Using the GSMA Mobile Connectivity Index to drive digital inclusion:

Guidelines for policymakers

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To get in touch with the Connected Society team, please email **connectedsociety@gsma.com**

Authors

Kenechi Okeleke, GSMA Intelligence
James Robinson, GSMA Intelligence

Contributors

Federico Agnoletto, GSMA Intelligence
Genaro Cruz, GSMA Connected Society
Melle Tiel Groenestege, GSMA Connected Society
Kevin Bowman, GSMA Connected Society

GSMA Intelligence

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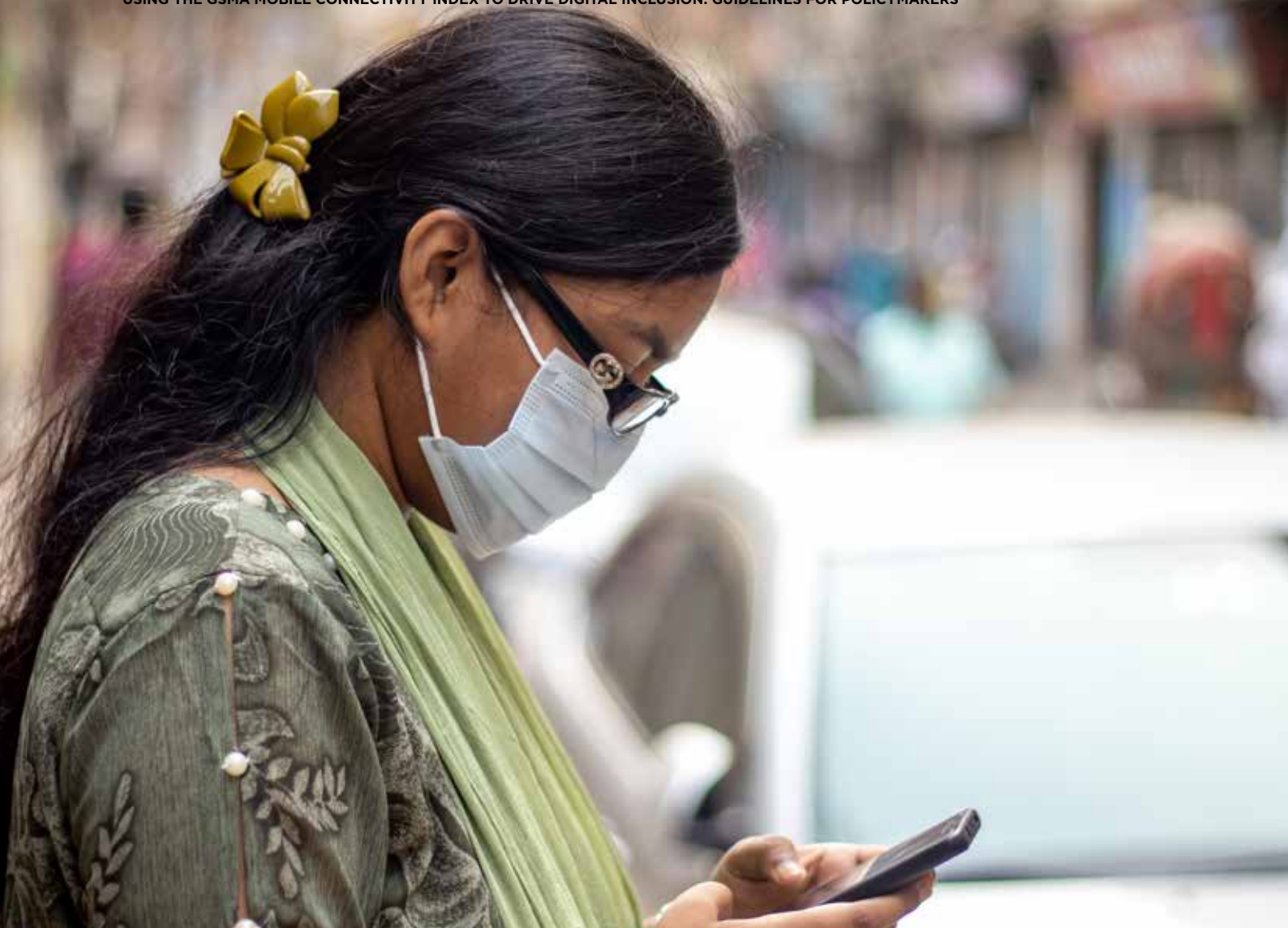**info@gsmaintelligence.com**

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Introduction

The COVID-19 pandemic has underscored the importance of the internet and the critical role of mobile technology, which is the primary way most people access the internet. Mobile internet is providing access to critical information, services and opportunities, in addition to supporting economic growth. Great strides have been made in delivering digital inclusion and connecting the unconnected; almost half the world's population now use mobile internet. But more is required to drive digital inclusion and ensure no one is left behind in an increasingly connected world.

Successfully increasing levels of mobile internet coverage, adoption and usage means adopting a data-driven approach to policymaking, with priorities determined by a country's local context and level of digital development. The GSMA's Mobile Connectivity Index (MCI) facilitates this type of data-centric analysis and evidence-based decisions. The MCI is a tool that measures the performance of countries against the key enablers of mobile internet adoption, enables comparison with regional and global peers, and highlights areas where engagement is required in order to support efforts to accelerate digital inclusion.

This report provides guidelines for policymakers on how to use the MCI to understand where to focus efforts in order to drive increased mobile internet coverage, adoption and usage. It sets out five guidelines, which outline a systematic process for how to apply the MCI to drive digital inclusion in a country:

1. **Investigate:** systematically review performance on the MCI;

2. **Benchmark:** assess performance against global and regional peers;

3. **Prioritise:** determine where to focus efforts;

4. **Research:** find the underlying reasons for current scores; and

5. **Resolve:** adopt policies and monitor performance.

The final section of this report comprises case studies for four countries (Bangladesh, Benin, Pakistan and Uganda), which aim to demonstrate how the MCI guidelines can be practically applied at a country level. By following each of the five stages closely, the case studies provide an illustration for policymakers of how to assess their performance against the MCI metrics and how these insights can be leveraged to identify opportunities for driving digital inclusion in their country. The case studies conclude with recommendations on how to deliver on those priority areas in order to drive digital inclusion.

1. Context: the role of connectivity in building an inclusive society

Over the past two decades, connectivity has become increasingly central to everyday life. It is the bedrock of the digital economy, underpinning many daily social and economic activities, from how people work, learn, shop and communicate to how businesses operate and engage with stakeholders. The importance of connectivity to society has been reinforced by the COVID-19 pandemic. With enforced restrictions on movement and trading, connectivity has emerged as a lifeline to help friends and families stay in touch, enable businesses to operate in a safe way, and support new ways for governments to deliver public services, including education and healthcare.

The post-pandemic world will see an even greater reliance on connectivity as governments aim to fast-track economic recovery and businesses seek ways to realise further productivity and efficiency gains. In this context, the access to and usage of fast and reliable connectivity will be crucial to people's wellbeing and livelihoods. This brings into sharp focus the risk of exclusion from the digital economy for unconnected populations around the world, the majority of whom tend to be poorer, have lower levels of education, live in rural areas, and are less able to mitigate the economic and social disruptions to their lives.

## 1.1 The state of mobile internet connectivity today

As a result of continuous investments in mobile broadband (MBB)[1] networks and rapidly expanding device and content ecosystems, mobile services have become more widely available and adopted, and new use cases beyond core communications have emerged. In the last five years alone, mobile operators have invested almost $1 trillion globally in network infrastructure, helping to narrow the coverage gap[2] by nearly two thirds.

As a result, close to 4 billion people were connected to the mobile internet at the end of 2019, representing 49 per cent of the world's population – considerably more than any other access technology (see Figure 1). For many people, mobile connectivity is their first and only means of accessing the internet, helping them to unlock significant social and economic benefits from interacting and transacting online.

Figure 1

Almost half of the global population used mobile internet at the end of 2019, but a sizeable proportion remain at risk of exclusion from the digital economy

Percentage of population
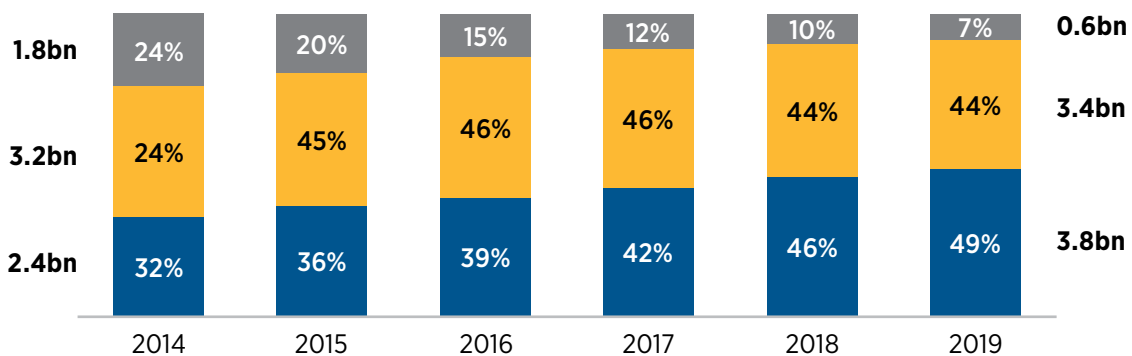
■ Coverage gap (people without access to mobile internet services (3G and above))

■ Usage gap (people who live in areas covered by mobile broadband networks but do not yet use mobile internet services)

■ Connected (mobile internet subscribers)

Note: totals may not add up due to rounding.

Unique subscriber data is sourced from GSMA Intelligence, combining data reported by mobile operators with the annual GSMA Intelligence Consumers in Focus Survey. Coverage data is sourced from GSMA Intelligence, combining data reported by mobile operators and national regulatory authorities. Population data is sourced from the World Bank.

Source: GSMA

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1. 3G services and above
2. The proportion of the population that lives beyond the reach of mobile broadband networks

Despite a meaningful reduction in the coverage gap, the pace of growth in mobile internet adoption has been relatively slower and the usage gap remains large. At the end of 2019, 44 per cent of the global population, equivalent to around 3.4 billion people, lived within the footprint of a network but did not use mobile internet services. To explain this, the GSMA has identified five main barriers to usage and how these barriers[3] can be overcome:

1. **Access:** increasing access to networks and enablers (quality network coverage, handsets, electricity, agents and formal IDs), and usability of handsets, content and services;

2. **Affordability:** improving the affordability of handsets, tariffs, data and service fees;

3. **Knowledge and skills:** enhancing digital skills and literacy, and increasing awareness and understanding of mobile technology and its benefits;

4. **Safety and security:** tackling harassment, theft, fraud and security, and building consumer trust; and

5. **Relevance:** ensuring availability of relevant content, products and services.

## 1.2 Enhancing digital inclusion: a data-led approach

As digital technologies become more integral to daily life, especially in a post-pandemic scenario, there is a greater urgency among governments to enhance digital inclusion and ensure that no one is excluded from the socioeconomic benefits of the internet. Policymakers – and other mobile industry stakeholders – must be appropriately equipped to identify, measure and address a range of enablers to digital inclusion. As such, they need to understand where to focus attention in their country and when to act in order to drive increases in mobile internet coverage, take-up and usage.

Delivering on that imperative means adopting a data-driven approach to policymaking, with priorities determined by a country's local context and level of digital development. Data is a valuable asset that can be drawn on to enable informed assessments in a given country of the magnitude and urgency of connectivity-related issues, which policymakers can then address. Robust evidence in relation to factors impacting digital inclusion is often limited, particularly at national and sub-national levels. Therefore, policymakers should commit to:

• Regularly collecting granular (including gender-disaggregated), reliable data in accordance with international standards, making the information freely available within the limits of data protection rules and commercial confidentiality;

• Conducting and supporting research to better understand the context, circumstances, challenges and needs of individuals not yet using mobile internet; and

• Using these insights and data to decide priorities, set clear and measurable targets, allocate budgets, measure progress and evaluate the effectiveness of interventions across all strategies, policies and programmes aimed at improving digital inclusion.

Regular impact evaluations should also be incorporated into digital inclusion strategies to better understand their impact and inform ongoing policy development and implementation. The GSMA Mobile Connectivity Index (MCI) is a trusted tool that supports data-led analysis and evidence-based decisions.

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3.   Connected Society programme, GSMA
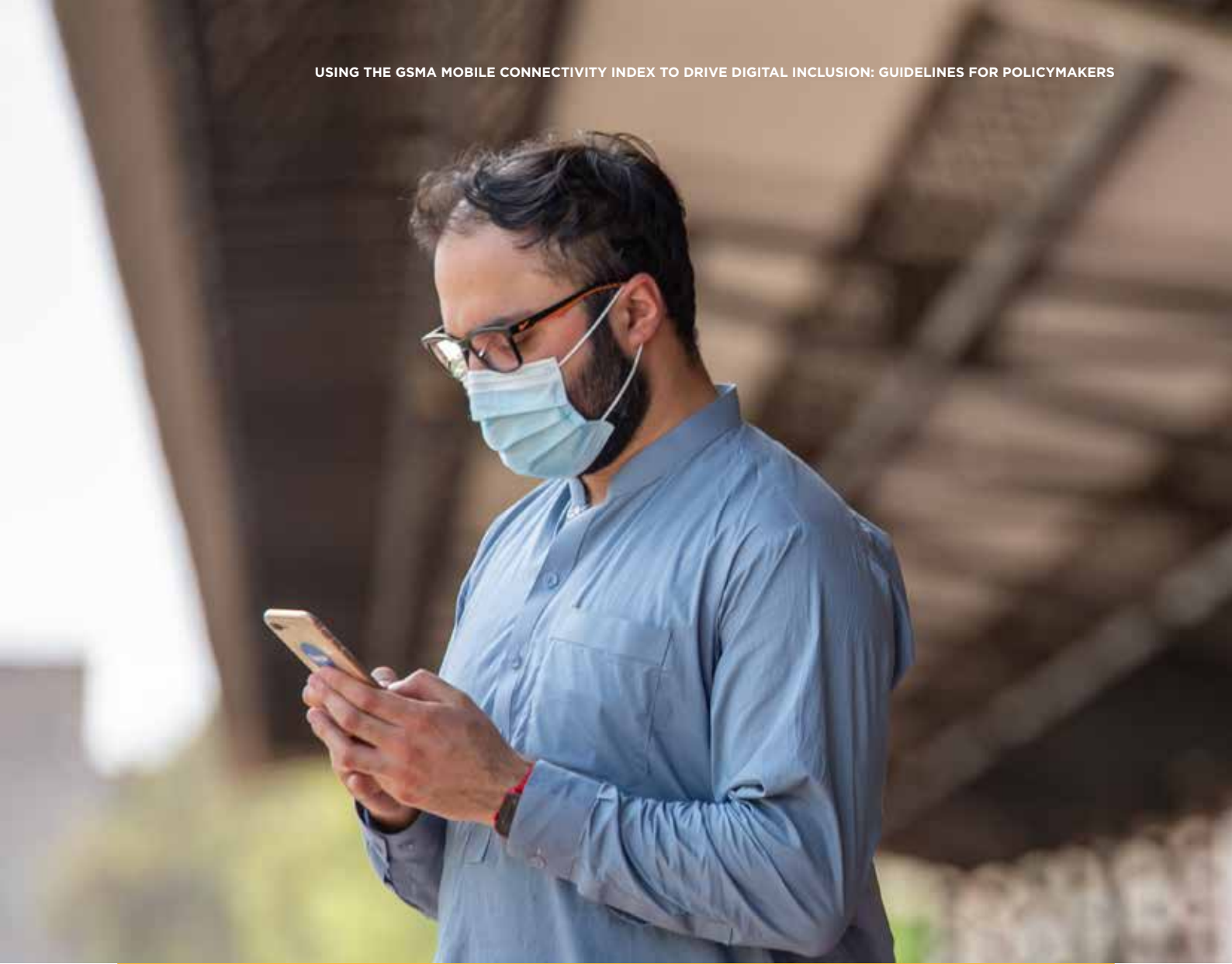
2. Overview of the Mobile Connectivity Index

The GSMA has developed the MCI to help mobile industry stakeholders focus efforts and policy actions to address the prevailing coverage and usage gaps. The latest iteration measures the key enablers of mobile internet connectivity across 170 countries, representing 99 per cent of the global population. As a composite index, the MCI translates data into an easily digestible format. It can be used to understand a country's performance in isolation or relative to regional and global peers and highlights areas where engagement is required, in order to support efforts to accelerate digital inclusion. The MCI includes annual data going back to 2014 and has an accompanying online tool, which can be accessed using the following link: www.mobileconnectivityindex.com.

2.1 The MCI methodology

The index comprises four overarching enablers:

- **Infrastructure:** the availability of high-performance mobile internet network coverage;

- **Affordability:** the availability of mobile services and devices at price points that reflect the level of income across a national population;

- **Consumer Readiness:** citizens with the awareness and skills needed to value and use the internet; and

- **Content and Services:** the availability of secure online content and services accessible and relevant to the local population.
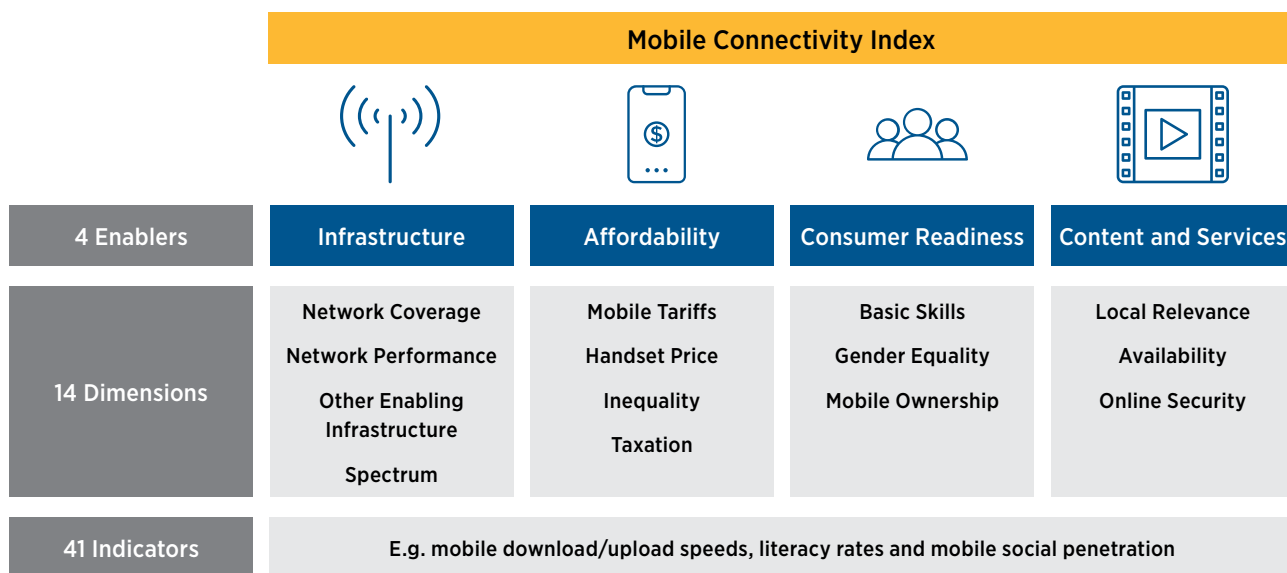
These enablers exhibit clear overlaps with the five barriers mentioned in Section 1; they are geared towards the building blocks to mobile internet adoption rather than the obstacles.

The MCI was first published in 2015 using data for the period to December 2014. The MCI has since been updated annually, with certain indicators modified and new ones added to reflect technological or country developments. For instance, the 2019 index included indicators capturing 5G coverage, spectrum assignments above 3 GHz and the affordability of 5 GB mobile data baskets.

The enablers consist of 14 dimensions underpinned by 41 indicators, which measure the factors impacting mobile internet adoption and usage. To ensure consistent units of measurement, all indicators have been normalised using the 'minimum-maximum method' to have a value within a range of 0–100, with a higher score representing stronger performance. Using these scores, we have defined five 'clusters' to group countries with similar enabling environments (see Figure 3).

Figure 2

Constructing the Mobile Connectivity Index

	Mobile Connectivity Index			
4 Enablers	Infrastructure	Affordability	Consumer Readiness	Content and Services
14 Dimensions	Network Coverage Network Performance Other Enabling Infrastructure Spectrum	Mobile Tariffs Handset Price Inequality Taxation	Basic Skills Gender Equality Mobile Ownership	Local Relevance Availability Online Security
41 Indicators	E.g. mobile download/upload speeds, literacy rates and mobile social penetration			

See A.4 for the full list of indicators.

Source: GSMA MCI

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4. For further details, see The State of Mobile Internet Connectivity 2020

Figure 3

The MCI groups 170 countries into one of five clusters, based on their overall index score[5]

	Discoverers Score is < 35	Emerging Score is ≥ 35 but < 50	Transitioners Score is ≥ 50 but < 65	Advanced Score is ≥ 65 but < 75	Leaders Score is ≥ 75
	Significant room for improvement across all four enablers and have correspondingly low levels of mobile internet penetration.	Perform fairly well on one or two enablers, but show room for improvement on others.	Perform well on at least two enablers.	Perform well on three enablers and usually have high penetration rates.	Generally perform very well across all enablers and have very high levels of mobile internet penetration.
Top-scoring countries	Mozambique (34.9) Liberia (34.4) Mali (33.9)	Kenya (49.6) Cambodia (49.1) Nigeria (49.1)	Barbados (64.8) Vietnam (64.6) Paraguay (64.0)	Russia (74.9) Malta (74.9) Latvia (74.8)	Australia (90.5) Singapore (89.3) New Zealand (87.6)

Source: GSMA MCI

2.2 Evolution of MCI scores

An analysis of global MCI scores between 2014 and 2019 reveals a positive trend. The 11-point gain has been driven by multiple factors, including expanding mobile broadband coverage, higher download speeds and greater 4G take-up. The scores also suggest that mobile internet usage is becoming more diverse: while instant messaging and social networks remain popular online activities, since 2017 there has been a notable increase in the use of educational and health services. Nevertheless, consumers report that a lack of digital skills and literacy are the two largest barriers to mobile internet usage, followed by affordability and safety and security[6].

Figure 4

The infrastructure enabler has improved the most, helped by the rapid expansion of mobile broadband networks

Global MCI scores
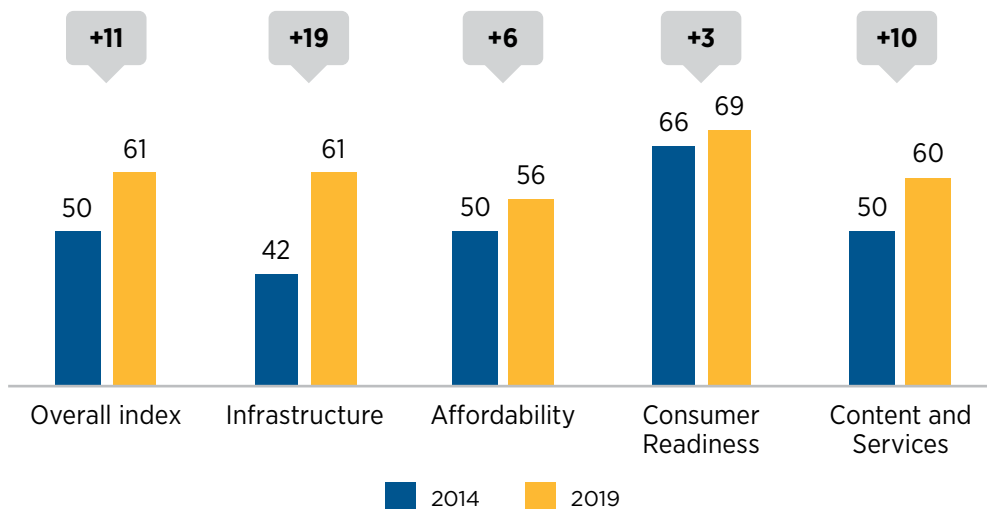
Source: GSMA MCI

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5. See Mobile Connectivity Index Methodology 2020 for a detailed overview of how the MCI is constructed, including the data selection and treatment, normalisation, weighting and aggregation processes
6. The State of Mobile Internet Connectivity 2020, GSMA

From a regional perspective, developed countries in Asia Pacific, North America and western Europe occupy the foremost clusters on the MCI, with the highest rankings across the various metrics. This reflects the advanced levels of key mobile internet demand and supply factors in those countries. In contrast, the majority of low- and middle-income countries (LMICs) sit within the Discoverers and Emerging clusters of the index, highlighting the need for policymakers in those countries to accelerate efforts to enhance digital inclusion.

Figure 5

The most improved countries on the MCI are LMICs, reflecting the expansion of 4G networks in recent years; but for most, there is still much to do to reach the foremost clusters

Top 10 most improved countries, 2014–2019
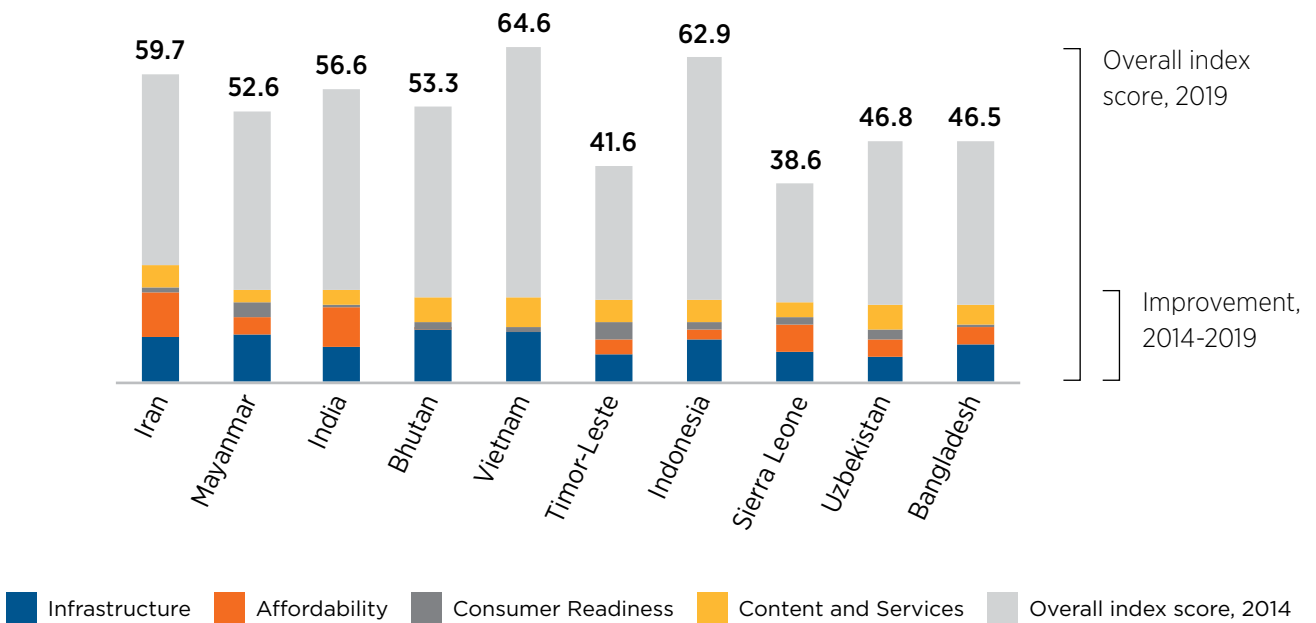
Source: GSMA MCI

3. Guidelines to operationalise the MCI

Around the world, policymakers face the twin challenges of identifying limiting factors and prioritising actions to advance digital inclusion and grow the mobile economy. The MCI has been designed to help policymakers better understand the enablers of mobile internet connectivity, set strategic priorities and evaluate progress on efforts to drive deployments, adoption and usage. To realise the full potential of the index, policymakers (and other stakeholders such as operators, vendors and the development community) need to have a clear understanding of how to use it in practice as an instrument to effect positive change. In the following guidelines, we outline a systematic process for how to apply the MCI in a country.

Figure 6

The MCI in the policy cycle

1. Investigate
Systematically review performance on the MCI

2. Benchmark
Assess performance against global and regional peers

3. Prioritise
Determine where to focus afforts

4. Research
Find the underlying reasons for current scores

5. Resolve
Adopt policies and monitor performance

Source: GSMA Intelligence

3.1 Stage 1: Investigate
Systematically review performance on the MCI

Stage 1 – Key questions:
a. What does the MCI show about a country's current state of connectivity?
b. On which enablers, dimensions and indicators does the country perform well or poorly?
c. How have these scores evolved over time and what trends are visible?

In any of the 170 countries covered by the MCI, the starting point for policymakers is to explore the index and understand the reasoning behind its construction. While the MCI provides a ranking of all countries by index and enabler scores, and for each year available (between 2014 and 2019), it is important to focus less on a country's position in the overall index and more so on its scores and how they have changed over time. This can enable policymakers to establish a baseline level of performance for their country and identify any areas for improvement.

Step 1: Navigate the logic of the MCI
An important first step for policymakers – particularly those less aware of or accustomed to using the MCI – is to get familiar with the logic behind the index, as well as how to navigate its structure and metrics. The MCI can be explored using the online dashboard, but its data can also be downloaded to be analysed with Excel. In addition, the accompanying methodology document sets out in detail the inputs and processes behind the creation of the index.[7] Policymakers should utilise these resources to understand the MCI components and how they combine to indicate the state of connectivity in a given country.
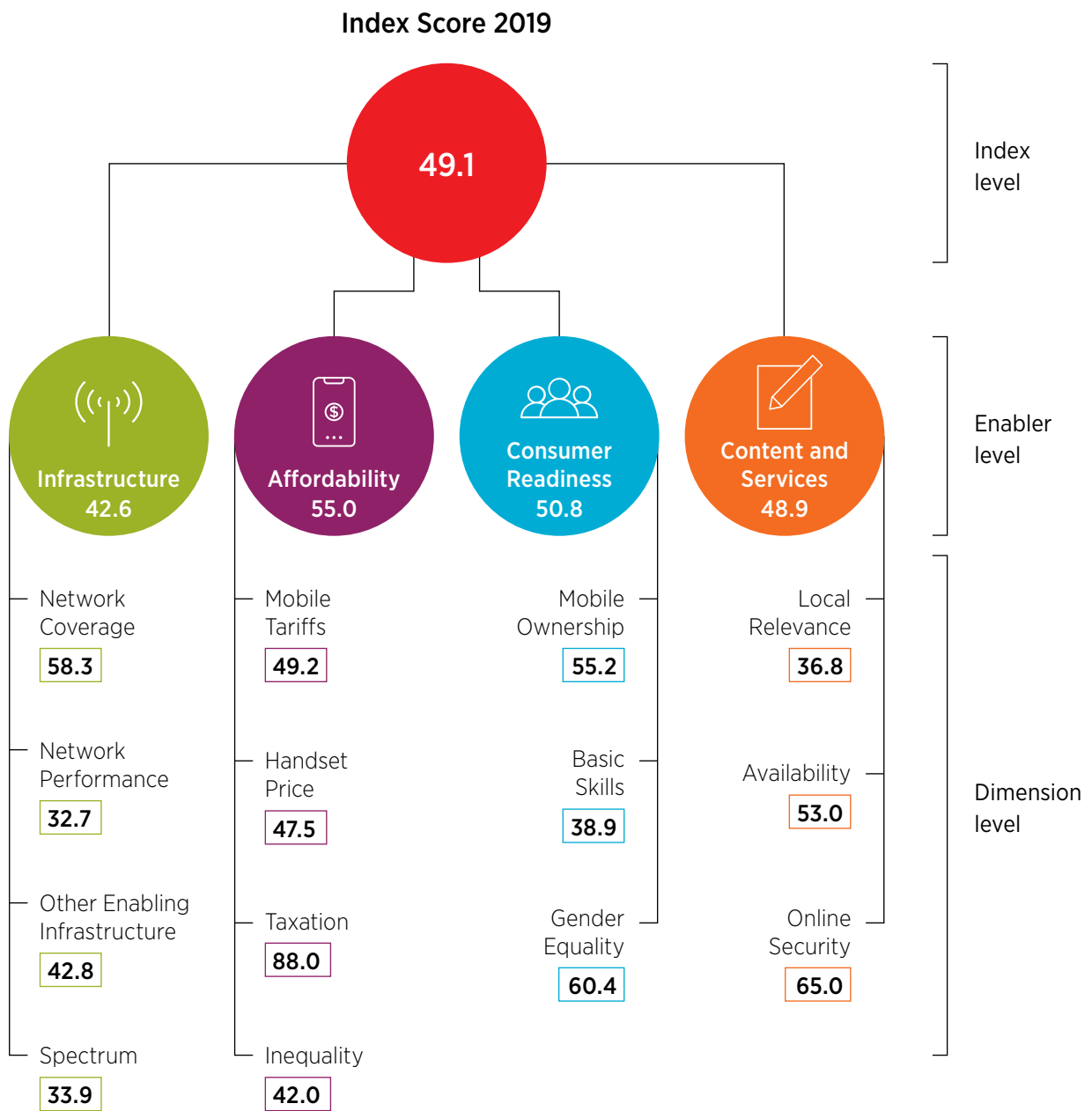
Step 2: Analyse the latest scores
Policymakers should then be in a position to analyse a given country's scores in isolation, reviewing the MCI information in a systematic way. They should take advantage of the MCI's hierarchy to consider first the headline figures, such as the index and enabler scores. However, as summarising multi-dimensional realities can risk simplistic interpretations, the MCI allows policymakers to dig deeper into the data for a more granular perspective. Policymakers should therefore break down a country's scores to the dimension and indicator levels to give a more detailed view on the level of connectivity and expose performance on the principal drivers of digital inclusion.

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7. See Mobile Connectivity Index Methodology 2020 for a detailed overview of how the MCI is constructed, including the data selection and treatment, normalisation, weighting and aggregation processes

Country A's index, enabler and dimension scores, 2019

With an overall score of 49.1, Country A is in the Emerging cluster of the MCI. Country A's performance across the enablers shows there is room for improvement with the Infrastructure score being particularly low. A closer look at the dimensions demonstrates poor performance across a range of measures – such as Local Relevance, Network Performance, Spectrum and Basic Skills – which could suggest strategic priority areas for policymakers.

Index Score 2019

Index level

49.1

Enabler level

Infrastructure 42.6

Affordability 55.0

Consumer Readiness 50.8

Content and Services 48.9

Dimension level

Network Coverage
58.3

Mobile Tariffs
49.2

Mobile Ownership
55.2

Local Relevance
36.8

Network Performance
32.7

Handset Price
47.5

Basic Skills
38.9

Availability
53.0

Other Enabling Infrastructure
42.8

Taxation
88.0

Gender Equality
60.4

Online Security
65.0

Spectrum
33.9

Inequality
42.0

Source: GSMA MCI

Step 3: Assess performance over time

In addition to assessing the most recent MCI scores, it is equally important that policymakers conduct an analysis of their country's performance scores across years to make trends clearly visible. Policymakers should undertake this assessment at each level of the index to shed light on how metric scores have changed, including those that have improved the most and the areas with untapped potential. This analysis will help governments construct a narrative for the digital inclusion journey in their country and suggest a course of action for policy development.

Stage 1 – Key outputs:

a. A ranking of enablers according to the latest scores on the MCI.

b. Insights on the performance of dimensions and indicators under each enabler.

c. A clear picture of the performance of indicators, dimensions and enablers over time.

3.2 Stage 2: Benchmark
Assess performance against global and regional peers

Stage 2 – Key questions:

a. How does a country compare to others on the MCI?

b. Do performance trends show a country is keeping pace with or lagging behind global and regional peers?

c. What are the strengths and weaknesses of a country relative to its comparators?

Having analysed a country's MCI performance in isolation, next it is useful to compare this with the scores of other countries. Cross-country measures are widely recognised as useful tools in policy analysis; they can highlight key issues and deliver a comparative snapshot at a given point in time. In this context, the MCI enables policymakers to look at the state and evolution of digital inclusion enablers in their county relative to regional and global peers.

Step 1: Establish a benchmarking approach
Policymakers first need to determine the countries against which they will benchmark their MCI scores. They can consider several options here and do not have to opt for just one specific group of countries. Suggested approaches to comparing MCI performance include benchmarking against:

- Neighbouring countries within the same region;

- Countries at a similar level of digital development (as defined by current rates of mobile internet coverage and adoption);

- Countries with similar socioeconomic factors (e.g. population, GDP or GNI per capita); and

- Countries within the same MCI cluster.

Step 2: Benchmark scores at each layer of the MCI
Having determined the approach, policymakers should begin by benchmarking their overall index and enabler scores against agreed comparators. Composite indexes can, however, mask valuable insights behind a single figure. To avoid the risk of simplistic conclusions, it is crucial to move on to the dimension and indicator levels (especially the more challenging metrics identified in the investigation stage), where key differences in data will not be averaged out or obscured. If making comparisons with neighbouring countries, policymakers should remain mindful that a score of 50, for example, is not especially strong even if it is high from a regional perspective. This indicates scope for progress and underscores the importance of benchmarking against appropriate comparators.

Step 3: Compare performance across years
The MCI also allows users to analyse changes in performance over time for any set of comparative countries. Policymakers should examine the trends and biggest country-level improvements (and declines) in their chosen cohort since 2014, and consider what these imply for their own country's relative strengths and weaknesses. Also, for poorer-performing areas that were previously identified, policymakers should benchmark these across multiple years to see whether the country's scores changed little over time and/or have been slower to improve relative to peers. A trend line that remains flat as comparators demonstrate an upward curve could be a consideration for later stages.

Stage 2 – Key outputs:

a. A considered list of relevant comparator countries.

b. For each metric identified as scoring poorly in the investigation phase, a comparison against the performance of peers and leading countries.

c. Trends in MCI scores for a given country benchmarked over time against comparators, highlighting dates of positive and negative changes in performance.

3.3 Stage 3: Prioritise
Determine where to focus efforts

Stage 3 – Key questions:
a. Where can policymakers have direct and indirect impacts on digital inclusion?
b. How do the different metrics of the MCI interrelate?
c. Based on the MCI scores, what should policymakers consider prioritising?

Data-driven assessments provide valuable input for policymakers, showing where their country scores poorly and/or trails behind its peers. The third stage, therefore, is to leverage this analysis to suggest which issues should be prioritised at a given phase of digital growth. For example, in countries with high mobile broadband network coverage but also a large usage gap, policymakers could focus efforts on the key barriers to usage highlighted in the different metrics – for instance, depending on the analysis of the MCI scores, efforts could focus on improving affordability, increasing knowledge and skills, increasing the availability of relevant digital content or expanding the local digital ecosystem to drive the consumption of mobile internet services.

Step 1: Build on the MCI performance analysis
Policymakers should review the outputs and utilise the insights garnered during the investigation and benchmarking exercises to begin the prioritisation process. This analysis can help authorities to hone in on where intervention is needed to drive digital inclusion. However, policymakers should not take their country's lowest scores from the most recent year at face value and solely target these. It may be the case that the metrics with the poorest performance should be prioritised, but policymakers should also consider those that have remained flat over time. Moreover, prioritisation will also mean examining the MCI metrics that policymakers can most easily mobilise resources for and have an immediate impact on (e.g. Spectrum), as well as those that are more complex (e.g. Gender Equality).

Step 2: Create associations between metrics
In conducting the prioritisation process, policymakers should consider how the various dimensions and indicators of the MCI affect each other, and whether they need to be addressed individually or in tandem. Correlation or causation between the enablers of mobile internet adoption could help to identify the underlying issues that matter most and guide policymakers on how to address them. For instance, Country A scores best on Network Coverage, but there is still room for improvement and its scores on the Network Performance and Spectrum dimensions further drag down its Infrastructure enabler score. Making more spectrum in the required bands available at appropriate prices would have a positive impact on the Spectrum dimension, but it would also support investment by operators, resulting in better service quality for consumers and an improvement in the Network Performance score. A similar logic follows in relation to taxation and the indirect effects on the Mobile Tariffs, Handset Price and Mobile Ownership dimensions. Additionally, understanding the relationships between these components can help to construct and communicate a narrative on a country's digital development journey and build support for priorities during stakeholder consultation.

Step 3: Develop provisional digital priorities
With these associations in mind, policymakers can leverage the review and benchmarking of MCI performance to make prioritisation decisions. This means considering all the evidence and making an informed judgement as to which areas of connectivity should be tackled first and why.

Stage 3 – Key outputs:
a. A list of the MCI metrics that policymakers can influence directly.
b. A list of the indicators for which effecting an improvement would have positive knock-on effects.
c. An initial determination of the metrics that should be prioritised.

3.4 Stage 4: Research

Find the underlying reasons for current scores

Stage 4 – Key questions:

a. What are the underlying factors behind the current performance in the prioritised metrics?

b. Are there any issues or policies not captured by the MCI that can explain the scores?

c. Are there specific interventions or best practices in other countries from which to learn?

Despite its benefits, the MCI is just one piece of the digital inclusion puzzle. For instance, while the enablers focus on connecting offline populations, they do not measure the level of sophistication of local digital ecosystems. Top-level scores may also disguise serious failings on some of a country's dimension scores and increase the difficulty of identifying the right policy intervention. Initiating a wider conversation on digital development can support data-led approaches and mitigate some of the limitations to quantifying policy decisions and their impacts.

Step 1: Consider the bigger picture

As there is no one-size-fits-all solution to connect everyone to the mobile internet, policymakers should fully consider their own country position. They should perceive MCI scores and trends in a broader context, taking a 360-degree view of the issues that influence digital inclusion. This entails recognising the impact of socioeconomic factors that are external to the mobile industry (e.g. the political environment and urbanisation) and other drivers of the internet economy (e.g. digital skills and employment, e-commerce, R&D and investment). Governments should also question what their country's MCI scores tell them about the policy interventions made to date and their effects, and how to build on what is going well or alter what is not.

Step 2: Analyse examples of international practice

Policymakers should identify and reflect on international practices, using them as a guide to decide the most appropriate policy interventions for their prioritised connectivity challenges. Through extensive research, engagement and knowledge sharing, the GSMA has produced several resources on international best practices in key areas, which policymakers can review (see Section A.1). When examining the higher MCI scores, policymakers should consider how and why interventions have improved connectivity, and whether they could serve as an example to follow or even replicate. For the most improved comparator countries, policymakers should research what policy actions were implemented (e.g. new spectrum assignments, enabling fiscal policies) and consider what lessons can be adopted locally.

Step 3: Hold consultations with external stakeholders

The consultation process is paramount for policymakers to gain a deeper understanding of their country's MCI scores, in order to get support for their priorities and to discuss possible solutions (leveraging identified best practices). The development of mobile policy requires multidisciplinary and multi-institutional collaboration that includes significant interaction and strong partnerships among telecoms stakeholders. Public consultations should be central to policy development, putting stakeholders on notice as to what issues are on the agenda and what could be proposed. Policymakers should organise these consultations to encourage broad participation and include a formal process of considering contributions.

Stage 4 – Key outputs:

a. An understanding of how existing telecoms policies and broader factors have impacted performance in prioritised MCI areas.

b. A list of priority issues and targets to improve digital inclusion.

c. A list of measures to implement to solve the identified issues, which has broad support from relevant stakeholders, including mobile operators, vendors, associations and development agencies.

3.5 Stage 5: Resolve

Adopt policies and monitor performance

Stage 5 – Key questions:
a. What is the most suitable policy design to address key priorities?
b. How should the public and private sectors collaborate on implementing the policy measures to have the maximum impact?
c. What monitoring mechanism will ensure accountability, measure progress over time and support future policy actions?

With the learnings from the MCI analysis and the resultant priority areas, the fifth stage is about implementing policy to effect improvements. The responsibility for building an inclusive digital society goes beyond a single sector. Only by recognising and acting on this shared duty to advance mobile broadband coverage and usage can countries ensure that the internet will benefit everyone. Successful policy strategies recognise the cross-cutting nature of digital inclusion and avoid a fragmented approach that focuses only on a subset of challenges.

Step 1: Develop policies that fit agreed priorities
Policymakers should develop the frameworks necessary to improve their prioritised metrics, maintaining or modifying certain measures or regulations and potentially removing others altogether. Due to the relationships between indicators – and the fact that the underlying factors of digital inclusion often transcend agency boundaries – this process should involve relevant government ministries, mobile operators and other stakeholders in the digital ecosystem.

Step 2: Implement well-defined, measurable policies
Based on that input, policymakers should implement their chosen interventions in priority areas, with stretching (but practically achievable) targets and clear mandates for responsibilities to promote accountability and transparency.

Priority issues may be interdependent, meaning that policies should be implemented in a holistic manner and through a well-defined governance model. Industry stakeholders – including mobile operators, non-governmental organisations (NGOs), content creators, and network and device vendors – all have roles to play in the effective implementation of government policy. This underscores the need for collaboration throughout the process to ensure stakeholder alignment and buy-in.

Step 3: Monitor progress in digital development
Once the agreed actions have been implemented, the resultant impacts on the ground should be observed and evaluated. Policymakers should put in place monitoring mechanisms to gauge the effectiveness of policy interventions and to identify areas that need to be strengthened. The accurate collection and management of data is essential, and multilateral platforms can allow public- and private-sector representatives to share interpretations, information and expertise. Ultimately, using the MCI should not be a one-off event, but rather a continuous and circular process to sustain progress. Therefore, operationalising the MCI should trigger a virtuous cycle whereby policymakers identify and prioritise pain points, establish and implement effective policy solutions, and monitor progress.

Stage 5 – Key outputs:
a. Effective cross-government and public-private sector collaboration to identify appropriate policy tools, considering the benefits and risks of available options.
b. A plan to successfully implement functional and coordinated policy measures with achievable, time-bound targets.
c. A monitoring process to continually review the impacts of policy interventions, using insights gained to inform future action.

Appendix

A.1: Case study: Benin

Stage 1: assessing Benin's performance on the MCI
Benin's aggregate index score of 39 puts it in the Emerging cluster of the MCI. It moved up from the Discoverer category in 2017, when its rate of improvement on the MCI accelerated; however, this upward trajectory appears to have flattened off, with Benin recording no growth in its index score between 2018 and 2019.

Benin doubled its score on the Infrastructure enabler between 2014 and 2019. This was underpinned by a widening of mobile broadband network coverage and the greater availability of spectrum per operator, especially in the 1–3 GHz bands. Though there have been some improvements to the Other Enabling Infrastructure dimension due to advances in international internet bandwidth and access to electricity, its score remains low at 36.4, showing a need for improvement. Reductions in mobile latency triggered a rise in Benin's Network Performance dimension score, but the indicator scores for download and upload speeds remain low and recorded limited growth.
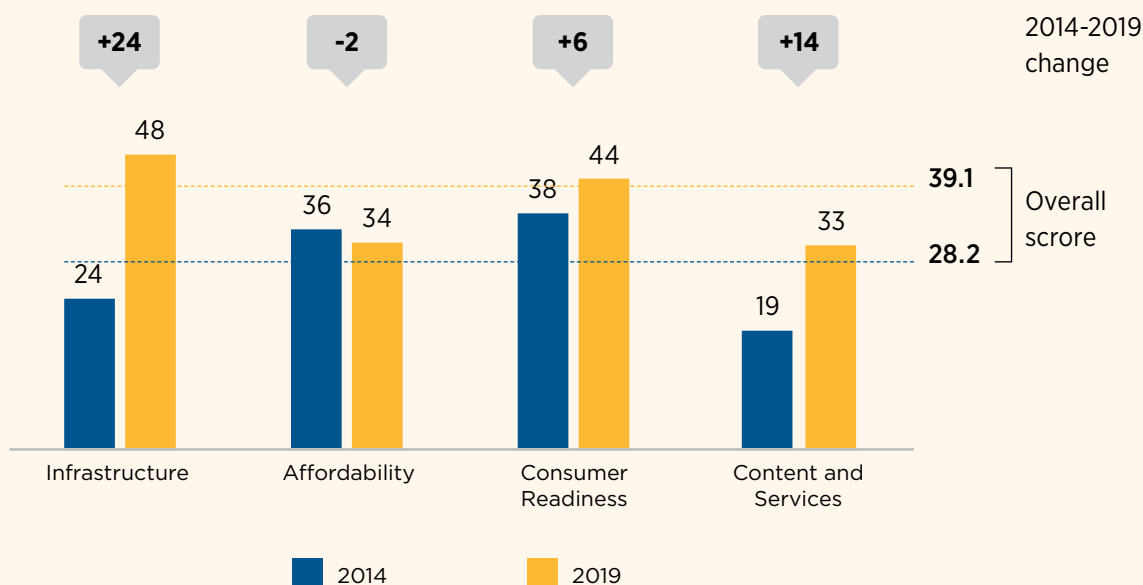

Figure 8

Benin's MCI improved steadily, but has now levelled off
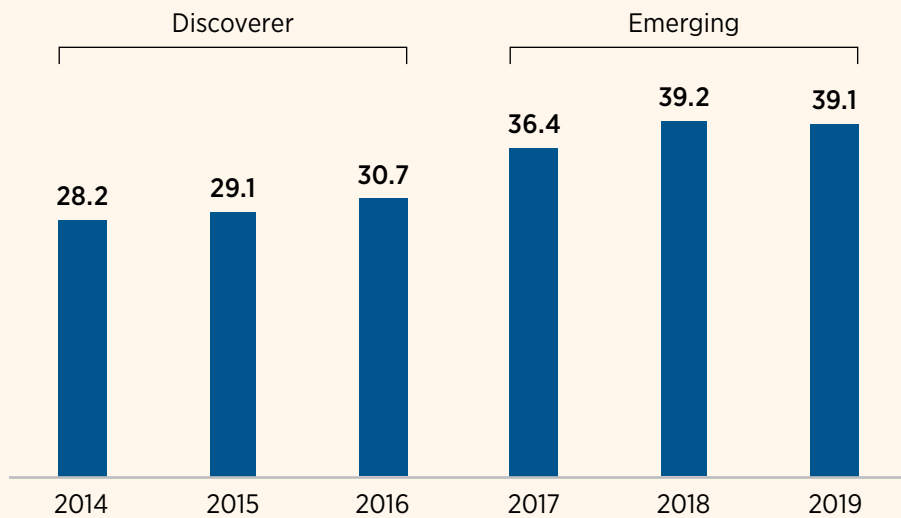
Source: GSMA MCI

Figure 9

Changes in Benin's MCI enabler scores, 2014-2019

Source: GSMA MCI

Benin saw a significant improvement in its Content and Services score between 2014 and 2019, driven by rising scores on the indicators for e-government and cybersecurity. E-government has been an increasing focus for Benin during this period, with the government signing an agreement with the Estonian government in December 2018 to develop a data exchange platform similar to the one established in Estonia (and several other countries).[8] However, Benin's score for the Availability dimension has been declining since 2017 due to a fall in the accessibility[9] of top-ranked apps.

Benin has witnessed some growth in Consumer Readiness, with a 10-point increase in Gender Equality between 2014 and 2019. However, the score for Basic Skills largely remained flat over the same period and the Mobile Ownership score has shown only minor improvement. Moreover, Benin's score on the Affordability enabler worsened slightly over the same period, despite the country's high score on the Taxation dimension. It is important to keep in mind that the MCI Taxation score only captures consumer-side taxes. Consumer taxes in Benin are lower than other countries in the region, resulting in a high score for the Taxation dimension.

The Inequality score declined sharply (down 21 points) between 2014 and 2019, while the Mobile Tariffs score remained relatively low at just 25, despite a 10-point improvement during the same period. The latter score is directly influenced by supply-side taxes, which are very high, though these are not currently captured by the MCI. This explains, in part, why the Mobile Tariffs dimension score is low, which in turn affects the Affordability enabler. The country's low scores for affordability imply that many users, especially those in low-income segments, will continue to struggle to afford mobile services and devices.

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8. "Benin Republic to develop data exchange platform based on Estonian model", The Baltic Times, December 2018
9. The MCI uses language as a measure for accessibility

Figure 10

Assessment of Benin's dimension scores over time, 2014–2019
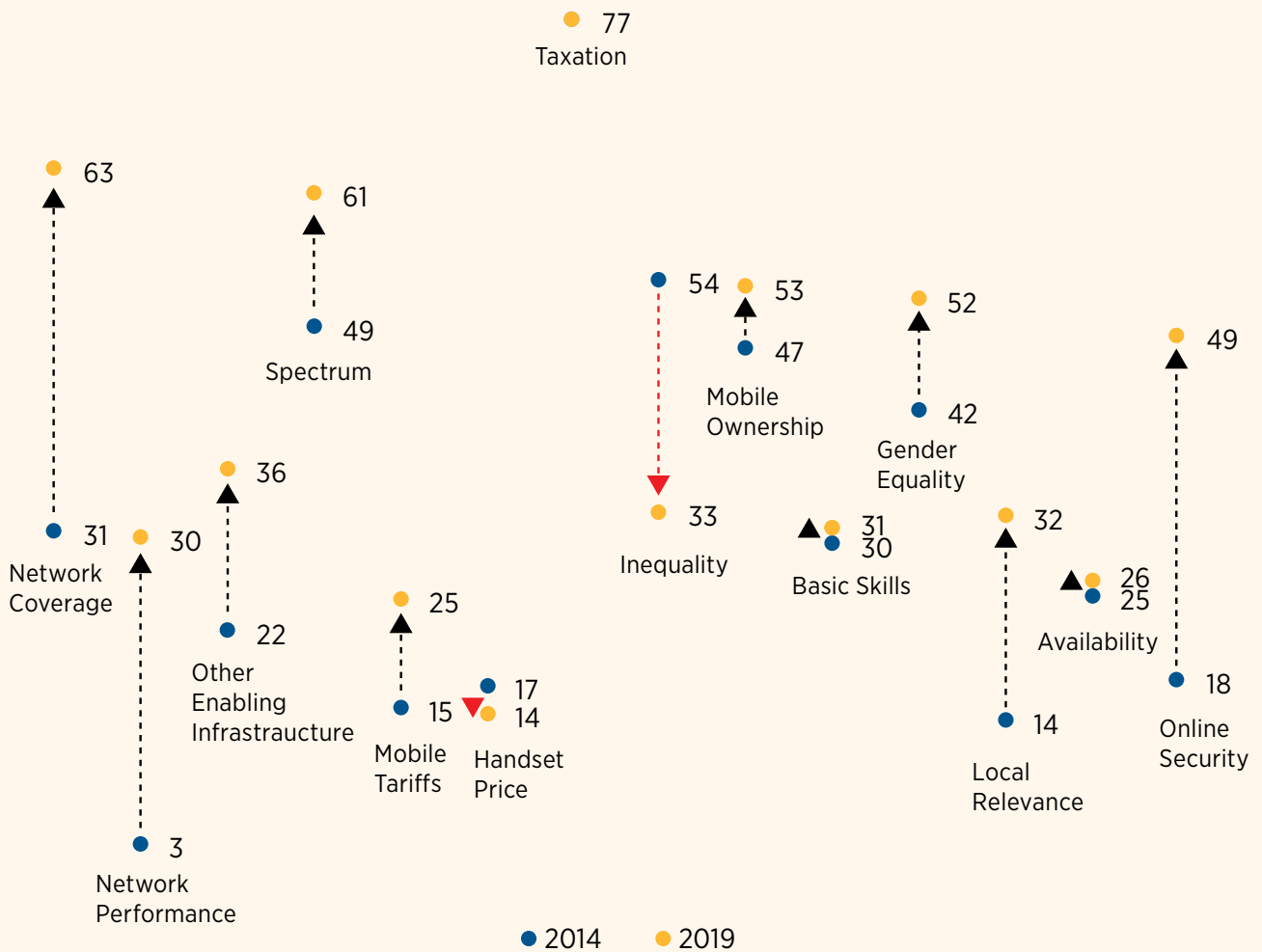
Source: GSMA MCI

Key outputs:

- Benin has performed best on the Infrastructure enabler, which has doubled in score over the 2014–2019 period. But its scores on Network Performance (30.4) and Other Enabling Infrastructure (36.4) show a need to improve performance on specific indicators within the Infrastructure enabler.

- Scores on the Handset Price and Inequality dimensions have declined since 2014, the latter considerably so, worsening the Affordability enabler score overall.

- The Availability dimension score has largely remained the same and this has influenced the country's score on the Content and Services enabler, masking improvements in Online Security and Local Relevance.

- Benin's score on the Consumer Readiness enabler is weighed down by its Basic Skills performance.

Stage 2: benchmarking against comparators

Like nearby Ghana (which is in the Transitioner category), Benin has had one of the largest increases in performance against the MCI in Sub-Saharan Africa. Its index score is now marginally ahead of the Sub-Saharan average of 38, though it trails the global average (59) by some distance.

Benin's 2019 scores for each of the four enablers also lag behind global averages, particularly on Consumer Readiness. Compared to more advanced peers in Sub-Saharan Africa though, Benin continues to trail in Affordability and Content and Services. Still, due to its significant improvement on the Infrastructure enabler, its enabler scores comfortably exceed the regional average.

Figure 11

Handset price dimension scores for Benin and suggested comparator markets, 2019
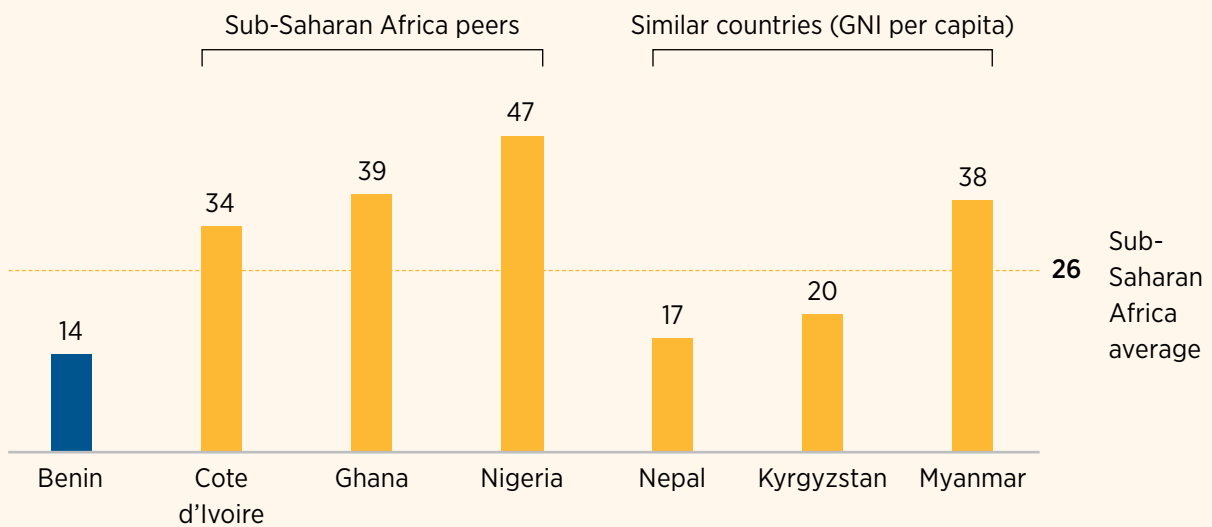
Source: GSMA MCI

Key outputs:
- Benin scores comfortably above the regional average on Infrastructure, but below the regional average for the other three enablers.
- In comparison to regional neighbours and some global peers, Benin scores poorly on Handset Price.
- Benin's score on Network Performance is slightly below the Sub-Saharan Africa average, but it trails considerably behind certain countries with similar GNIs per capita.

Stage 3: developing digital policy priorities

Benin exhibits quite a wide range of dimension scores, with several scores above 60 and many others below 40. Based on the 2019 index, Benin's lowest dimension scores are:

• Handset Price (14);

• Mobile Tariffs (25); and

• Availability (26).

Coupled with some relatively low scores for Local Relevance (32.3), Basic Skills (31.2), Other Enabling Infrastructure (36.4), Network Performance (30.4) and Inequality (32.5) – the last of which has declined significantly over the 2014–2019 period – this indicates various cross-cutting barriers to mobile internet adoption and usage that Benin's government should work collaboratively to address.

The associations between metrics suggests that interventions in one area could have positive knock-on effects in others. For example, positive action on the Other Enabling Infrastructure and Spectrum dimensions could provide operators better ability and incentives to invest, which would feed through to an improvement on the Network Performance dimension. However, improvements on handset prices would also be needed to provide the foundation for widespread mobile internet access – and to drive the Mobile Ownership score upwards.

Key outputs:
• Infrastructure issues would fall under the purview of telecoms ministries and regulatory authorities, whereas content- and skill-related dimensions would likely require cross-government attention.
• Improvements in Other Enabling Infrastructure and Spectrum could lead to an uplift in Benin's Network Performance score.
• Provisional digital policy priorities could target device and service affordability, and content availability.

Stage 4: researching the drivers of digital inclusion

It is vital to take a step back from the MCI scores to look at the local context and policy developments that have impacted digital inclusion in Benin.

Mobile tariffs

Despite steady economic growth over the past two decades, poverty remains widespread in Benin owing to limited growth in per capita terms (only 1.5% on average during 2008–2018).[10] This means the cost of internet access can be an insurmountable barrier for many citizens, particularly for mobile data and internet-enabled devices. Mobile tariffs represent a significant cost, with a 1 GB basket costing $4.22 per month. These are influenced by high corporate and sector-specific taxes faced by mobile operators. For example, operators pay almost 25% of annual recurring revenues in mobile-specific taxation, including annual licence and spectrum fees (compared to around 3% in Ghana and Sierra Leone). This high level of supply-side taxes, together with an inflexible regulatory regime for pricing that limits opportunities to offer promotions, explains why Benin's Mobile Tariffs dimension score is low.

Handset prices

With a score of just 14 on the Handset Price dimension, addressing handset affordability is a clear priority for Benin. A key factor affecting this is income inequality, which has increased since 2014. The cheapest internet-enabled device in Benin costs $74, which includes a 38% customs duty on imported smartphones. For those living below $2 per day, a $74 handset accounts for 10% or more of annual income. At such high prices, buying a mobile phone will remain a substantial purchase for many people in Benin and a key barrier to mobile phone ownership and internet access. The high cost of mobile phones has meant that many consumers in Benin acquire devices via the black market, where prices are often considerably lower than on the open market.

Beyond income levels, there are multiple supply-side factors influencing smartphone affordability – for example, import duties and taxes imposed on smartphones, which are significant contributors to total costs. Luxury taxes on handsets and SIM cards, and other activation or connection charges, create a direct barrier for consumers to connect and to access mobile broadband, especially in developing markets and for the poorest. To enable more users to gain access to the mobile market, governments should choose to address affordability barriers caused by taxes on devices and connections. It is also important that the government analyses the role that taxation plays in the local demand for black-market devices and the effects that a reduction in taxes could have on making the black market a less lucrative place for consumers to trade in.

Availability

The lack of content that is either locally relevant or in the local language can contrive to dull demand for mobile internet services, leaving certain groups unconnected. Benin's government is working to increase the availability of apps – for example, by encouraging entrepreneurship by supporting initiatives geared towards unlocking value for SMEs such as Benin Digital Week and creating a community of entrepreneurs through initiatives such as Sèmè City. The government is also taking steps to accelerate the digitisation of public services, which can be a valuable source of locally relevant content that can drive demand for mobile internet services. In 2020, Estonia-based e-Governance Academy partnered with the government of Benin to deliver a portal that provides information about more than 250 services offered by public authorities in Benin.[11] This is a positive development in efforts to increase the availability of locally relevant content and services, although Benin's latest performance on the MCI and UN E-Government Development Index (EGDI)[12] points to work left to do.

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10. The World Bank
11. "Estonia's e-Governance Academy helps deliver digital services in Benin and Ukraine", Estonian World, April 2020
12. Benin ranked number 157 out of 193 countries, according to the latest EGDI

Cross-cutting areas

Below, we highlight other areas where Benin scores below 40 and that would benefit from government action.

Network performance

Benin's Network Performance score improved significantly from just 3.0 in 2014 to 30.4 in 2019, but remains relatively low. In comparison, neighbouring Togo has a score of 42.2. Although mobile latencies in Benin have improved considerably, the country's overall Network Performance score continues to be impacted by low download and upload speeds. Operators in the country face a strict regulatory environment, where customs duties on equipment, high spectrum fees, regulation of fibre for backhaul and a lack of technological availability all affect their ability and incentive to invest in mobile networks, constraining the quality experienced by end users. Geographic coverage obligations can also mean that operators must target investment in reaching certain rural areas instead of more densely populated or congested areas.

Skills

For individuals to adopt mobile internet, they need to be aware of it, know what the benefits are and understand how to use it. GSMA research shows that among mobile users in LMICs who are aware of the internet, a lack of literacy and digital skills has been identified as the single most important barrier to mobile internet use by both men and women.[13] As is the case globally, there is a lack of reliable data on the factors affecting digital skills, so the MCI's inclusion of Basic Skills uses traditional skills indicators to measure consumers' ability to effectively use and engage with digital technology (e.g. literacy and years of schooling).

Benin's score on the Basic Skills dimension has seen a negligible improvement over the 2014–2019 period. Though the adult literacy rate increased from 38% to 42% in the same period, this score is still significantly lower than the Sub-Saharan Africa average of 65%.[14] The gross enrolment ratio in tertiary education[15] in Benin reduced from 16% in 2014 to 12.3% in 2019, depicting a fall in participation in tertiary education by students of all ages. Low levels of participation in tertiary education are generally an indicator of the lack of capacity of the education system to enrol students of a particular age group, so this highlights an opportunity to improve in this area. As Benin and the rest of the world become more technologically driven, it is imperative that policymakers analyse and address the key issues affecting literacy and digital skills to equip and embolden individuals, enabling them to fully engage in the online world.

Best practice ideas include using tools such as the GSMA's Mobile Internet Skills Training Toolkit (MISTT).[16] The MISTT has been created to help people with little or no mobile internet skills participate in an increasingly connected world and use mobile internet more safely. Moov has also been providing tutorials to show customers how to use certain services (e.g. WhatsApp).

Key outputs:
- Relatively high mobile tariffs compared to income levels add an additional layer of costs to the total cost of mobile ownership, highlighting the value of looking at policies that can have a negative impact on tariffs.
- Mobile handsets remain unaffordable for many users due to high costs, further limiting access to the mobile internet.
- Action is being taken to improve local relevance – for example, through e-government – but more still needs to be done.
- There is a need to address issues in cross-cutting themes such as the Network Performance dimension, in particular aspects of Benin's regulatory environment that are curtailing operators' ability to extend mobile broadband coverage and improve capacity and the Basic Skills dimension.

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13. [The State of Mobile Internet Connectivity Report 2020](#), GSMA
14. The World Bank
15. The gross enrolment ratio for tertiary education is the total enrolment in tertiary education, regardless of age, expressed as a percentage of the population in the five-year age group immediately following upper secondary education.
16. www.gsma.com/mistt

Stage 5: implementing measures to improve connectivity

Having assessed Benin's MCI performance and determined priorities, the final step for policymakers is to effect interventions aimed at increasing mobile internet coverage, take-up and usage in Benin. This sub-section outlines a number of proposed recommendations on how to enhance digital inclusion in the country.

Handset prices

- Improve handset affordability and penetration by analysing the factors influencing the high prices of devices, including sector-specific taxation. The cost reductions that would ensue from removing sector-specific taxation on smartphones would allow more people to participate in the digital economy. This will broaden the tax base over the long run, outweighing short-term falls in tax revenue.

Mobile tariffs

- Create an enabling regulatory environment for mobile operators to achieve operational and other cost efficiencies that will improve the cost of data.
- Improve the affordability of data services by reducing the tax burden of these services for consumers and operators.

Availability and local relevance

- Encourage and foster local digital ecosystems by ensuring that regulatory frameworks are dynamic, efficient and needs based – for example, empowering local entrepreneurs to set up websites in the local language that meet local needs.
- Enable the digital transformation of SMEs and priority sectors such as agriculture, health and logistics.

Recommendations for cross-cutting areas

Network performance

- Permit technological neutrality to allow operators to utilise spectrum holdings more efficiently in order to deliver improvements in mobile broadband coverage and quality.
- Reconsider onerous, and potentially unrealistic, coverage obligations based on geography, formulating fair and practical requirements that:
  - are based on connecting Benin's population; and
  - take into account the different mobile network economics and availability of enabling infrastructure between urban and rural areas.

Skills

- Build on successful ongoing initiatives[17] to raise literacy levels over the longer term;
- Develop a comprehensive framework to design effective digital skills strategies that takes into consideration literacy levels, key competency areas and levels of proficiency within the context of specific use cases; and
- Incorporate digital skills development in education policies at all levels.

Key outputs:
- Recommended policy interventions to increase performance on Handset Price, Local Relevance, Mobile Tariffs and cross-cutting areas of Basic Skills, Availability and Network Performance dimensions.

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17. "Girls' education in Benin", The Borgen Project, August 2018

A.2: Case study: Uganda

Stage 1: assessing Uganda's performance on the MCI
With an index score of 41, Uganda sits in the Emerging cluster of the MCI. Uganda progressed from the Discoverer group in 2017 and has increased its overall MCI score by 10 points between 2014 and 2019 at a broadly steady pace of growth.

Uganda has made improvements across each of the four enablers since 2014, with its greatest gain made on Infrastructure. On this enabler, the country has seen widening 3G and 4G coverage and a sizeable uplift (up 37 points) on the Network Performance dimension, instigated by a surge of improvement in the indicator for mobile latencies. Uganda was one of the first countries in the region to welcome 4G services, which was helped by enabling regulations on unified licences.

Figure 12

**Uganda's MCI score has grown at a consistent rate**
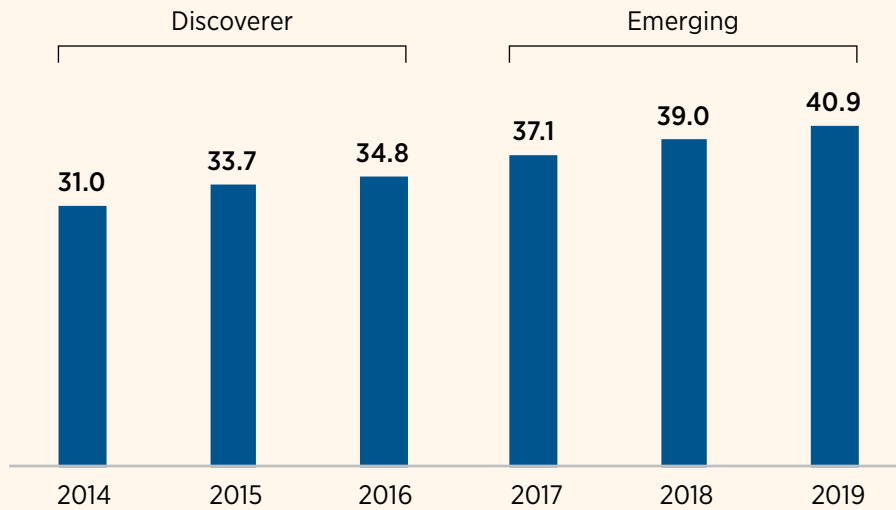
Source: GSMA MCI

The MCI takes into account the amount of spectrum available and not other factors such as price. Since there have been no changes to the amount of spectrum available to operators in Uganda, its performance on the Spectrum dimension has remained stationary.[18] For example, scores for the 'below 1 GHz' and '1–3 GHz' indicators have remained unchanged since 2014. This is the same for the Digital Dividend Spectrum indicator, as Uganda is yet to release this spectrum to mobile operators. A direct link exists between greater amounts of spectrum assigned and faster network speeds. This means that the current assignment of spectrum per operator accounts for Uganda's scores on the indicators for download and upload speeds, which have only increased by 5.1 and 2.5 points respectively since 2014.

Uganda recorded considerable improvement on the Content and Services enabler, supported by higher scores on the indicators for e-government and app development. Uganda updates its e-Government Master Plan every two years based on nationwide surveys. The strategy focuses on enhancing ICT usage in businesses and public institutions; this includes public services delivery, for which it is mandatory that each government entity has its own online portal.[19] Still, the limited accessibility of top-ranked apps and low mobile social media penetration, which fell by 2 percentage points between 2017 and 2019, have caused growth of this enabler to level off. In 2018, the government introduced a daily social media tax of UGX200 ($0.05) for online services such as WhatsApp, Facebook and Twitter, resulting in millions of users abandoning those sites.[20]

Figure 13

Changes in Uganda's MCI enabler scores, 2014-2019
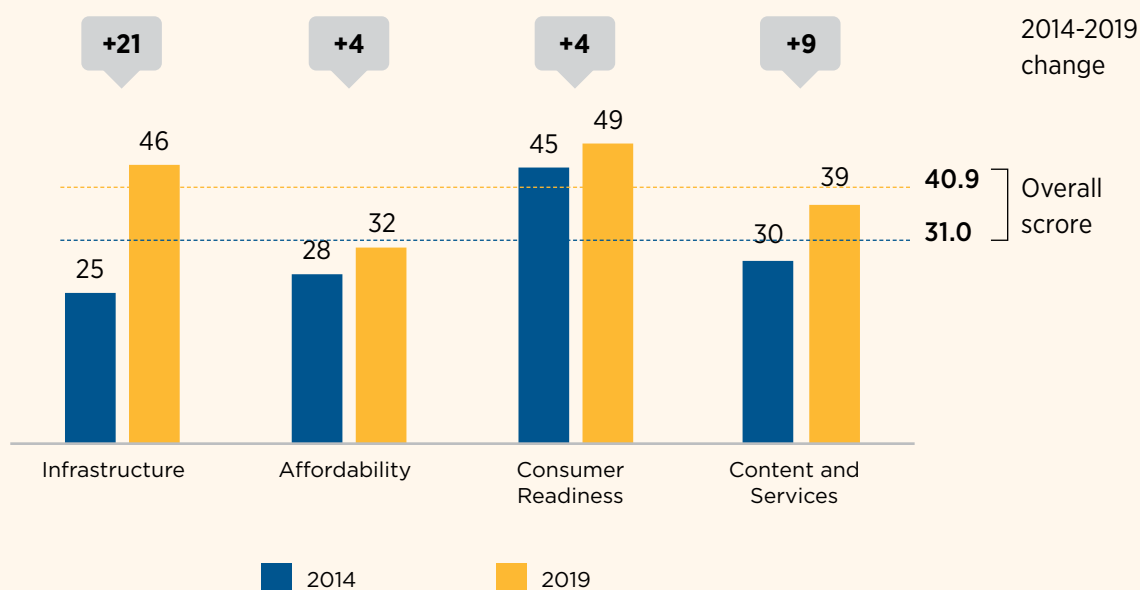
Source: GSMA MCI

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18. Though the amount of spectrum available has remained the same since 2014, Uganda's Spectrum dimension score on the MCI fell from 25.7 in 2017 to 23.3 in 2018 due to the addition of a new spectrum indicator. This new indicator measures the spectrum assignments in bands above 3 GHz, which will be important in the rollout of 5G. This indicator is considered in only 2018 and 2019.
19. UN E-Government Survey 2020, United Nations, 2020
20. "Millions of Ugandans quit internet services as social media tax takes effect", The Guardian, February 2019

Meanwhile, Uganda has made some headway in terms of the Affordability and Consumer Readiness enablers. Consumer Readiness remains the highest-scoring enabler, driven by improvements to the Mobile Ownership and Gender Equality dimensions. Similarly, performance on Basic Skills has improved marginally from 37.7 to 40.1.

The Affordability enabler also increased (by 4 points) due to improvements to the Mobile Tariffs and Handset Price scores. Nevertheless, Affordability remains the lowest-scoring enabler at 32 points, showing the need for clear policy actions, particularly to address worsening performance on the Taxation dimension.

Figure 14

Assessment of Uganda's dimension scores over time, 2014–2019

● 2014   ● 2019
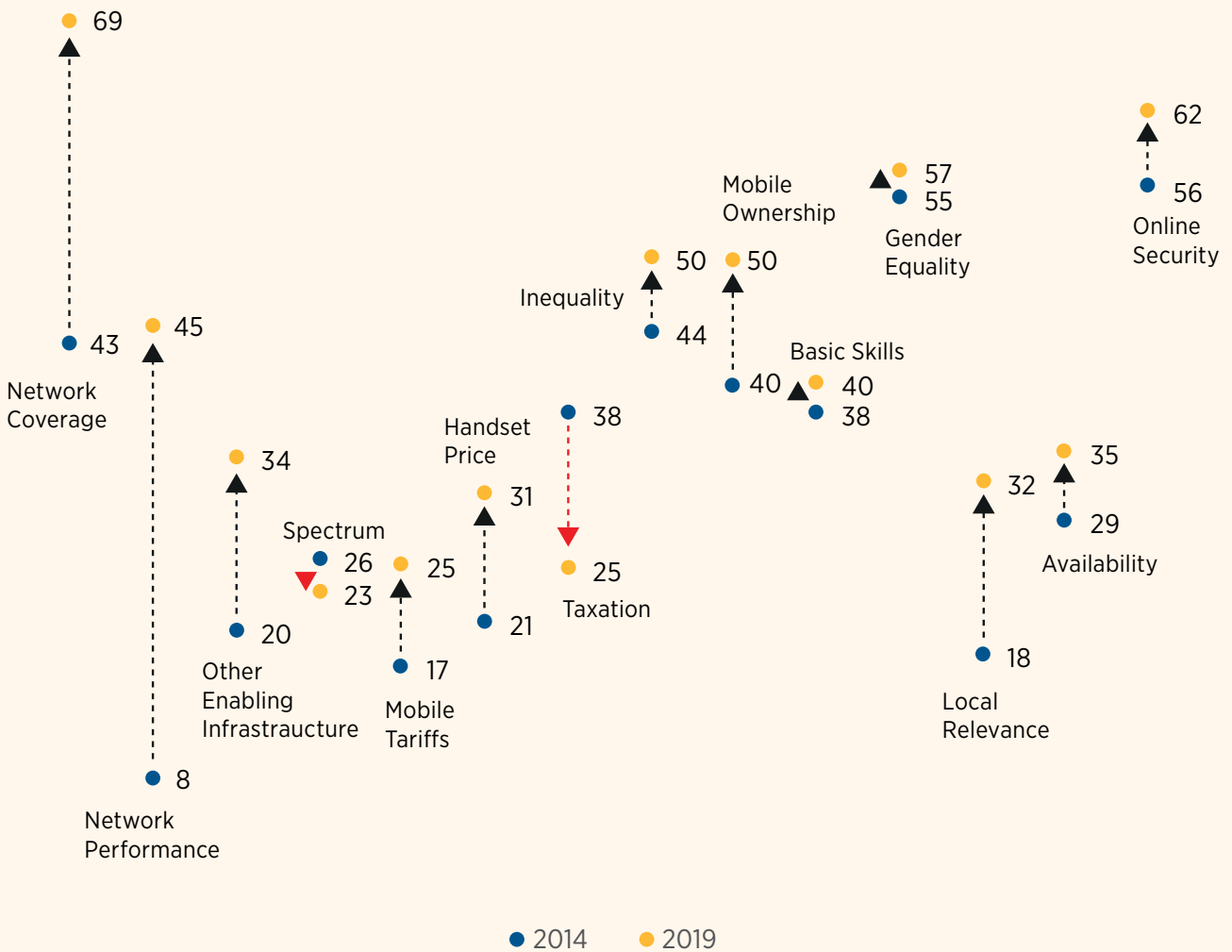
Source: GSMA MCI

Key outputs:

- Investment in 4G, helped by technology neutrality, has significantly improved Uganda's Network Coverage and Network Performance scores, but more needs to be done to improve the performance on the Spectrum dimension.
- The fall in the Taxation dimension score has hampered growth in the Affordability enabler.
- Uganda recorded considerable improvement on Content and Services, supported by higher scores on the indicators for e-government and app development.

Stage 2: benchmarking against comparators

Uganda's biggest increase in score between 2014 and 2019 was on the Infrastructure enabler. The country scores easily above the Sub-Saharan Africa average in this area, on rising 3G and 4G network coverage. Uganda also scores above the regional average on the Content and Services enabler. Its performance on the Spectrum dimension score is similar to that of several comparator countries, but it lags behind its closest neighbours in the East Africa sub-region. The country also trails regional peers in the Mobile Tariff dimension, with a score of 25 compared to 45 for Kenya and 34 for Rwanda. Like several other countries in East Africa,[21] Uganda has seen its Taxation score decline between 2014 and 2019.

Figure 15

Spectrum dimension scores for Uganda and selected comparator countries, 2019
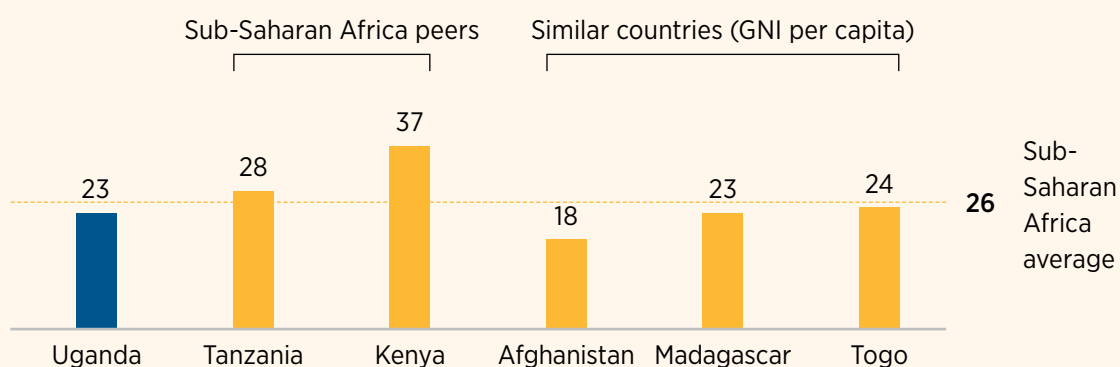
Source: GSMA MCI

Key findings:

- Uganda scores higher than the Sub-Saharan Africa average on the Infrastructure enabler and better than the regional average on Content and Services.
- The country's score on the Spectrum dimension is similar to several comparator countries, but Uganda lags behind its closest neighbours in the East Africa sub-region.
- The country also falls behind regional peers in the Mobile Tariffs dimension, with a score of 25 compared to 45 for Kenya and 34 for Rwanda.
- Uganda is not the only East African country to see its Taxation score decline between 2014 and 2019.

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21. Excluding Burundi and Rwanda

Stage 3: developing digital policy priorities

Uganda's three lowest dimension scores are:

- Taxation (25, which fell between 2014 and 2019);
- Mobile Tariffs (25); and
- Spectrum (26).

There is clear scope for policy actions in these areas to boost overall MCI performance and digital inclusion. Beyond these three dimensions, there is room for improvement on several metrics that have scores of 40 or below, including Other Enabling Infrastructure, Handset Price, Local Relevance and Availability.

The relationships between MCI metrics suggest that interventions to address the Spectrum and Other Enabling Infrastructure dimensions could support investment in network rollout and service quality, thereby also effecting improvements in the Network Coverage and Network Performance scores. Uganda's performance on Consumer Readiness is promising, although progress in the Affordability and Content and Services enablers needs to keep pace if the country is to exploit untapped potential and enhance digital inclusion. This indicates various cross-cutting enablers to mobile internet adoption and usage that government departments should work collaboratively to address.

Key findings:
- Taxation, mobile tariffs and spectrum are three key areas for policymakers to focus efforts on.
- It is important to take into account other indicators where the country scores below 40.
- For example, improvements on the Other Enabling Infrastructure and Spectrum dimensions could lead to an uplift in Uganda's Network Performance score.

Stage 4: researching the drivers of digital inclusion

It is vital to step back from the MCI scores to look at the local context and policy developments that have impacted digital inclusion in Uganda.

Taxation and mobile tariffs

Mobile consumers are subject to a substantial tax burden, increasingly driven by consumer sector-specific taxes. The MCI has been designed to measure this tax burden on consumers by estimating the proportion of the total cost of mobile ownership (TCMO) that is accounted for by all taxes and the proportion that is accounted for by mobile-specific taxes.

A key component of TCMO is mobile tariffs. The price of data remains high in Uganda, with a 1 GB basket of data costing $2.70. This price includes an 18% VAT and a 12% excise duty on mobile services, making tax as a proportion of TCMO in Uganda one of the highest in Sub-Saharan Africa.[22] Meanwhile, the July 2018 introduction of a UGX200 ($0.05) per user per day tax to access over-the-top (OTT) services has been blamed for a sharp drop in mobile internet adoption in subsequent years.[23]

Taxes on devices represent another barrier. Devices are subject to a 12% excise duty as well as a 10% customs duty on imported handsets.[24] While this is aimed at increasing the adoption of locally made devices, protectionist measures can increase the cost of devices and leave consumers worse off. Furthermore, the effect of the 10% customs duty on consumers will particularly impact internet adoption, as local phone manufacturers mostly produce 2G phones, which are not suitable to access mobile internet services.[25] As such, consumers are forced to either buy imported handsets that have become more expensive due to the extra taxes or forgo an internet-enabled phone altogether.

Spectrum

The MCI focuses on the availability and amount of spectrum, rather than price, and this accounts for Uganda's low spectrum score of 23. In terms of availability, operators' access to certain spectrum holdings remains low due to, for example, delays in the assignment of sub-1 GHz spectrum. Encouragingly, the country has a roadmap in place, which will provide the clarity and certainty needed for investment in this area, and is working on its implementation.

With regard to the amount of spectrum, Uganda's score on the 'below 1GHz' and '1–3 GHz' indicators have remained the same since 2014, given that no additional spectrum has been released in these bands. Larger amounts of spectrum assigned would allow operators to build more capacity into their networks with the same level of infrastructure investment. This would allow users of mobile services to experience improved quality of service, including faster upload and download speeds.

Uganda has made progress in issuing technology-neutral licences, which gives operators the flexibility to manage spectrum and optimise the use of each band in the context of the totality of their spectrum holdings. However, impact is being limited by processes surrounding the application and approval for operators to deploy new services on existing spectrum bands. There is also a need for the government to review its coverage obligation that is based on geography (rather than population), as this can lead to the inefficient use of scarce resources, including spectrum.

22. GSMA Intelligence
23. "Social Media Tax Cuts Ugandan Internet Users by Five Million, Penetration Down From 47% to 35%", CIPESA, January 2019
24. "Uganda to impose 10% tax on imported phones", ITWeb Africa, June 2020
25. "The SIMI S300 is the first phone to be 'made in Uganda' and it's not even a smartphone", Techjaja, November 2019

Cross-cutting areas

Handset prices

One in five Ugandans still live in extreme poverty and more than a third live on less than $1.90 a day.[26] Though the cheapest internet-enabled device improved from $26.69 in 2018 to $18.7 in 2019,[27] it still remains unaffordable for the vast majority of the population. The imposition of a 10% import duty on handsets, alongside the existing 12% excise duty on devices, will increase the tax burden faced by consumers. This will have a direct impact on device affordability and ownership, particularly for the poorest in society.

Local relevance

Local relevance measures the amount of content produced in a given country, including e-government services, web domains, social media and mobile applications. These are included because content that is created or developed within a country is likely to be relevant to many of the people living there. Although Uganda scores above the regional average on the Contents and Services enabler, Local Relevance is Uganda's fourth lowest-scoring dimension (32), suggesting it is a factor that policymakers should consider improving given its impact on mobile internet adoption and usage. Uganda, along with neighbouring Kenya and Tanzania, has benefited from significant growth of mobile content in Swahili, with the number of mobile apps in the language increasing from around 5,000 in 2014 to almost 30,000 in 2017.

The increase in the number of public sector policies aimed at encouraging digital entrepreneurship is promising. It points to increasing government recognition of the role that entrepreneurs can play in creating localised solutions to national problems, and the importance of creating an environment for digital businesses to thrive in. To increase the availability of local content and develop the local ecosystem, the government should continue to develop national-level policies with local economic potential and broader socioeconomic development priorities in mind – as is the case with the Third National Development Plan (NDPIII). It is also important for the government to analyse the relationship between the OTT tax and entrepreneurs' willingness to develop local content. The OTT tax has reduced demand for mobile internet services in Uganda; this will have a knock-on effect on digital entrepreneurship by reducing the incentive for entrepreneurs to develop digital offerings or use digital channels.

Key findings:
- Taxation is linked to both mobile tariffs and handset prices, and all three have a negative impact on mobile internet adoption and usage in Uganda.
- While Uganda has put in place some important enabling regulations for spectrum (e.g. technology neutrality), the positive effect of such regulations could be counterbalanced by red-tape processes.
- The number of apps in Swahili has grown considerably, but the tax on OTT services could have a negative impact on entrepreneurs' willingness to create local content (which drives mobile internet adoption).

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26. "Uganda Economic Update Recommends Expanding Social Protection Programs to Boost Inclusive Growth", World Bank, February 2020
27. Tarifica, 2019

Stage 5: implementing measures to improve connectivity

Having assessed MCI performance and determined priorities, the final step for policymakers is to effect interventions aimed at increasing mobile internet coverage, take-up and usage in Uganda. This sub-section outlines a number of proposed recommendations on how to enhance digital inclusion in the country.

Spectrum

- Assign digital dividend spectrum to operators to allow them to further expand mobile broadband coverage in a cost-efficient way.
- Follow through with plans to migrate existing legacy users from sub-1 GHz bands for rural rollout.
- Streamline the spectrum roadmap and pricing guidelines to provide more clarity and predictability for investment decisions by allowing operators a clear view of the spectrum that will become available, when it will become available and the purpose of the spectrum.
- Implement long-term planning to ensure that the bands are cleared and existing legacy users are migrated at minimum cost.
- Revise the coverage target to be based on population, as opposed to geography, considering the implications for investment in network quality and network performance.

Taxation

- Reduce or eliminate sector-specific taxes on devices and mobile services. These include the new 10% duty on smartphones, excise duty of 12% and VAT of 18% on mobile services, and taxes on OTT services. In April 2021, the government proposed a set of tax amendments, including a 12% tax on internet data to replace the UGX200 excise duty on OTT services.[28] If implemented, this new tax would have an adverse effect on the affordability of data services, with low-income users and other vulnerable groups likely to be disproportionately impacted.
- Avoid protectionist measures, such as customs duties that increase the cost of imported devices, and consider other means of supporting the domestic production of handsets – for example, implementing policies that aim to attract or stimulate domestic or foreign investment in the local production of internet-enabled devices.

Recommendations for cross-cutting area

Local relevance

- Streamline existing policies on local content to encourage local content development and accelerate impact on digital inclusion.[29]
- Ensure that all cross-cutting policies (including those for taxation) are aligned with local socioeconomic priorities and work together to create the enabling business and regulatory environment needed for organisations and businesses to thrive.
- Encourage the development of content, products and service interfaces in a range of languages outside of English, such as Swahili.

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28. "Proposed taxes will increase cost of doing business", Daily Monitor, April 2021
29. Supporting the Growth of the Tech Start-Up Ecosystem in Uganda: A Policy Outlook, GSMA, 2020

A.3: GSMA resources on international best practices

- Driving the digital revolution with improved mobile coverage, GSMA Public Policy Position, 2020

- Mobile Policy Handbook: An insider's guide to the issues, GSMA, 2018

- Accelerating affordable smartphone ownership in emerging markets, GSMA, 2017

A.4: MCI technical summary

The Mobile Connectivity Index (MCI) is constructed in several steps:

- **Data selection:** As the MCI measures the enablers of mobile internet connectivity, all indicators are selected to be inputs to mobile internet connectivity, rather than outputs or outcomes (e.g. the level of take-up). The indicators (see Table A1) have been chosen based on the following criteria:

  - Relevance: the indicator should measure a barrier or an enabler in the take-up of mobile internet services;

  - Accuracy: the indicator should correctly estimate or describe the quantities or characteristics they are designed to measure;

  - Coverage: the data should cover as many countries as possible, as the MCI is intended to be a global index. An indicator is not included if there is missing data on more than 25% of countries in the index; and

  - Timeliness: the data should be collected consistently over time.

- **Data treatment:** We identify outliers that would impact the overall index scores. Outliers are then adjusted and transformed. Where data is missing, we use the closest historical data point (if available) before implementing a modelling-based approach. This is used for indicators such as number of servers and international bandwidth per user. This process is likely to result in a more accurate estimate for a specific country than using a modelled or imputed value based on data for other countries. If there is no data for the current or previous years, we use the earliest available observation in the period 2014 to 2019. The remaining missing data is imputed with an expectation-maximisation (EM) multiple imputation algorithm.

- **Normalisation:** For the MCI, the minimum-maximum method is used, which transforms all indicators so that they lie within a range between 0 and 100. To allow for comparisons of index scores over time, the minimum and maximum for each indicator are fixed. Some of the indicator maxima have therefore been adjusted where there are likely to be increases during the next few years in order to give all countries room to improve. As part of the normalisation process, all indicators are transformed such that they have the same orientation i.e. a higher score always represents a 'better' score. This is necessary for indicators that are negatively correlated with mobile internet penetration – for example, mobile tariffs, income inequality and latency.

- **Weighting:** To construct the weights at the dimension, enabler and overall index levels, a number of considerations are taken into account, including the statistical relationship between indicators and dimensions concerning mobile internet penetration, the analysis of consumer survey responses regarding perceived barriers to mobile internet access, and research carried out by the GSMA and other organisations on digital inclusion and barriers to mobile connectivity. The MCI methodology provides a detailed overview of the weights that are used.

- **Aggregation:** Once we have determined the weights assigned to each indicator, dimension and enabler, the following aggregation rules are adopted:

  - Dimension aggregation: arithmetic weighted average of indicator scores;

  - Enabler aggregation: arithmetic weighted average of dimension scores; and

  - Index aggregation: geometric weighted average of enabler scores.

Table A1: Mobile Connectivity Index indicators

Enabler	Dimension	Indicator	Original unit of measurement	Source
Infrastructure	Network coverage	2G network coverage	% of population covered	ITU
		3G network coverage	% of population covered	GSMA Intelligence
		4G network coverage	% of population covered	GSMA Intelligence
		5G network coverage	% of population covered	GSMA Intelligence
	Network performance	Mobile download speeds	Mbps	Ookla's Speedtest Intelligence
		Mobile upload speeds	Mbps	Ookla's Speedtest Intelligence
		Latencies	Milliseconds	Ookla's Speedtest Intelligence
	Other enabling infrastructure	International bandwidth per user	Bits per second	ITU
		Number of secure servers	Secure servers per 1 million people	World Bank
		Access to electricity	% of population with access	World Bank
		Number of Internet exchange points (IXPs)	IXPs per 10 million people	Packet Clearing House
	Spectrum	Digital dividend spectrum (a)	MHz per operator (b)	GSMA Intelligence
		Other spectrum below 1 GHz	MHz per operator (b)	GSMA Intelligence
		Spectrum in bands 1-3 GHz	MHz per operator (b)	GSMA Intelligence
		Spectrum in bands above 3 GHz (c)	MHz per operator (b)	GSMA Intelligence
Affordability	Mobile tariffs	Cost of 100 MB	% of monthly GDP per capita	Tarifica
		Cost of 500 MB	% of monthly GDP per capita	Tarifica and ITU
		Cost of 1 GB	% of monthly GDP per capita	Tarifica
		Cost of 5 GB	% of monthly GDP per capita	Tarifica
	Handset price	Cost of entry-level internet-enabled handset	% of monthly GDP per capita	Tarifica
	Inequality	Inequality in income, Atkinson measure	Index value (0-100)	UN
	Taxation	Cost of taxation	Cost of tax as a % of TCMO (c)	GSMA Intelligence
		Cost of mobile-specific taxation	Cost of mobile-specific taxes as a % of TCMO	GSMA Intelligence

Enabler	Dimension	Indicator	Original unit of measurement	Source
Consumer Readiness	Basic skills	Adult literacy rate	% of literate adult population (above 15 years old)	UN
		School life expectancy (d)	Years	UN
		Mean years of schooling (e)	Years	UN
		Tertiary enrolment rate	%	UN
	Gender equality	Gender years of schooling ratio	Female/male ratio	UN
		Gender account access ratio	Female/male ratio	World Bank Global Findex
		Gender Gross National Income (GNI) per capita ratio	Female/male ratio	UN
		Women, Business and the Law Index	Index value (0-100)	WBL
		Gender gap ratio for social media use	Female/male ratio	We Are Social and Facebook Audience Insights
		Gender gap ratio for mobile phone ownership	Female/male ratio	GSMA Intelligence and Gallup World Poll
	Mobile ownership	Penetration of mobile users	% of population	GSMA Intelligence
Content and Services	Local relevance	Top-Level Domains (TLDs) per capita (g)	Number of domains per person	ZookNIC
		E-Government services (h)	Index value (0-1)	UN
		Mobile social media penetration	% of population	We Are Social
		Mobile application development	Number of active mobile apps developed per person	Appfigures
	Availability	Number of apps in national language	Number of mobile apps available in national language(s)	Appfigures, Ethnologue and GSMA Intelligence
		Accessibility of top ranked apps	Average of the % of population that can use each app in the top 400 for the country	Appfigures, Ethnologue and GSMA Intelligence
	Online security	Global Cybersecurity Index	Index value (0-1)	ITU

Source: GSMA

gsma.com