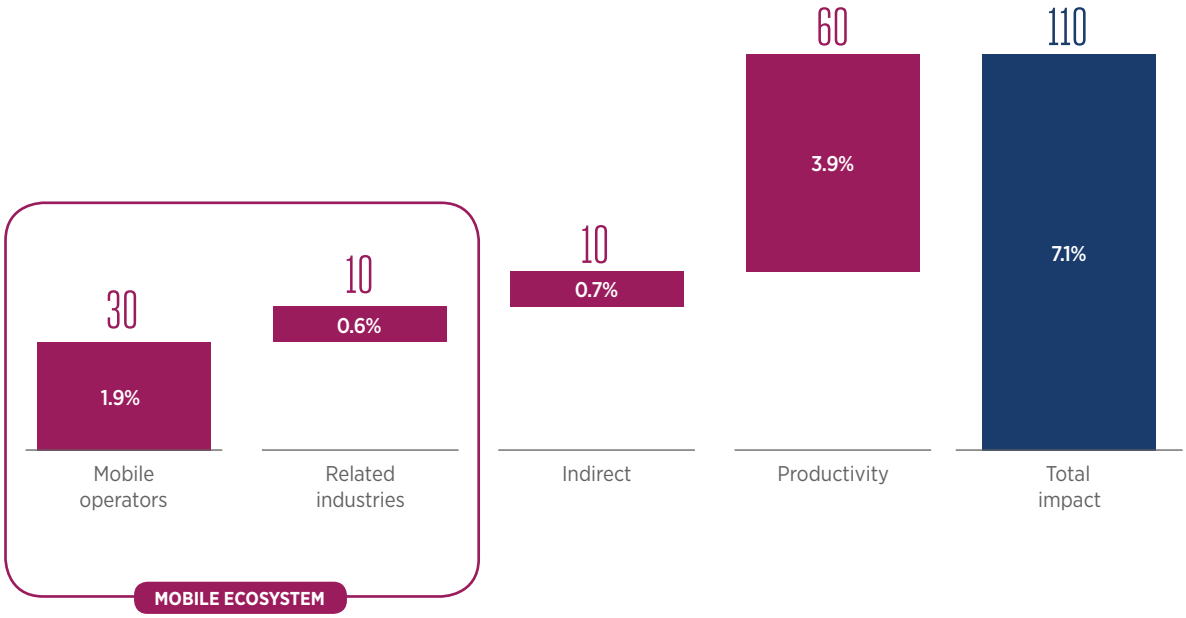
Different types of mobile technology have different impacts on the productivity of the regional economy. Basic mobile voice and text services allow workers and firms to communicate more efficiently and effectively, for example reducing unproductive travel time. 3G and 4G technology allow workers and firms to use internet services. This improves their access to information and services, which in turn drives efficiency in business processes across many industries. The impact of mobile internet is particularly significant in developing countries, where fixed infrastructure is poor and mostly confined to large cities and business/industrial districts.

Together, these productivity impacts generated $60 billion in 2017 (almost 4% of GDP). Overall, taking into account the direct, indirect and productivity impacts, in 2017 the mobile industry made a total contribution of $110 billion in value added terms, equivalent to 7.1% of the region's GDP.

Figure 8 Source: GSMA Intelligence

Total (direct, indirect and productivity) contribution to GDP

$ billion, % 2017 GDP



Note: totals may not add up due to rounding.

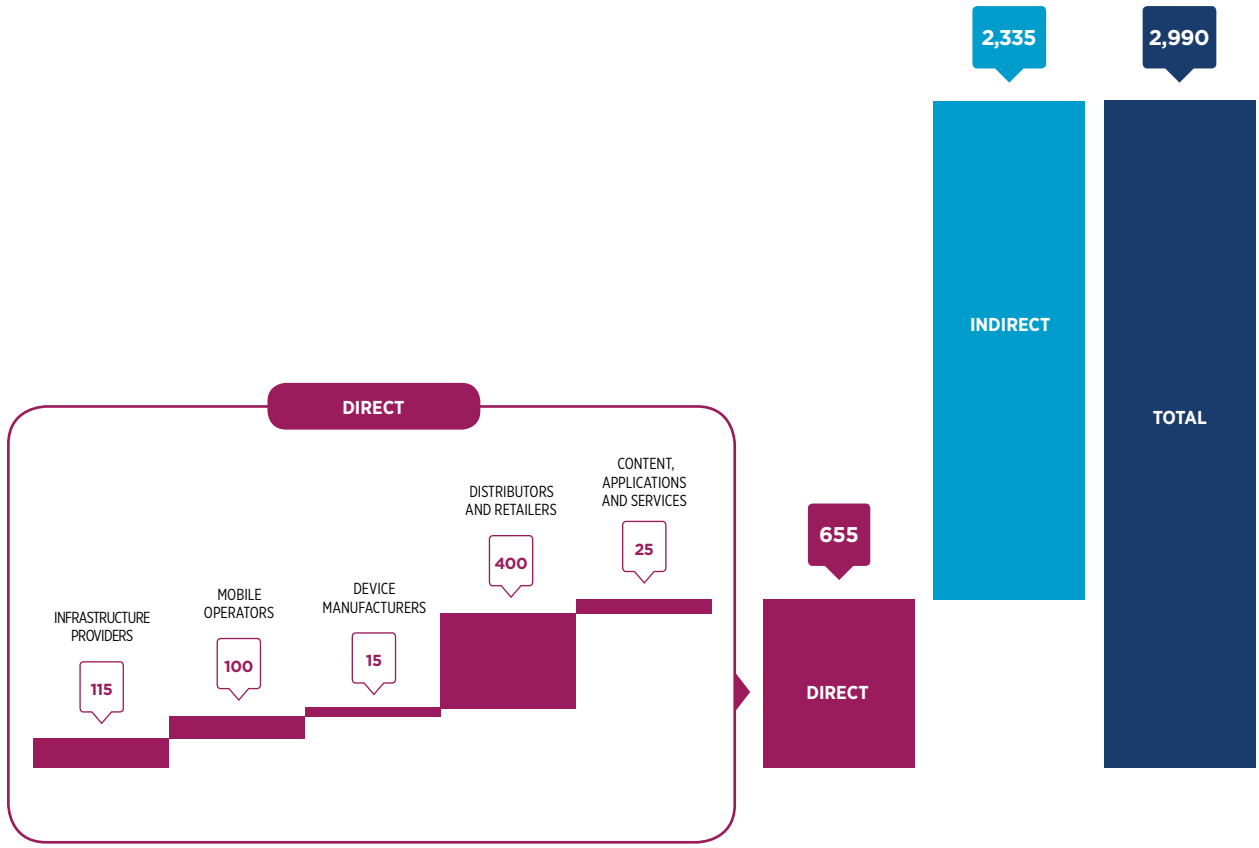
2.3 Employment

In 2017, mobile operators and the wider mobile ecosystem provided around 3 million direct and indirect jobs across Sub-Saharan Africa. As part of this, economic activity in the ecosystem generated jobs in other sectors. Firms that provide goods and services as production inputs for the mobile ecosystem, for example microchips or transport services, will employ more workers as a result of the demand generated by the mobile sector. Furthermore, the wages, public funding contributions and profits paid by the mobile industry are spent in other sectors, which provide additional jobs.

Figure 9 Source: GSMA Intelligence analysis

Employment impact

Jobs (thousands), 2017



Note: totals may not add up due to rounding.

2.4
Public funding

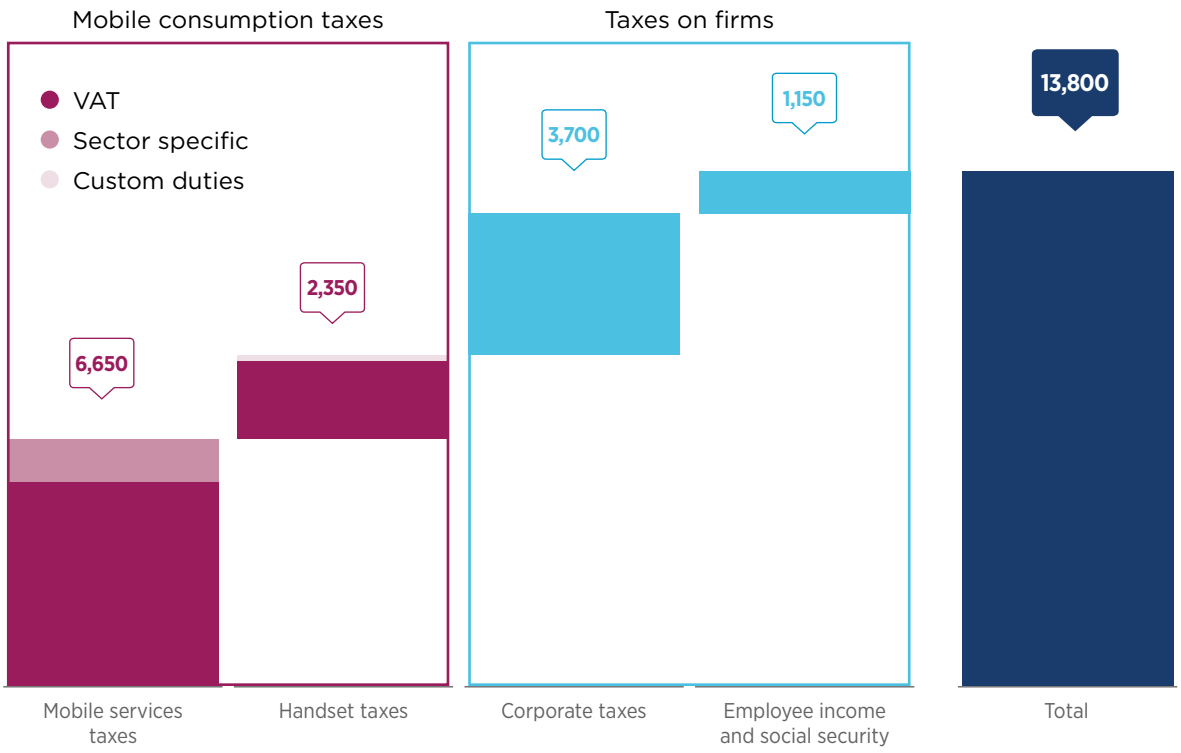
The mobile ecosystem also makes a significant contribution to the funding of the public sector. In most countries, this includes value added tax or sales tax, corporation tax, income tax and social security from the contributions of firms and employees. In some countries, besides general taxation, consumption of mobile services is also subject to levies specific to the industry. In 2017, two thirds of the countries in the region had excise taxes on airtime, SIM cards or mobile money transactions, or higher VAT rates on the usage of mobile services. Overall, these represented more than 20% of all mobile taxes directly supported by consumers in the region.

Overall, we estimate that the mobile ecosystem made a contribution to the public finances of governments of almost $14 billion in 2017. This takes into account the general and sector-specific taxes directly paid by consumers when using mobile services and devices, as well as general taxes paid by firms in the ecosystem. It does not include further contributions made by mobile operators through industry-specific taxes – for example, spectrum fees, revenue share taxes or universal service fund contributions.

Figure 10 Source: GSMA Intelligence

Contribution to public funding by the mobile industry in Sub-Saharan Africa

2017 $ million



Note: totals may not add up due to rounding.

2.5
Outlook and trends for the next five years

We expect the economic contribution of the mobile ecosystem in Sub-Saharan Africa to continue to increase in both relative and absolute terms. In value-added terms, we estimate that mobile will contribute $150 billion to the Sub-Saharan Africa economy by 2022, up from $110 billion in 2017. Mobile will drive an impact of 7.9% of GDP by 2022, up from 7.1% in 2017.

Most of this value added increase will be due to productivity gains, which will increase from $60 billion in 2017 to more than $90 billion by 2022. Productivity growth will be mostly driven by the adoption of mobile internet services; penetration is expected to reach 34% over the same period.





03

Mobile enabling the digital economy

3.1
Mobile as a platform for innovation

Sub-Saharan Africa has a fast-growing tech start-up ecosystem, which plays an increasingly important role in the development of homegrown digital content and services. Mobile is a key factor in the region's start-up ecosystem; many tech startups now use the technology as the primary platform to create solutions that address various socioeconomic challenges. Furthermore, mobile network assets and services, such as APIs, cellular IoT, mobile money and billing platforms, are enabling the implementation of sustainable business models for key services across verticals.

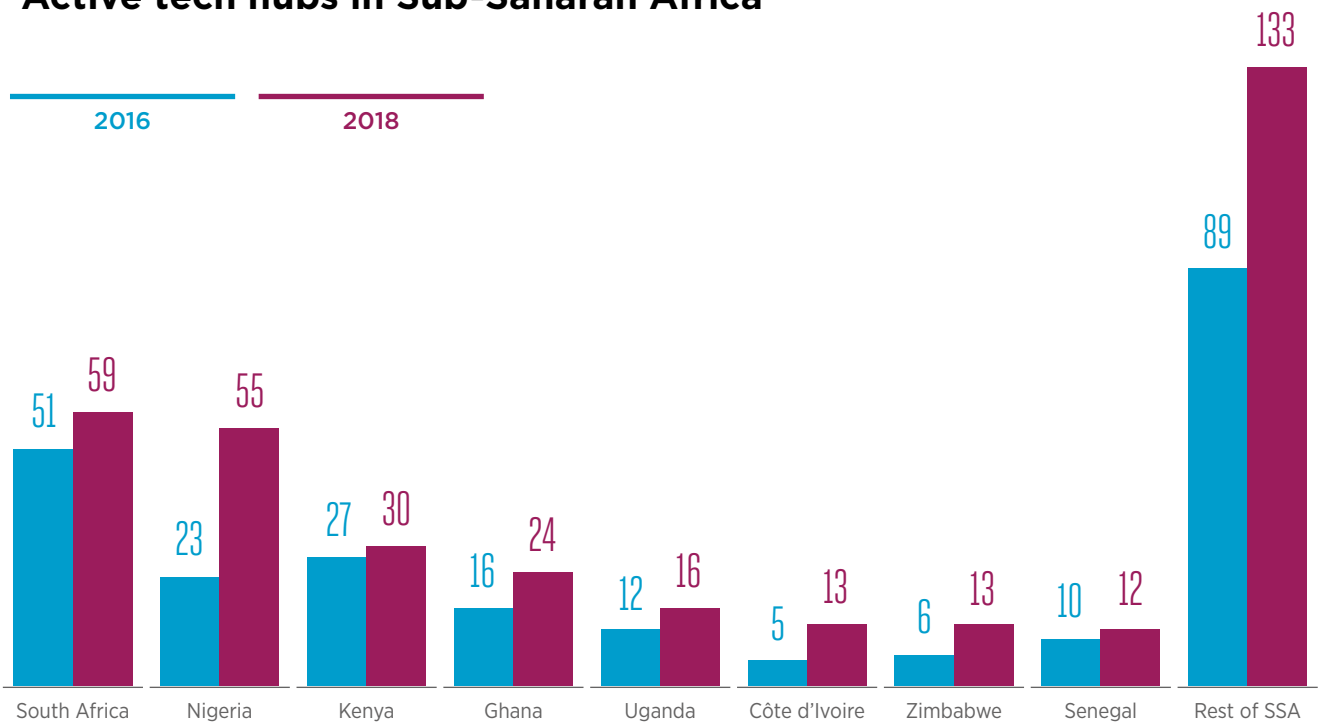
Tech hubs and the funding landscape

Tech hubs are a critical part of the tech startup ecosystem. They promote ideas and collaboration locally, and provide start-ups with business support resources and services to help them scale. In March 2018, iHUB (Kenya) launched the second cohort of its six-month scale-up accelerator programme with 27 startups drawn from five countries – Kenya, Rwanda, Somalia, Tanzania and Uganda. In May 2018, CcHub (Nigeria) selected four startups to take part in its 2018 incubation programme, providing them with $25,000 in funding, free workspace, mentorship and other support. CcHub also partnered with Facebook to launch NG Hub in Lagos, the latter's first flagship community hub space in Africa.

Research by the GSMA Ecosystem Accelerator programme found that there were 355 active tech hubs[2] across Sub-Saharan Africa in 2018[3], up from 239 in 2016. Nearly half of all the tech hubs in the region are located in four countries – Ghana, Kenya, Nigeria and South Africa.

Figure 11 Source: GSMA Ecosystem Accelerator programme

Active tech hubs in Sub-Saharan Africa



2. The broad term "tech hub" includes incubators, accelerators, co-working spaces, fab labs, makerspaces, hackerspaces and other innovation spaces.
3. As of February 2018

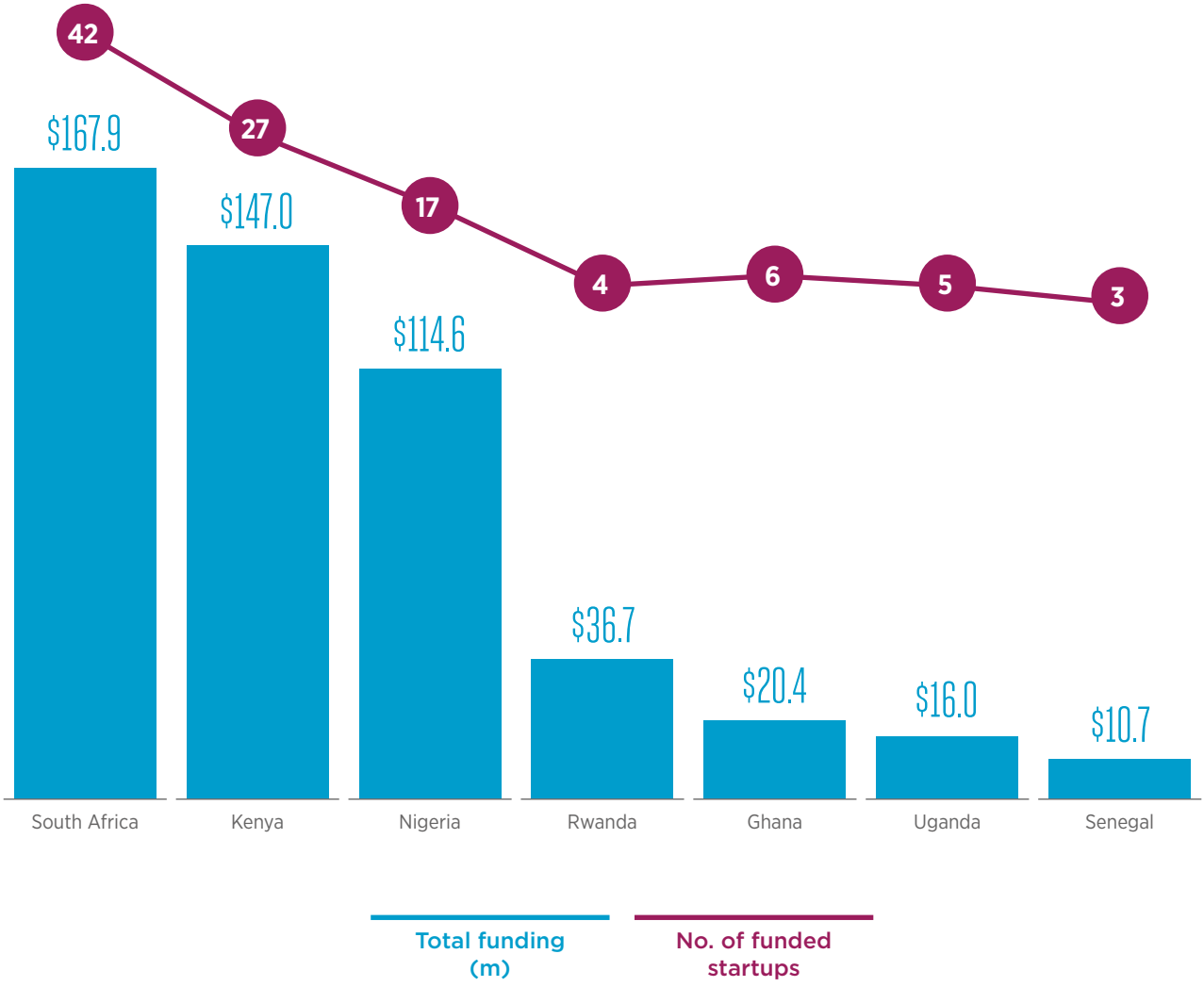
Meanwhile, investment in the region's tech startup ecosystem is growing: in 2017, 124 tech startups across Africa[4] raised a total of $560 million, a 53% increase over the previous year.[5] Of this, Sub-Saharan Africa accounted for around $515 million in more than 100 deals. The range of tech startups funded and the growing size of deals reflect the accelerating development of the ecosystem.

Fintech (21%), solar (21%), e-commerce (19%) and edtech (12%) accounted for the highest shares of investment. This underscores the increasing innovation and investor interest in solutions that address the region's starkest social challenges, such as limited access to financial services, education and energy by large swathes of the population. In October 2017, Ugandan solar startup SolarNow secured a $6 million debt facility to help it reach more customers and expand access to pay-as-you-go (PAYG) solar power.

Kenya, Nigeria and South Africa remained the most popular investment destinations, accounting for 76% of total funds raised by startups in the region. However, the downward trend in the combined share of investments for the three markets, from more than 80% in 2015 and 2016, shows growing investor appetite for other markets, notably Ghana, Rwanda, Senegal and Uganda.

Figure 12 Source: Partech Ventures

Top seven markets by total funding, 2017



4. Including North African countries
5. Partech Ventures

2018 has already seen a number of high-profile investments, including the following:

- A $3.5 million investment in Kenya-based customer feedback platform mSurvey to fund its expansion into Nigeria and South Africa. mSurvey gathers opinions via SMS conversations with its Voice of the Customer and Consumer Wallet products. The new funding round was led by TLcom Capital, with investment from Social Capital, Kapor Capital and Golden Palm.
- $1.1 million in seed funding for Nigerian startup Piggybank.ng, which offers online savings plans to low- and middle-income Nigerians for deposits of small amounts on a regular basis. The financing was led with a $1 million commitment from LeadPath Nigeria, with Village Capital and Ventures Platform contributing $50,000 each.
- $8.6 million series A funding for Kenyan mobile solutions startup Africa's Talking, led by the International Finance Corporation (IFC), alongside Orange Digital Ventures and Social Capital. Africa's Talking operates a cloud-based communication platform-as-a-service that virtualises telco infrastructure across the continent. The platform provides unified access via its API to more than 20,000 software developers in Africa.

In March 2018, the GSMA launched the third round of the **Ecosystem Accelerator Innovation Fund**. Tech start-ups in Africa and Asia Pacific are provided with grant funding of up to £250,000, technical assistance and mentoring, and the opportunity to partner with mobile operators in their markets to help scale their products and services into sustainable businesses. A total of 480 startups from Sub-Saharan Africa applied for the third round of the Ecosystem Accelerator Innovation Fund.



Mobile operators play a growing role in the tech startup ecosystem

Mobile operators already support the tech startup ecosystem through initiatives to identify and develop new talent and solutions, including direct funding of incubators, competitions and mentorship programmes. More recently, mobile operators have been developing closer ties with tech startups through direct investment and partnerships. Orange's €50 million investment fund, launched in June 2017, is dedicated to African start-ups that utilise mobile network capabilities, such as APIs and mobile money, to address fundamental challenges in connectivity, fintech, cellular IoT, e-health and other key business areas.

Deeper collaboration between mobile operators and tech startups can be mutually beneficial. Mobile operators' scale (customer base and distribution networks), network capabilities (APIs, USSD and billing platforms) and financial resources can provide startups with the required market opportunities, technical support and capital to mitigate various route-to-market challenges. Conversely, the agility of startups and local innovation across verticals, for example transportation, energy, agriculture, health and education, can help mobile operators create new avenues of revenue growth, generate cost efficiencies, and drive user acquisition and retention by enhancing or expanding their product offerings.

Figure 13 Source: GSMA Ecosystem Accelerator programme

Snapshot of mobile operator and startup initiatives launched over the 12 months to January 2018

January 2017

Kenya
COMPETITION
Safaricom announces plans to launch BLAZE BYOB TV show at iHub

March 2017

Kenya
COMMERCIAL AGREEMENT
Safaricom and mSurvey partner to map Africa's cash economy

Cameroon
TECH HUBS
Orange launches second season of Orange Fab Cameroon

April 2017

Uganda
COMPETITION
MTN Uganda announces winners of App Challenge

June 2017

Africa
INVESTMENT
Orange announces €50 million African start-up investment initiative

August 2017

Kenya
COMMERCIAL AGREEMENT
Safaricom releases plug & play M-PESA APIs

Ghana
COMPETITION
Vodafone Foundation runs a five-day coding camp

Nigeria
COMMERCIAL AGREEMENT
9mobile and Africa's Talking empower SMEs with programming apps

August 2017

Zambia
INVESTMENT
Fenix raises more than $4 million from MTN, Swedish Embassy & USAID to launch pay-to-own solar home systems

September 2017

Africa
COMPETITION
Orange announces winners of the Social Venture Prize 2017

Kenya
INVESTMENT
Safaricom Spark Fund invests in agritech startup iProcure

October 2017

South Africa
COMPETITION
MTN announces winners of the 2017 MTN Business App Of The Year Award

November 2017

Côte d'Ivoire
TECH HUBS
MTN CIV launches an incubation programme for local start-ups

Uganda
COMPETITION
MTN Uganda announces 2017 innovation award winners

December 2017

Kenya
COMMERCIAL AGREEMENT
Airtel and edtech startup Kukua launch mobile learning game for children

January 2018

Africa
APIs
Orange announces Bizao, a one-stop shop for direct carrier billing

3.2
Mobile enabling life-enhancing digital services

For many consumers across the region, the mobile phone is not just a communication device but also the primary channel to get online, as well as a vital tool to access various life-enhancing services. This is particularly true in rural areas, where around half the population live and the provision of these services by conventional means is constrained by acute funding, skills and infrastructure gaps.

Mobile internet enhancing digital inclusion

Internet adoption in Sub-Saharan Africa continues to grow rapidly, driven by the uptake of mobile internet subscriptions. The number of mobile internet subscribers in the region has quadrupled since the start of this decade, as the technology is the only available platform for the majority of the population to get online. Over the period to 2025, nearly 300 million people will come online, the majority of them connecting via high-speed mobile broadband[6] networks.

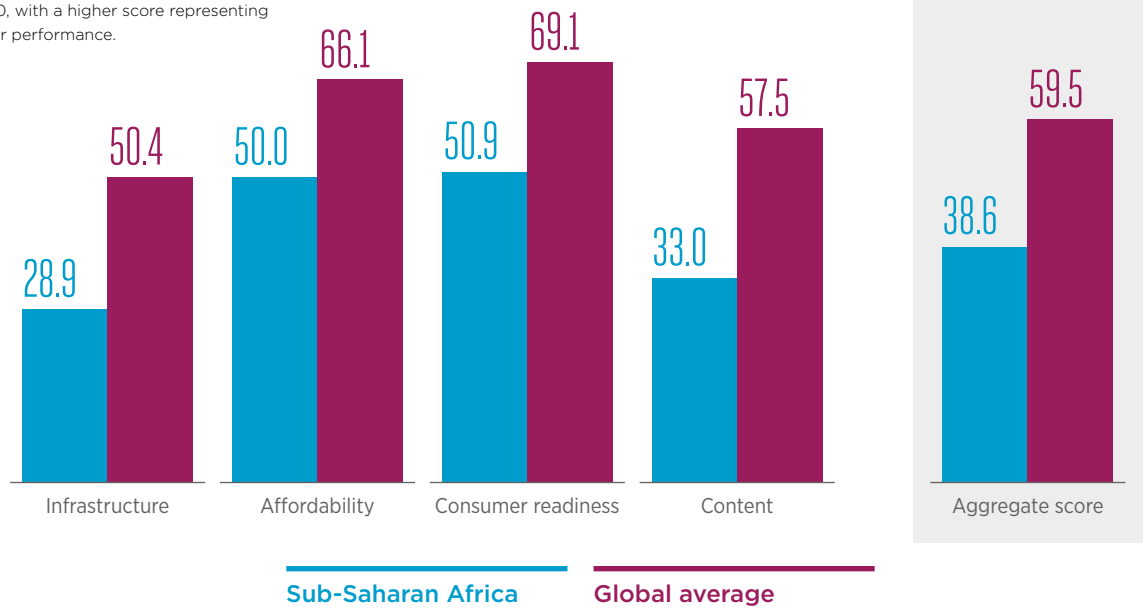
Despite rapid growth in mobile internet adoption in recent years, around 800 million people will remain unconnected and unable to benefit from the socioeconomic opportunities of the internet. The vast majority of people offline come from underserved population groups (rural, women, low income and youth).

The GSMA Mobile Connectivity Index[7] measures digital inclusion in 163 countries across the world, including 37 countries in Sub-Saharan Africa, against four key enablers – infrastructure, affordability, consumer readiness, and content. This helps to demonstrate the impact of the enablers on digital inclusion, and supports the efforts of the mobile industry and other stakeholders to deliver on the ambition of universal internet connectivity.

Figure 14 Source: GSMA Intelligence

GSMA Mobile Connectivity Index, 2017

Note: The Index is scored within a range of 0-100, with a higher score representing stronger performance.



6. 3G or 4G network services
7. www.mobileconnectivityindex.com

Sub-Saharan Africa's aggregate score has consistently improved over the last three years, reaching 38.6 in 2017. This was mostly driven by notable improvements in the affordability and content enablers. However, it lags other regions by a considerable margin, highlighting the need for all stakeholders – governments and regulators, mobile operators and other ecosystem players, and development agencies – to work together to enhance digital inclusion in the region.



Infrastructure

The availability of high-performance mobile internet network coverage

Sub-Saharan Africa has achieved near-universal 2G coverage: on average more than 90% of the population were covered by 2G networks as of the end of 2017. However, mobile broadband networks cover around two-thirds of the population; around 400 million people in the region currently cannot access mobile broadband services due to a lack of coverage.

Mobile operators' direct investment in infrastructure deployment has so far proven effective in expanding coverage to current levels. With most urban areas now covered by a mobile broadband network, infrastructure-related exclusion is highest in rural areas where the deployment of conventional network infrastructure is more challenging. In a typical Sub-Saharan African country, 20% of the population is spread across 70% of the territory and, in many cases, surrounded by difficult terrain such as mountains and forests. For operators, revenue from rural sites is around a tenth of that for urban areas, owing to the low purchasing power of most rural dwellers, while backhaul, power and taxes account for up to 60% of the cost of providing mobile broadband in rural areas.

Reaching underserved populations requires both investment and innovation in more efficient connectivity solutions. Here, we highlight three broad solutions than can help close the coverage gap in the coming years:

- **Infrastructure sharing**: this enables mobile operators to optimise asset utilisation, avoid duplication and reduce running costs. Passive infrastructure sharing, mostly through independent tower companies, has taken off in the region. However, active infrastructure sharing[8] is only starting to gain traction.
- **Partnerships:** a number of solutions and business models have emerged in recent years, including community-based networks and aerial technologies, such as satellites and drones. Most of these solutions are being deployed in partnership with mobile operators, a vital ingredient to drive scale and sustainability. In February 2017, connectivity solution provider Vanu licensed spectrum from the Rwandan regulator to provide solar-enabled wholesale services to mobile operators. Vanu has partnered with Airtel and MTN to provide voice and data services to unconnected communities in rural Rwanda. In May 2018, Uganda's regulator announced a pilot with MTN and satellite firms Intelsat and Gilat to provide broadband services in two rural communities.
- **Government support:** as private investment depends heavily on the regulatory climate, governments have a role to play in creating and sustaining an enabling environment for effective investment in infrastructure deployment. Among several levers at the disposal of governments, the two that could have the biggest impact on mobile internet adoption are:
  - efficient use of USFs and other financial incentives, such as tax breaks on imported equipment, to stimulate rural deployment. For example, in June 2017, the government of Zimbabwe approved a $250 million scheme, funded by the country's USF, to deploy more than 600 base stations to improve connectivity in rural areas.
  - the allocation of low-frequency spectrum (below 1 GHz) for mobile broadband services.

8. Operators share the radio access network (RAN) or, at a more advanced level, the core network

Affordability

The availability of mobile services and devices at price points that reflect the level of income across a national population

Affordability represents a significant barrier to the uptake of mobile services in the region, with the total cost of mobile ownership (TCMO) determined by the cost of service usage (voice, data, SMS), activation and mobile handset. This is without accounting for charging costs, which may be high and/or involve travel to access power in off-grid communities, further hindering access.

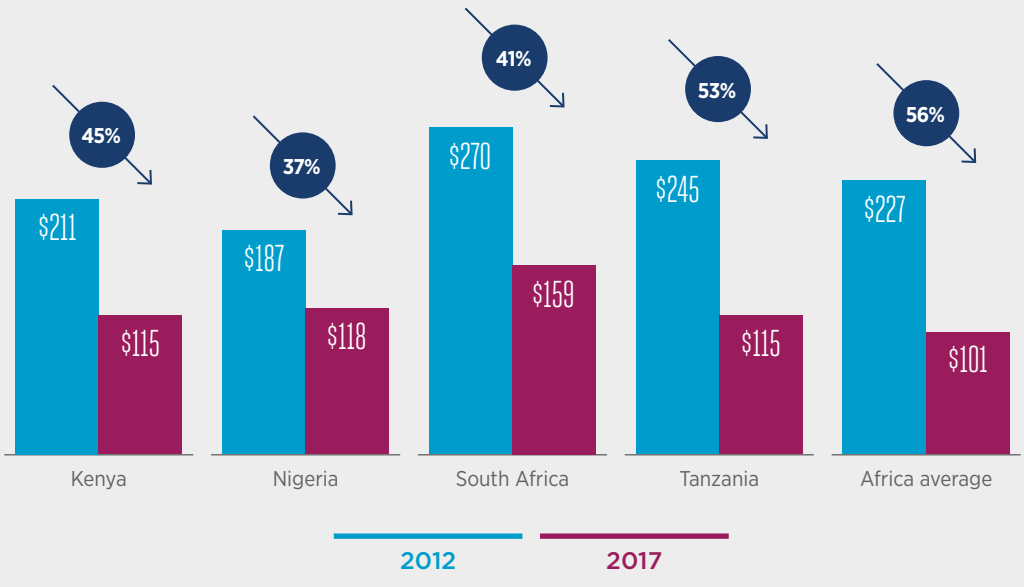
Countries in Sub-Saharan Africa have among the highest level of TCMO as a proportion of income worldwide; this is particularly pronounced for those at the bottom of the income pyramid. For the 27 countries in the region where data is available, the TCMO for purchasing a handset and 500 MB of data per month represents on average 10% of monthly income, well above the 5% threshold recommended by the UN Broadband Commission.

In many markets across the region, handset cost and sector-specific taxes, such as SIM taxes imposed on consumers and mobile operators, affect the affordability of devices and services. The GSMA has extensively studied the effects of reforming sector-specific taxes and fees in a number of countries in the region. The research suggests that a reduction in sector-specific taxes and fees on the mobile industry can expand the user base and use of mobile services, consequently improving digital inclusion, mobile sector development and economic growth.

In recent years, some governments have reversed tax increases on mobile devices and/or services to stimulate growth. For example, Niger reduced two mobile-specific taxes in June 2017 having introduced them in 2011 to help fund an anticipated rise in state funding, while Ghana reversed a 20% duty on imported handsets in November 2014 to help bridge the digital divide in the country. Meanwhile, the declining cost of smartphones is allowing more people to access high-speed mobile internet services. The average selling price (ASP) of smartphones has fallen below $120 in most markets, with sub-$100 smartphones, mostly from Asian manufacturers such as Gionee and Tecno, now widely available across the region.

Source: Strategy Analytics

Smartphone average selling price





Consumer readiness

Citizens with the awareness and skills needed to value and use the internet and a cultural environment that promotes gender equality

The GSMA Intelligence Consumer Survey identifies a lack of digital literacy and skills as one of the biggest barriers to mobile internet adoption in Sub-Saharan Africa. Low education levels and infrastructure are an issue here; the region lags every other region on most education indicators, such as literacy rates and primary & secondary school enrolment rates. ICT infrastructure in schools is also limited. For example, in Ethiopia only 11% of primary schools and 42% of secondary schools have computer laboratories, in Cameroon 1% and 33%, and in South Africa 26% and 39% respectively.[9]

Improving consumer readiness requires collaboration among all stakeholders to identify approaches to overcome the digital skills gaps. For example, governments can partner with the private sector and the development community to improve ICT infrastructure in schools and public institutions. In February 2017, the government of Rwanda launched the Digital Ambassador Programme to increase the number of digitally literate citizens. The digital ambassadors are expected to help other citizens acquire digital skills and boost adoption of e-services.



Content

The availability of online content and services that are accessible and relevant to the local population

Sub-Saharan Africa has a rich variety of cultures and languages. Although many of these are currently not being catered for by existing mobile content and services, there has been a significant increase in the number of apps created in some major languages, including Swahili and Zulu. Partnerships between mobile operators, tech hubs and startups have the potential to accelerate the development of locally relevant content and services. Governments can also collaborate with startups to digitise relevant public services and information for end users.

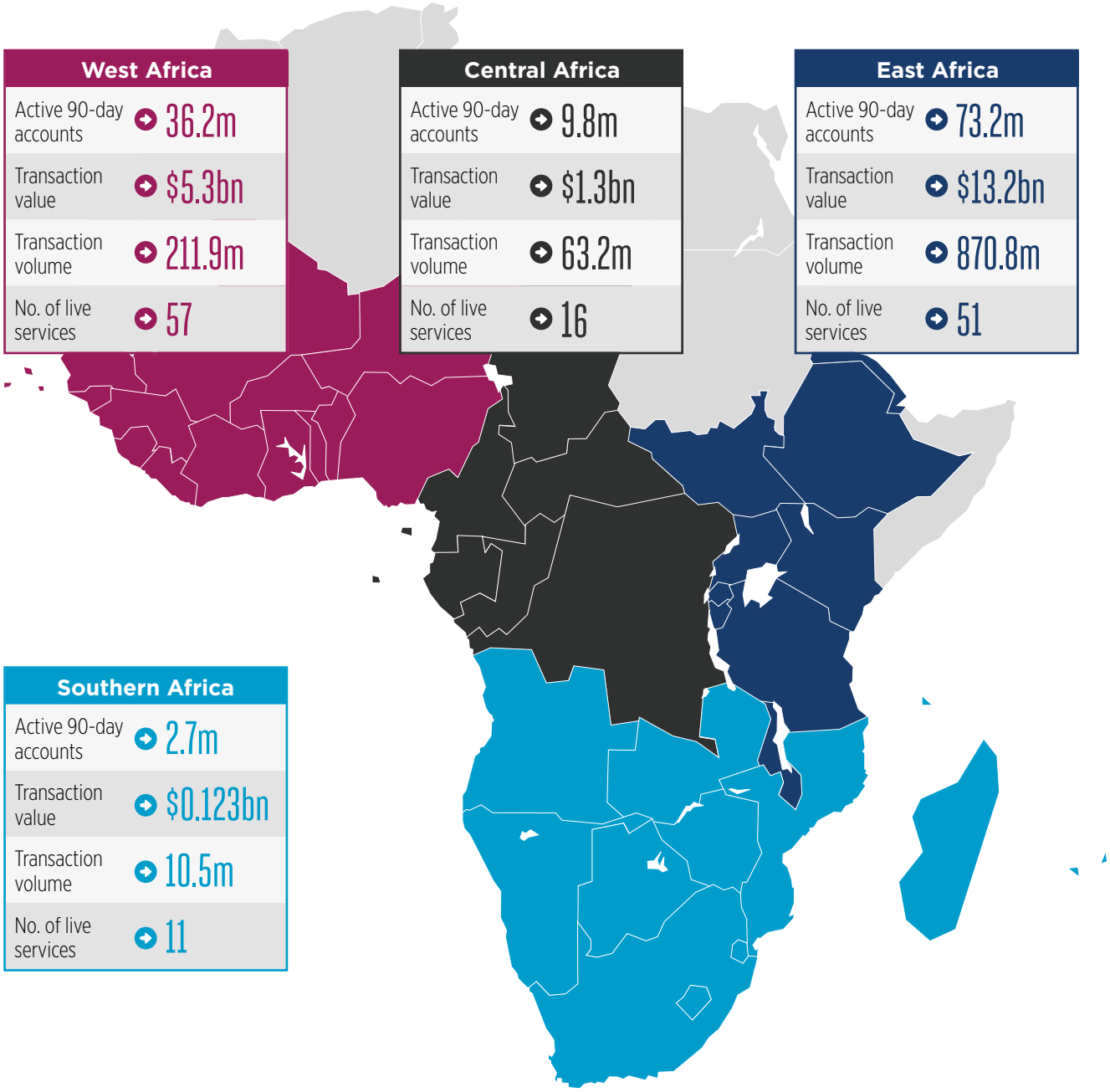
Meanwhile, global content providers such as Facebook and Google have launched localised services and announced plans to support initiatives to improve digital skills in the region. On a visit to Nigeria in July 2017, Google's CEO, Sundar Pichai, said that the company aims to train 10 million people in the region in online skills over the next five years through a combination of in-person and online training. Google plans to carry out the training in languages including Swahili, Hausa and Zulu, and aims to ensure that at least 40% of the people trained are women.

9. UNESCO Institute for Statistics

Mobile money enabling digital transactions

Mobile money continues to expand rapidly across Sub-Saharan Africa; in 2017, the total value and number of mobile money transactions grew by 14.4% and 17.9% to reach $19.9 billion and 1.2 billion, respectively. There were 135 live mobile money services across the region at the end of 2017, with 122 million active[10] accounts. Although East Africa remains the largest mobile money market, accounting for 56.4% of total users in the region, West Africa and Central Africa have seen rapid uptake in recent years, helped by enabling regulatory policies. Both sub-regions have seen their share of the mobile money market double to 30.9% and 9.7%, respectively, over the five years to 2017.

Source: GSMA Mobile Money programme



10. 90-day active



Across the region, mobile money plays a key role in extending financial services to people with limited access to traditional financial institutions, particularly women and rural populations. In recent years, however, mobile money has become a vital tool in digitising transactions in the public and private sectors. Today, a growing number of mobile money providers across emerging markets are collaborating with governments to digitise person-to-government (P2G) payment streams in a bid to improve fund collection, transparency, traceability and accountability.

Countries including Côte d'Ivoire, Guinea, Kenya, Mauritius, Rwanda, Tanzania and Uganda have done well in driving digital P2G payments[11], with the most popular use cases including tax collection, school fee payment and health services payment. In Kenya, the central e-government platform (eCitizen), which hosts more than 250 government services, reports that more than 90% of digital payments are via mobile money[12], while 85% of Nairobi City County payment wallet re-loads (eJijiPay) are via mobile money. Kenya's National Transportation Safety Authority has also reported that revenue collection doubled between July 2015 and October 2016, from an average of $1.1 million to $2 million per month. It also generated cost savings of around $18.2 million between 2014 and May 2016 from the growth of mobile money-enabled online applications for services, such as driving tests and licences.

The shift from cash to digital delivers widespread benefits up and down the value chain. For customers, mobile money provides a safer, more efficient and more convenient payment option than cash, saving travel time and costs and reducing the risk of theft. A recent study in Uganda[13] revealed that over a three-month period, each of the 5 million regular users of mobile financial services saved at least 12 productive hours that would otherwise have been spent travelling to a financial institution and dealing with traditional transaction and payment methods.

Beyond digitising P2G transactions, mobile money is also enabling innovative business models that provide affordable and sustainable access to life-enhancing services for underserved consumers across the region. A number of sectors are already benefitting from this development.

11. Person-to-government (P2G) payment digitisation: Lessons from Kenya, 2017, GSMA
12. Government Digital Payments Department, 2017. eCitizen Overview Presentation to BFA.
13. Digital Impact Awards Africa



Agriculture

In 2015, mobile technology provider Yo Uganda (Yo) partnered with coffee exporter Kyagalanyi Coffee, United Nations Capital Development Fund (UNCDF) and mobile operator MTN to digitise business-to-person payments to smallholder farmers in the coffee value chain. As of January 2017, around 3,000 unique smallholder farmers supplying coffee cherries to Kyagalanyi had accepted mobile money as a mode of payment. This has helped reduce risks to personal safety for staff as well as the time wasted on the road travelling with physical cash.



Clean energy

In Tanzania, KopaGas designed a smart meter for gas cylinders and deployed a Pay-as-you-Cook service in Dar es Salaam, in partnership with Oryx Energies. The service uses cellular IoT to monitor and control gas usage, while customers use mobile money to purchase gas in affordable quantities for clean cooking. Digital payments via mobile money eased the affordability barrier for many users, helping them save on average $2.92 per week on cooking fuel by shifting from charcoal. The Pay-as-you-Cook pilot improved access to clean cooking fuel for 148 households and two small food stands for a total reach of 870 people.

Mobile operator Orange is piloting prepaid smart metering on mini-grids in Burkina Faso, in partnership with SINCO, a cooperative that manages electricity distribution through rural grids. The operator also plans to launch a Solar Home System service on a pay-as-you-go basis in Madagascar, in partnership with d.light, a supplier of solar home system products. Both initiatives will leverage mobile money and other mobile technologies, such as cellular IoT and SMS, to improve access to electricity for underserved households. Mobile money removes the affordability barrier for many users by enabling a flexible equipment financing and bill payment solution.



Water

Tech start-up CityTaps has developed a solution CTSuite, to improve access to water for consumers and bring financial sustainability to water utility companies. The firm launched a pilot in October 2016 in Niamey, Niger in partnership with the local water utility, Société d'Exploitation des Eaux du Niger (SEEN) and mobile operator Orange Niger. Customers use mobile money to prepay for water and check their balances. Results from the pilot show improved affordability and access to water services, improved collection efficiency via mobile money, and reduced burden for women and girls in sourcing safe water for their families. CityTaps is a GSMA Mobile for Development (M4D) Utilities Innovation Fund grantee.



Humanitarian services

Bulk payments via mobile money offer a cheaper, faster, more secure and transparent solution for humanitarian agencies looking to transfer cash to refugees and displaced persons. In Uganda, Airtel and MTN have partnered with Mercy Corps and International Rescue Committee, respectively, to deliver humanitarian cash digitally in camps across Bidi Bidi, a refugee settlement in northern Uganda. In Kenya, Safaricom has partnered with the World Food Programme to disburse food vouchers to refugees in camps across the country.

3.3
Mobile support for the SDGs

In September 2015, countries in the region joined the other United Nations member states to adopt the Sustainable Development Goals (SDGs). The 17-point plan, with its 169 associated targets, aims to end poverty, combat climate change and fight injustice and inequality by 2030. Successful delivery of the SDGs requires the power of mobile to be fully leveraged by all stakeholders involved and a commitment to innovate and collaborate for effective implementation.

In Sub-Saharan Africa, the mobile industry has made progress against the SDGs predominantly through increased connectivity and access to information, as well as using mobile services such as cellular IoT and mobile money to increase productivity, improve wellbeing and reduce poverty.

For example, mobile is helping close the health access gap in the region by leapfrogging the infrastructure and skills gap in the health sector. There were 202 active mHealth services in the region in 2017, a 58% increase on 2016.[14] According to a GSMA consumer survey, around 11% of the population in Sub-Saharan Africa accessed health services via their mobile phones in 2017, of which 44% were female.[15]

In Tanzania, Healthy Pregnancy, Healthy Baby (HPHB) is available across four mobile networks – Airtel, Tigo, Vodacom and Zantel – and allows mobile phone owners to have access to vital health and nutrition information via SMS. It is available in Swahili as a free service. The service is owned by the Ministry of Health, Community Development, Gender and Children, with funding from the US Government Center for Disease Control and Prevention. More than 1.8 million users have cumulatively received over 115 million messages through the service since it was launched in 2012.

The GSMA works with mobile operators and other stakeholders, including governments and the development community, to develop, fund and implement mobile-enabled services that contribute to achieving the UN SDGs in the region. A testament to this is the focus of the various GSMA Innovation Funds, backed by international development partners, on tech startups with solutions that address specific SDG goals in the region. These include the Disaster Response Innovation Fund, which was launched in September 2017 with the support of the UK Department for International Development (DFID), the M4D Utilities Innovation Fund, also supported by the UK government, and the Ecosystem Accelerator Fund, supported by the UK and Australian governments.

14. GSMA mHealth Deployment Tracker
15. GSMA Intelligence Consumer Survey, 2017

The Ecosystem Accelerator programme focuses on bridging the gap between mobile operators and innovators, enabling strong partnerships that support the growth of commercially sustainable mobile products and services. Below we highlight the SDGs addressed by the 14 startups funded in the first two rounds of the Ecosystem Accelerator Innovation Fund in Sub-Saharan Africa.[16]

		THE PROBLEM	THE STARTUP
MOZAMBIQUE		In Mozambique, nine in ten people work in the informal economy. It is estimated that 80% of those under 35 lack stable employment, with many struggling to meet day-to-day living costs.	**Biscate** ("odd job" in Portuguese) allows informal and often uncertified skilled workers to register and advertise their services with a basic phone using USSD technology.
UGANDA		More than 3 million people across Uganda use the country's 6,000 Savings and Credit Cooperatives (SACCOs) to access financial services. As most SACCOs rely on manual systems, they are generally inefficient and susceptible to human error and fraud.	**Ensibuuko** uses mobile money and the cloud to help SACCOs in Uganda mobilise and manage savings and to offer credit efficiently. Its customised software, MOBIS, enables SACCOs to gain better insights from their data, manage transactions, and make data-driven decisions.
NIGERIA		Agriculture represents 23% of Nigeria's GDP. Smallholder farmers produce 90% of the country's agricultural output, but have little access to credit to sustain and grow their businesses. Between 2009 and 2013, less than 3% of all annual credit issued by deposit money banks in the country went to smallholder farmers.	**Farmcrowdy's** digital platform connects investors to farmers through sponsorship packages that fund higher yields for a share of the returns. The service allows the sponsors to browse and select screened agricultural opportunities by produce type, funding amount, contract duration and expected returns.
TANZANIA		Less than 30% of people in Tanzania currently have access to health insurance. The remaining 70%, many of whom work in the informal economy, must pay for health services each time they need them. Due to high administration costs, large insurance companies rarely serve MSMEs or Tanzanians making less than $100 per month.	**Jamii** is a mobile management platform for health insurance policies that performs the administrative functions of an insurer. This allows it to provide low-cost micro health insurance policies for individuals and MSMEs through mobile phones via USSD, in partnership with Vodacom Tanzania.

16. https://www.gsma.com/mobilefordevelopment/programme/ecosystem-accelerator/ecosystem-accelerator-innovation-fund-start-portfolio/

		THE PROBLEM	THE STARTUP
KENYA		In Kenya, the costs of school supplies and learning materials are inflated due to supply-chain inefficiencies and trade issues. Textbooks can cost up to a third of a middle-class household's income, but these costs disproportionately affect the poorest families, who can spend more than half their income on education.	**Kytabu** is a leasing app for textbooks, downloadable from an online library or preinstalled on a Kytabu tablet. By breaking textbooks down into leasable lessons, the aim is to make educational content more accessible and affordable to low- and middle-income families and to improve educational access across Kenya.
UGANDA		Households in Uganda typically pay the full costs for pre-primary education, and more than two-thirds for secondary and tertiary education. However, less than a fifth of adults save with a formal financial institution.	**LipaMobile's** Somesa service is an integrated cashless platform that allows parents, schools and food vendors to pay for school fees, supplies and services. It also offers a savings platform where parents can save money and set a timeline for fee payment.
KENYA		The informal sector accounts for more than 80% of Kenya's employment, leading to uncertainty, low pay and few career growth opportunities for millions of workers.	**Lynk** connects informal workers to suitable jobs via a mobile platform. Workers can bid for jobs, receive payment via mobile money, and receive a service rating on completion of a job on the platform.
SENEGAL		Less than 25% of adults in Senegal have a bank account. This rate drops to around 10% in rural areas. As most of the population are unable to access credit, they rely on traditional, informal rotating savings circles called "tontines", usually managed by women.	**MaTontine** offers a mobile-based automated platform for tontines. By allowing users to build credit scores over time, MaTontine enables them to access other financial services, such as small loans and insurance.
ZAMBIA		A quarter of the youth segment, which make up two-thirds of Zambia's working-age population, are unemployed. Meanwhile, local MSMEs face delays in the delivery of packages and inventory.	**Musanga** enables MSMEs to reduce their delivery costs and allows informal entrepreneurs with underutilised assets, such as motorbikes and bicycles, to fulfil last-mile delivery and earn an extra income through Musanga's mobile platform.

		THE PROBLEM	THE STARTUP
EAST AFRICA		In Kenya, about 70% of the population do their daily shopping in open markets and through other informal channels. Lack of reliable socioeconomic data, basic market information and customer feedback creates a barrier to investment for many brands.	**Optimetriks** allows a community of users, paid per visit, to perform retail census and audits, and collect data which is aggregated and analysed through an artificial intelligence solution. The results are transmitted to clients through live web dashboards.
NIGERIA		At over 80 million, Nigeria has the world's third largest population of under 15s. However, the Nigerian school system ranks low in terms of both quality and enrolment rates, from primary to higher education.	**PrepClass** is a tutoring marketplace that connects students and tutors through an online platform. A pool of teachers who have been interviewed and vetted offer their services to learners, providing a source of income for tutors while supporting the education of students.
RWANDA		Although low- and middle-income countries account for only half of the world's vehicles, they account for 90% of the world's road traffic deaths. Africa has the highest rates of traffic fatalities, making its roads the most unsafe in the world.	**SafeMotos** is a safety-focused ride-hailing service for motorcycle taxis in Rwanda. The mobile-based platform improves road safety and enables more transparent interaction between motorcycle taxi drivers and customers.
SENEGAL		In Senegal, up to 70% of local taxes go uncollected due to fraud at different steps of the collection process. This missed income in turn prevents municipalities from improving public services.	**Sudpay** has developed a solution called Townpay which allows municipalities to automate and digitise the collection of local taxes from MSMEs to reduce fraud and improve collection rates.
KENYA		In emerging markets, smallholder farmers struggle to sell their produce in urban areas, where issues with storage, transportation or intermediaries mean city dwellers end up being overcharged for farm produce. In Africa especially, customers spend 35% more for food than in comparable low- and middle-income countries.	**Twiga Foods** provides improved market access to farmers by buying their fresh produce and ensuring a constant, hassle-free supply chain to roadside vendors. These vendors are empowered to increase their product offering and income. It also ensures fresh and low-cost produce is available to lower income residents of Nairobi.



04

Policy measures to support mobile ecosystem development

The mobile market in Sub-Saharan Africa has expanded considerably in recent years as a consequence of widening network coverage and rising demand from consumers, particularly in urban areas, for mobile internet services. However, as operators edge towards full coverage of the more densely populated conurbations within the region, mobile penetration generally sits at around 50%, and growth rates for the adoption of mobile services are beginning to slow. The remaining unconnected populations are primarily located in rural areas where the economics of network rollout are more challenging.

While operators face the twin challenges of macroeconomic uncertainty and the negative impact of the growing migration to IP services on traditional revenue streams, they are also experiencing cost pressures in terms of network deployment in their attempt to reach rural consumers, who typically fall into the low-income bracket and are generally low spenders. To provide industry sustainability in the longer term as well as ensure universal access to wireless services, the policy setting and regulatory frameworks must be investment-friendly and facilitate multi-year capex programmes.

Two key policy enablers that can help support the health and continued growth of the mobile ecosystem are:

- the implementation of the appropriate spectrum management framework
- tax reform to improve affordability of mobile technology for consumers, especially those in low-income segments.

4.1 Spectrum for mobile broadband

Spectrum is a precious and finite resource, fundamental to the delivery of mobile services, especially in unconnected areas. For example, spectrum below 1 GHz has strong propagation characteristics and can be key to delivering universal broadband access, bringing socioeconomic benefits to people in cities and remote areas. As such, it is essential for governments and regulators in Sub-Saharan Africa to make the right spectrum decisions both individually and collectively. These include ensuring operators have access to sufficient spectrum in a timely and affordable manner; providing support for new network investments; encouraging cross-country harmonisation of frequencies; and avoiding costly restrictions on spectrum use.

To that end, the region has witnessed examples of policymakers employing best practices. In Nigeria, for example, the GSMA has been driving the development of a framework for spectrum transfer, leasing and sharing. In May 2018, the Nigeria Communications Commission (NCC) published new guidelines that permit the trading and sharing of spectrum, allowing for an environment that can make for more efficient use of scarce spectrum resources. The NCC is also working on measures to facilitate national roaming and active infrastructure sharing.

Adopting spectrum licensing best practice for a thriving business environment

For forward-thinking countries, there are a number of best practices that can help drive investments. For example, policymakers can consider assigning spectrum bands based on a methodology that emphasises the socioeconomic impact that spectrum allocation can have. Governments should allocate spectrum to fulfil their connectivity objectives rather than seeking short-term gains of revenue generation. High award prices increase operator costs, which decrease their financial ability to deploy networks and put the spectrum to use. Evidence shows that when prices are too high, consumers can suffer from more expensive, lower quality mobile services. It can also often leave spectrum unsold, depriving many of the socioeconomic benefits it could bring.

For spectrum awards by auctions, regulators should set reserve prices below a conservative estimate of market value to ensure scope for competition and price discovery. Pricing rules – whether by auction or beauty contest – should also offset any onerous coverage obligations via a discounted final price.

Licence renewal and technology neutrality also have a significant impact on operators' business plans. A clear renewal policy, published well ahead of expiry, ensures the stability and continuity of services for mobile operators. Technology neutrality of spectrum, which allows operators to evolve and address consumers' needs in a timely manner, also helps the mobile industry make efficient use of spectrum and stay competitive.

Looking further ahead, national and regional bodies should look to identify spectrum for 5G and future IMT services early in order for Sub-Saharan Africa to align with global developments in technology and network rollout. Although trials around the world show great potential, realising the 5G vision requires timely and affordable access to new spectrum. The World Radiocommunication Conference 2019 (WRC-19) is an opportunity to identify and harmonise the needed high-frequency spectrum for mobile.

It is essential for the development of the mobile sector that a clear and comprehensive spectrum roadmap is in place to provide long-term visibility and certainty. A holistic roadmap that outlines government strategy for the release and renewal of spectrum reduces uncertainty and allows operators to assess viability and return on investments.

The mobile industry is capital intensive; predictability of spectrum policy is paramount. These factors combined with an investment-friendly regulatory environment will enhance stability, reduce risk and encourage operators to develop business cases and make positive network investment decisions, providing socioeconomic benefits to the country.



Digital dividend spectrum is key to overcoming the coverage gap

With mobile data traffic in Sub-Saharan Africa expected to see a more than 10-fold increase by 2023,[17] coordinating and accelerating the analogue to digital switchover (DSO) and freeing the digital dividend spectrum bands for mobile broadband will be essential steps in bridging the digital divide and meeting the strong demand for data services. Sub-1 GHz spectrum has better signal propagation than higher frequencies, and its use can reduce the number of base stations required for rural coverage expansion by up to 50%. This significantly increases the revenue opportunity per site while reducing upfront capital investment and ongoing operating costs.

The African Union Commission (AUC) advocates the harmonisation of spectrum allocation to bring about economies of scale for the cost of mobile broadband equipment and devices, lowering costs for consumers, and enabling greater interoperability and international roaming between networks.[18]

It recommends that all countries in Africa adopt the following in each of the digital dividend frequency bands:

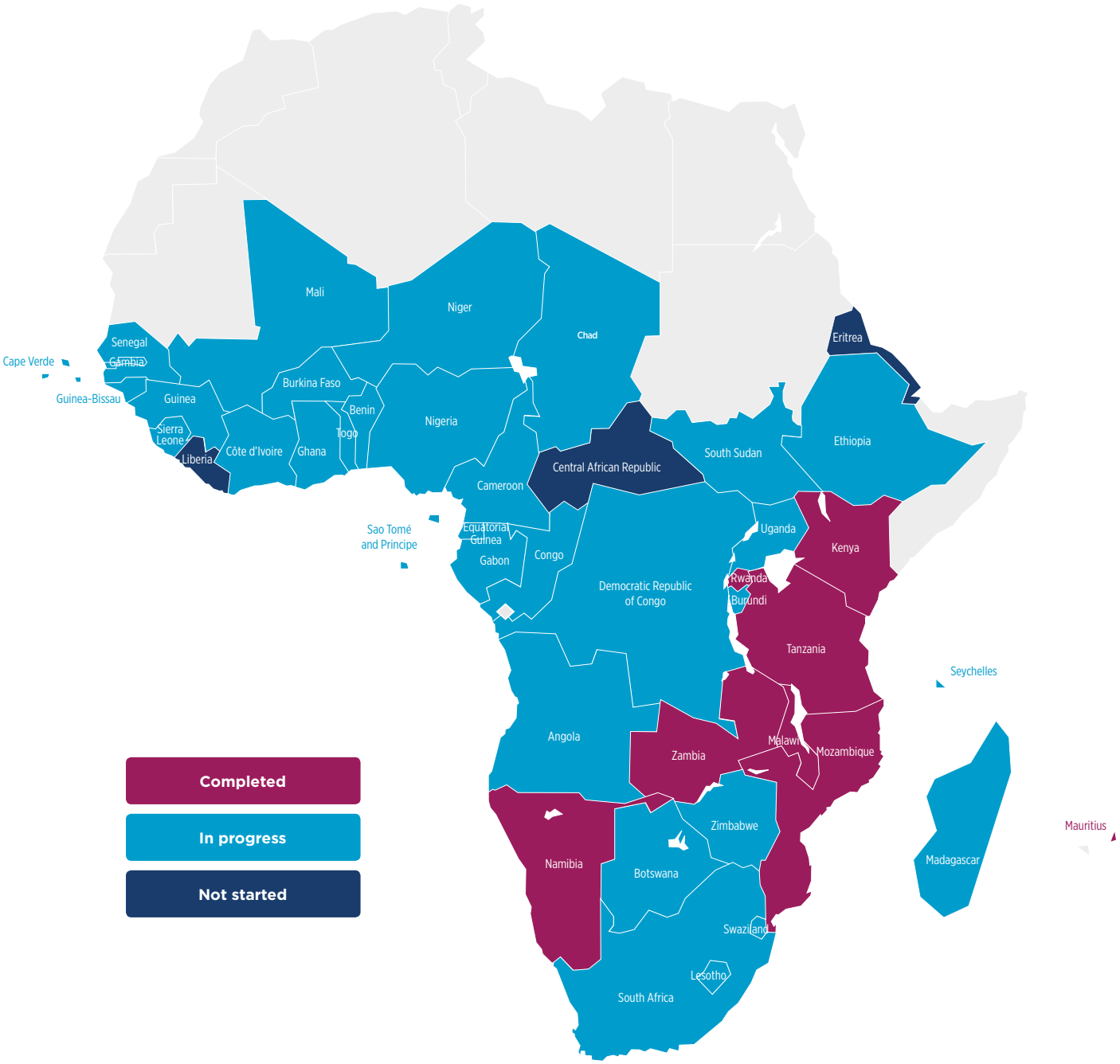
- 700 MHz: 2×30 MHz consisting of 703–733 MHz (uplink) paired with 758–788 MHz (downlink)
- 800 MHz: 2×30 MHz consisting of 832–862 MHz (uplink) paired with 791–821 MHz (downlink)
- 900 MHz: 2×35 MHz consisting of 880–915 MHz (uplink) paired with 925–960 MHz (downlink), extending the existing 900 MHz band usage by 2×10 MHz.

Despite these recommendations by the AUC, and more than two years after the ITU deadline mandated analogue switch-off across most of the region, the 700 MHz band is currently largely occupied by broadcasters in countries in Sub-Saharan Africa. Only eight countries have completed the digital switchover.

17. Ericsson Mobility Report, November 2017
18. Guidelines on the harmonized use of the digital dividend in Africa: Policy, technical and regulatory procedures, AUC, 2017

Figure 15 Source: GSMA Intelligence

DSO status in Sub-Saharan Africa as of June 2018



There are several reasons why the migration has been delayed. The transition from analogue to digital broadcasting is a long and complex process that requires involvement of various stakeholders throughout. Some countries have experienced difficulties raising the money needed for the digital switchover – funds that are needed not only to upgrade infrastructure but also to subsidise the purchase of set-top boxes for low-income households. The digital migration has also not been a political priority in many countries, some of which also face resistance from broadcasters who are averse to the potential of increased competition in the sector.

In light of the significant contribution of mobile technology and the activities of mobile operators to the region's development goals, it is essential for governments to make progress in licensing sub-1 GHz spectrum in adequate amounts and on terms that encourage investment in broadening coverage. Doing this provides operators with an important tool to connect the unconnected, sustain the growth of the country's economy and give access to broadband services to citizens, some for the first time.

Tanzania

By completing the digital switchover ahead of many other markets in Sub-Saharan Africa, Tanzania has shown that it has the drive to implement an enabling spectrum policy. The next step is for available spectrum in this band to be awarded to those that can generate the most value to society. An auction of spectrum is moving nearer after a consultation and a call for stakeholder comments on the award of 700 MHz spectrum was issued by the Tanzania Communications Regulatory Authority (TCRA), along with the publication of draft auction documents in March 2018.

Kenya

Planning for Kenya's digital TV migration began in 2006 and was completed in 2015. The Kenyan government viewed the migration as a vehicle to not only deliver improved audio-visual quality and diversity of content through digital broadcasting, but also to efficiently utilise spectrum, resulting in greater access to mobile broadband services. Compounding the migration's benefits, this digital dividend, notably of 168 MHz in the 700 MHz and 800 MHz bands,[19] will later be used to support new mobile services, including 4G, bringing significant benefits to Kenyans.

19. Digital Migration Process in Kenya, GSMA, 2017

4.2 Tax reform

The positive contribution of the mobile sector to the economy is well recognised. However, the tax treatment of the sector is not always aligned with best-practice principles of taxation; this may have a distortive impact on the industry's development. Sector-specific taxes and fees are often the driver of the high tax burden, which results in mobile operator payments to governments in the form of tax revenues outweighing their contribution to the overall size of the economy.

Countries that have a higher level of taxes and fees as a proportion of sector revenues tend to have relatively low levels of readiness for mobile internet connectivity, as measured by the GSMA's Mobile Connectivity Index.[20] Also, taxation levied on mobile, especially over and above standard rates, exacerbates affordability and coverage barriers for the underserved. In Guinea, sector revenues accounted for 6% of the country's GDP in 2017, while mobile tax payments represented more than 20% of total government tax revenues. Tax and fee payments from the sector, as a share of total tax revenues, were therefore 3.3 times greater than the sector's revenue as a share of GDP.

In the DRC, the cost of a low consumption basket (500 MB of data) represents approximately 96% of the average monthly income level for those individuals in the bottom 20% by income distribution. This is significantly above the 5% affordability threshold outlined by the United Nation's Broadband Commission. Countries with a relatively high cost of mobile ownership (including both device and airtime/data) as a share of income per capita typically have lower penetration rates.

Moreover, tax has a deflating effect on the business environment and reduces operators' ability and incentive to invest in the quality and coverage of their networks. In 12 Sub-Saharan African countries for which data is available,[21] taxes and fees paid by the mobile sector in 2015 represented on average 35% of mobile sector revenues. In 2017, countries with a high total tax contribution of the mobile sector compared to the sector's total market revenue include Guinea (54%), Chad (48%) and Niger (43%).

There is a need to explore tax reform to improve the affordability of mobile technology for consumers. This would lead to better connectivity, which in turn will increase both digital and financial inclusion, with positive knock-on effects for productivity and the wider economy. Through policy reform, governments have the opportunity to simplify and rebalance mobile industry taxation, leading to increased productivity across the economy, thanks to the positive externalities of the sector. A recent report[22] by the GSMA and EY identifies three options for tax reform in Guinea. These reforms would lead to growth in mobile penetration, increased technology migration to smartphones and 3G connections, and an increase in GDP and taxation revenue over the medium term.

20. See https://www.mobileconnectivityindex.com/
21. Cameroon, Chad, DRC, Ghana, Guinea, Madagascar, Niger, Rwanda, Senegal, Sierra Leone, South Africa and Tanzania. Note that payments data for Madagascar is from 2014 rather than 2015 and that the 2014 data does not include tax payments related to spectrum fees.
22. Reforming mobile sector taxation in Guinea: unlocking socio-economic gains from mobile connectivity, GSMA and EY, 2018

Table 1

Source: GSMA and EY

Estimated impacts of tax reductions in Guinea over period from 2019 to 2023

	Price of services	Additional investment in the economy	Total unique new subscribers	GDP growth	Total new jobs	Annual gain in tax revenue by 2023
Elimination of the excise duty on bonus calls (taxe sur la consommation téléphonique – TCT)	–4.4%	+$14m	+663,000	+$57m	+4,156	+$13m
Elimination of the surtax on international incoming traffic (SIIT) of $0.12 per minute	–42.3% (price of international incoming traffic)	+$24m	+927,000	+$89m	+13,193	+$8m
Reduction by 80% of the annual backhaul spectrum fees (redevance faisceaux hertziens)	–2.6%	+$9m	+220,000	+$22m	+3,798	+$2m

gsma.com



GSMA HEAD OFFICE
Floor 2
The Walbrook Building
25 Walbrook
London EC4N 8AF
United Kingdom
Tel: +44 (0)20 7356 0600
Fax: +44 (0)20 7356 0601