Connected Society

State of Mobile Internet Connectivity 2018

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http://www.socialprogressimperative.org/

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Contents

Executive summary

At the end of 2017, 3.3 billion people were connected to the mobile internet, representing an increase of almost 300 million compared to the previous year.[1] However, more than 4 billion people still remain offline and 1 billion of these are not covered by mobile broadband networks (the 'coverage gap'). Some 3 billion people live within the footprint of a network but are not accessing mobile internet services (the 'usage gap'), highlighting the importance of demand-side factors in connecting the unconnected.

Understanding where to focus industry effort

The GSMA's Mobile Connectivity Index supports the mobile industry's commitment to connect everyone and everything to a better future. It measures the performance of 163 countries – representing 99% of the global population – against the key enablers of mobile internet adoption: infrastructure, affordability, consumer readiness, and content and services. This data can help the mobile industry and other stakeholders understand where to focus action to drive increased mobile internet adoption.
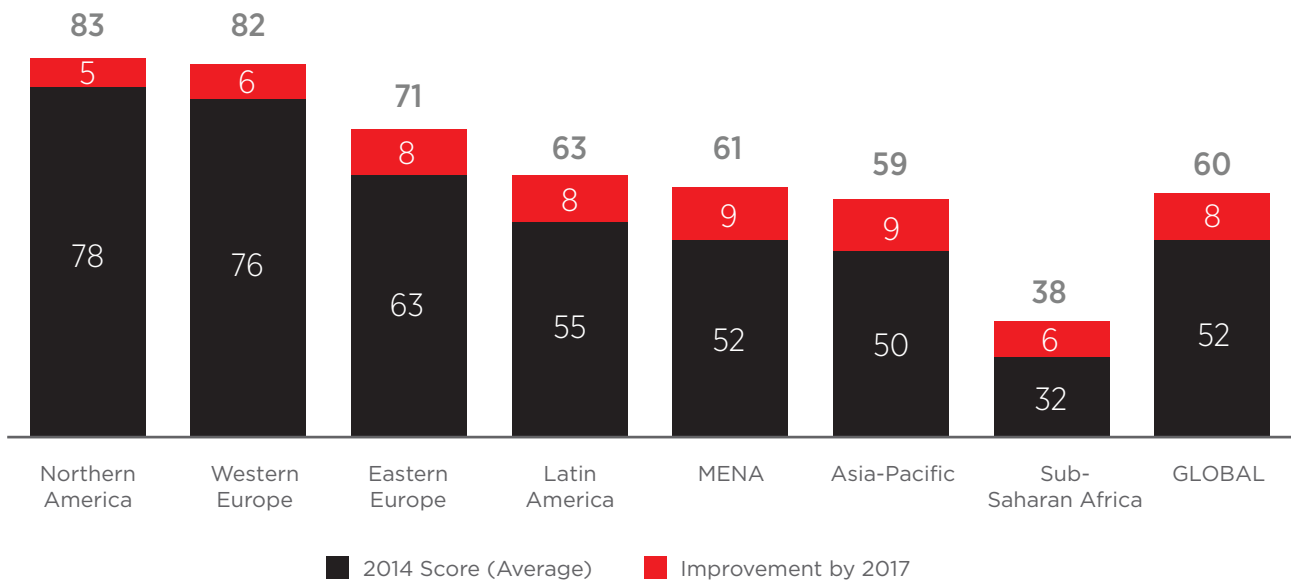
This report accompanies the 2018 update to the Index, which can be found at www.mobileconnectivityindex.com and now includes four years of data from 2014 to 2017. The Index is built up through 35 indicators feeding into 12 dimensions that are aggregated to give a score for each of the four enablers. Scores fall within a range of 0–100. The scores for each of these enablers are rolled up into an overall Connectivity Index score, which represents how advanced a country's mobile internet environment is.

The Index continues to correlate strongly with actual mobile internet penetration. While there is a strong link between positive changes in the Index over time and increases in a country's mobile internet penetration, in some instances there can be a lag. Once an enabling environment is in place, mobile internet adoption will occur – but not always immediately.

The global average Mobile Connectivity Index score has increased from 52 in 2014 to 60 in 2017 (see Figure I). North America and Western Europe remain the regions with the highest Index scores, while Sub-Saharan Africa has the lowest average score. The most improved region between 2014 and 2017 was Asia-Pacific, due to significant improvements in scores for infrastructure and content & services.

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[1] All figures quoted are sourced from GSMA Intelligence unless otherwise stated

Mobile Connectivity Index scores by region

	83	82	71	63	61	59	38	60
Improvement by 2017	5	6	8	8	9	9	6	8
2014 Score (Average)	78	76	63	55	52	50	32	52
	Northern America	Western Europe	Eastern Europe	Latin America	MENA	Asia-Pacific	Sub-Saharan Africa	GLOBAL

■ 2014 Score (Average)   ■ Improvement by 2017

Source: GSMA Intelligence

All four enablers have seen growth over the past four years

Infrastructure has progressed but remains limited in rural areas:

- 3G coverage increased from 75% to 87% globally between 2014 and 2017, covering an additional 1.1 billion people[2]. However, coverage remains limited in rural and remote areas: only around a third of rural populations in low-income countries are covered by 3G networks.
- Network quality has improved[3] but there is substantial variation across countries. Average download speeds for leading performers are approaching 40 Mbps but the vast majority (75%) of countries have not achieved speeds of even a quarter of this.
- The majority of countries that achieved the biggest improvements in network coverage and quality between 2014 and 2017 were those that assigned additional spectrum to operators, particularly in the digital dividend bands.[4]

Affordability has improved but remains a key consumer barrier:

- While the average monthly cost of a 500 MB data plan fell from 4.8% to 2.5% of monthly GDP per capita between 2014 and 2017[5] and the average cost of an entry-level internet-enabled device fell from 2.6% to 2.3% of annual GDP, affordability remains one of the biggest barriers for consumers to mobile internet adoption in low- and middle-income countries.[6]
- In 2017, more than half of the low- and middle-income countries in the Index imposed sector-specific consumer taxes which on average accounted for around 7% of the total cost of mobile ownership. The cost of accessing 500 MB of data in low- and middle-income countries that impose sector-specific consumer taxes is almost 4% of monthly GDP per capita, compared to 2.5% in countries that do not.

[2] 4G coverage increased from 36% to 72%, covering an additional 2.8 billion people
[3] Average download speeds increased from 2.6 Mbps to 8.6 Mbps and average upload speeds increased from 0.9 Mbps to 3.3 Mbps between 2014 and 2017. Source: GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data
[4] This includes spectrum in the 600, 700 and 800 MHz bands
[5] GSMA Intelligence calculations based on data from Tarifica
[6] Source: GSMA Intelligence Consumer Survey

Consumer readiness is slower to change, with literacy levels and gender inequalities holding some countries back:

- While the global adult literacy rate is 87%[7], with more than 200 million more adults becoming literate between 2014 and 2017, a significant proportion of the unconnected continue to lack the skills (or confidence) to access and engage with mobile technology. This issue is particularly significant in low-income countries, where 40% of adults are not literate.[8]
- There is a significant gender gap in mobile internet use in low- and middle-income countries, with women 26% less likely than men to use mobile internet services. This equates to 327 million fewer women using mobile internet than men.[9]

Content and services are proliferating with greater language diversity but still require further development:

- Penetration of social media through mobile, which can provide a platform to generate relevant content, increased from 23% to 40% between 2014 and 2017, with more than 1 billion new accounts.[10]
- In 2017, 35% of all mobile applications were developed outside of North America and Europe, and 25% were from low- and middle-income countries (up from 28% and 15% in 2014). This has generated significantly more mobile content in local languages. [11]

Acceleration of efforts required to achieve universal internet access

Accelerating mobile internet adoption to achieve universal access will require deliberate and strategic efforts by the mobile industry, policymakers and the international community, particularly for rural populations, women and other underserved groups. Significant progress has been achieved and an additional 1 billion people have come online via the mobile internet since 2014. However, based on current trends, almost 50% of the world's population will still be offline by 2020 and 40% will still be offline by 2025.

The cause of the mobile digital divide is complex and rooted in a range of social, economic and cultural factors. The 2018 Mobile Connectivity Index provides evidence that efforts across the following will help drive adoption and use of mobile internet: improving rural coverage, easing operator access to affordable spectrum, reducing sector-specific consumer taxes, building literacy and digital skills, and improving female digital inclusion. However, achieving universal internet access requires an acceleration of efforts by the mobile industry, policymakers and the international community.

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[7] Source: UNESCO.
[8] Source: UNESCO. In low-income countries, adults have also generally completed only 4 years of formal education compared to almost 9 years globally
[9] The Mobile Gender Gap Report 2018, GSMA, 2018
[10] Source: We Are Social. The percentages are calculated by dividing the number of mobile social media accounts by total population. The number of accounts refers to the most popular social media platform in each country.
[11] Source: Appfigures

Highest scoring and most improved countries

Mobile Connectivity Index: top 10 performers – globally and by region

GLOBAL	AMERICAS	ASIA-PACIFIC	EUROPE	MENA	SUB-SAHARAN AFRICA
Australia	Canada	Australia	Iceland	Israel	Mauritius
New Zealand	US	New Zealand	Norway	Qatar	South Africa
Iceland	Bahamas	Singapore	Denmark	UAE	Cabo Verde
Singapore	Uruguay	South Korea	Sweden	Bahrain	Ghana
Norway	Chile	Hong Kong	Finland	Saudi Arabia	Botswana
Denmark	Barbados	Japan	UK	Kuwait	Kenya
Sweden	Mexico	China	Netherlands	Oman	Angola
Canada	Argentinav	Thailand	Switzerland	Turkey	Gabon
Finland	Peru	Malaysia	Ireland	Lebanon	Nigeria
UK	Ecuador	Philippines	Austria	Jordan	Côte d'Ivoire

Mobile Connectivity Index: top 5 most improved globally and by region

GLOBAL	AMERICAS	ASIA-PACIFIC	EUROPE	MENA	SUB-SAHARAN AFRICA
Iran	Guatemala	Myanmar	Cyprus	Iran	Cameroon
Myanmar	Guyana	India	Serbia	Turkey	Kenya
India	Uruguay	Bhutan	Macedonia	Libya	Lesotho
Bhutan	Bahamas	Indonesia	Montenegro	Jordan	Cote d'Ivoire
Turkey	Panama	Vietnam	Bulgaria	Morocco	Rwanda

Source: GSMA Intelligence

About the Mobile Connectivity Index

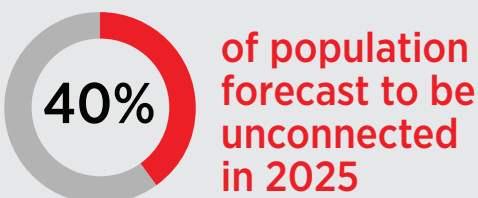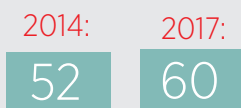|		
1	**Index**	measures the strength of a country's building blocks to support mobile internet adoption
4	**Enablers**	define the key characteristics a country needs to have in place to support mobile internet adoption
12	**Dimensions**	feed into the four key enablers of mobile internet adoption
35	**Indicators**	form the foundation of the Index and feed into the 12 dimensions
163	**Countries**	included in the Index
7.4 billion	**People**	covered by the Index, representing 99% of the world's population

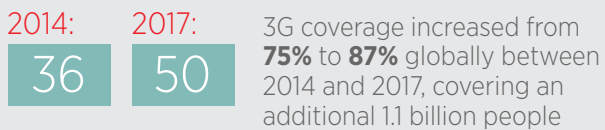# Mobile internet connectivity in numbers

Mobile internet subscribers

2014:
2.4 billion
33% of population

2017:
3.3 billion
44% of population

4 billion people remain unconnected

Coverage gap:
1 billion
(do not live in a 3G+ area)

Usage gap:
3.3 billion
(3G+ coverage but do not use)

40% of population forecast to be unconnected in 2025
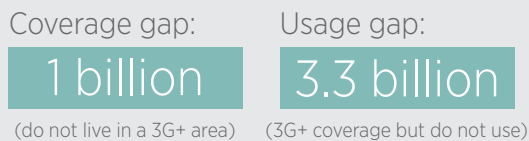
AVERAGE GLOBAL MOBILE CONNECTIVITY INDEX SCORE

2014:
52

2017:
60

INFRASTRUCTURE SCORE

2014: **36**

2017: **50**

3G coverage increased from **75%** to **87%** globally between 2014 and 2017, covering an additional 1.1 billion people

AFFORDABILITY SCORE

2014: **64**

2017: **66**

Average monthly cost of a 500MB data plan fell from **4.8%** to **2.5%** of monthly GDP per capita between 2014 and 2017

CONSUMER READINESS SCORE

2014: **68**

2017: **69**

Global adult literacy rate is **87%**, with more than 200 million more adults becoming literate between 2014 and 2017
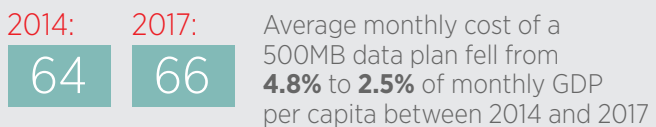
Women are **26%** less likely than men to use mobile internet services (327 million fewer women using mobile internet than men)

CONTENT AND SERVICES SCORE

2014: **50**

2017: **58**

Mobile social media penetration increased from **23%** to **40%** between 2014 and 2017, an increase of more than 1 billion accounts

Source: GSMA Intelligence

Mobile Connectivity Index: top 5 performers – globally and by region

GLOBAL	AMERICAS	ASIA-PACIFIC	EUROPE	MENA	SUB-SAHARAN AFRICA
Australia	Canada	Australia	Iceland	Israel	Mauritius
New Zealand	US	New Zealand	Norway	Qatar	South Africa
Iceland	Bahamas	Singapore	Denmark	UAE	Cabo Verde
Singapore	Uruguay	South Korea	Sweden	Bahrain	Ghana
Norway	Chile	Hong Kong	Finland	Saudi Arabia	Botswana

Source: GSMA Intelligence

Mobile Connectivity Index: top 5 most improved – globally and by region

GLOBAL	AMERICAS	ASIA-PACIFIC	EUROPE	MENA	SUB-SAHARAN AFRICA
Iran	Guatemala	Myanmar	Cyprus	Iran	Cameroon
Myanmar	Guyana	India	Serbia	Turkey	Kenya
India	Uruguay	Bhutan	Macedonia	Libya	Lesotho
Bhutan	Bahamas	Indonesia	Montenegro	Jordan	Côte d'Ivoire
Turkey	Panama	Vietnam	Bulgaria	Morocco	Rwanda

Source: GSMA Intelligence

The GSMA's Mobile Connectivity Index supports the mobile industry's commitment to connect everyone and everything to a better future.

It measures the performance of 163 countries to evaluate how advanced a country's mobile internet environment is. Scores fall within a range of 0–100.

To find out more visit www.mobileconnectivityindex.com or contact the GSMA Connected Society team connectedsociety@gsma.com

1. Introduction

State of mobile internet connectivity

At the end of 2017, 3.3 billion people (44% of the global population) were connected to the mobile internet, representing an increase of almost 300 million compared to the previous year. This is in line with the steady growth seen in previous years (see Figure 1).

For the more than 4 billion people that remain offline, there is a coverage gap and a usage gap.

- The **coverage** gap refers to populations with no access to 3G or 4G network coverage. This has almost halved since 2014, falling from 25% to 13% in 2017, which equates to 1.1 billion additional people covered by mobile broadband networks. As of 2017, almost 1 billion people were not covered.

- The **usage** gap refers to populations that live within the footprint of a mobile broadband network (3G or 4G) but are not accessing mobile internet services. As the coverage gap has fallen, the usage gap has become the primary connectivity barrier, illustrating the importance of demand- as well as supply-side factors in connecting the unconnected. There has been a steady increase in the usage gap from 42% to 44% between 2014 and 2017. This equates to around 3.3 billion people currently unconnected but living in an area where mobile internet connectivity can be accessed.

Figure 2 presents the coverage and usage gap by region, highlighting that the former is most significant in Sub-Saharan Africa. The usage gap is significantly larger in Asia (especially South Asia), Latin America and MENA. The majority of people in Europe and North America are now connected to the mobile internet. There remains a significant usage gap in these regions, but many of these individuals are potentially accessing the internet via fixed technologies, which are much more widespread than in the other regions.

While the proportion and number of people connected to the mobile internet is increasing year-on-year, GSMA Intelligence forecasts that almost one half of the world's population will still be offline in 2020 and around 40% will still be offline in 2025.
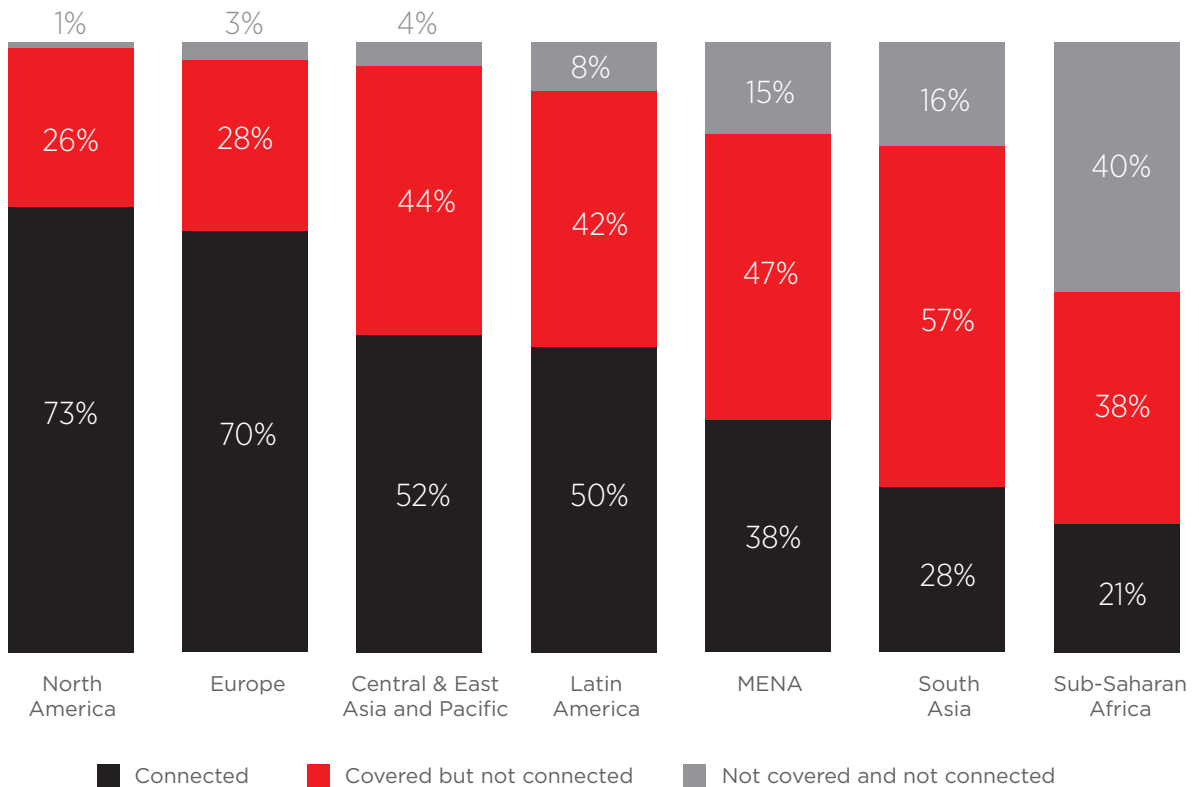
Figure 1

Connected and unconnected populations, 2014–2017
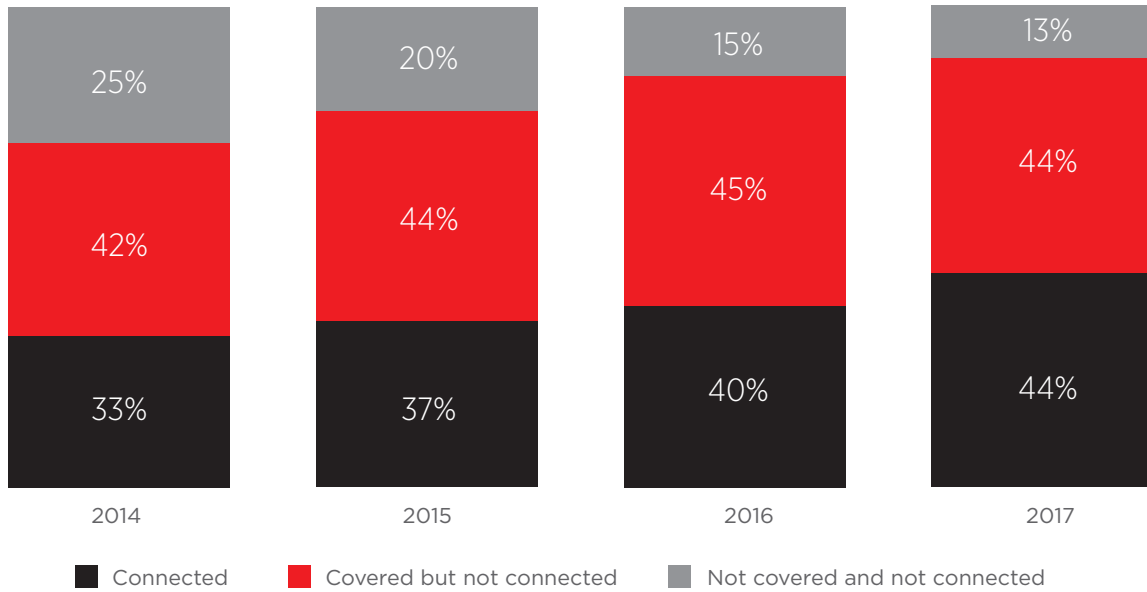
Source: GSMA Intelligence
Percentages may not sum to 100% due to rounding

Figure 2

Connected and unconnected populations, by region in 2017

Source: GSMA Intelligence
Percentages may not sum to 100% due to rounding

The Mobile Connectivity Index

Mobile internet connectivity has been widely established as a key enabler of social and economic development, providing a platform for reducing poverty, improving healthcare and education, and driving economic growth. This is especially the case in low- and middle-income countries, where mobile is the primary – often only – channel to access the internet.

In recognition of the transformative impact that mobile has had thus far and remains capable of driving, the mobile industry (as part of its support for the UN Sustainable Development Goals) is committed to creating a world where everyone is connected.[12]

To support this commitment, in 2016 the GSMA launched the Mobile Connectivity Index, a tool to measure the performance of countries against the key enablers of mobile internet adoption.[13] This was developed to support the efforts of the mobile industry and the wider international community to deliver on the ambition of universal access to the internet. Policymakers, operators, NGOs and international organisations can use the Index to better understand what key elements need to be in place to promote greater adoption of mobile internet adoption and use in each country and help them effectively prioritise their efforts.

This report accompanies the 2018 update to the Index, which now includes four years of data to track the enabling environment and readiness of 163 countries (representing 99% of the world's population) to achieve widespread mobile internet adoption.

Research[14] shows that four key enablers need to be in place in a country to support greater adoption of mobile internet:

- **Infrastructure –** the availability of high-performance mobile internet network coverage. Without network coverage, people cannot get online. Furthermore, without high performing networks they will be less inclined to get online and less able to access the full potential of the internet.

- **Affordability –** the availability of mobile services and devices at price points that reflect the level of income across a national population. Aside from prices and incomes, affordability is affected by the level of taxation and inequality: if income distribution is skewed towards a small proportion of the population, mobile internet will remain unaffordable for many people.

- **Consumer readiness –** citizens with the awareness and skills needed to value and use the internet and a cultural environment that promotes gender equality. Without the necessary skills and supporting cultural environment, individuals will not understand how to use the mobile internet or appreciate how it can benefit them. Individuals, especially women, might also find themselves prevented from accessing the mobile internet.

- **Relevant content and services –** the availability of online content and services accessible and relevant to the local population. Consumers are less likely to connect to the mobile internet unless there is online content and services that they can see are of relevance and benefit to them. This might be as simple as having content in the native language or having certain apps or services available such as for social media, banking or education.

The Mobile Connectivity Index is structured around these four enablers, as illustrated in Figure 3. Each of the enablers comprises a range of dimensions, which in turn are made up of individual indicators. Scores are generated for each enabler and these are combined to produce a single composite measure for a given country of the strength of the foundations to support widespread adoption of mobile internet.

Further details on the specific indicators that are included in the Index are provided in the Appendix.
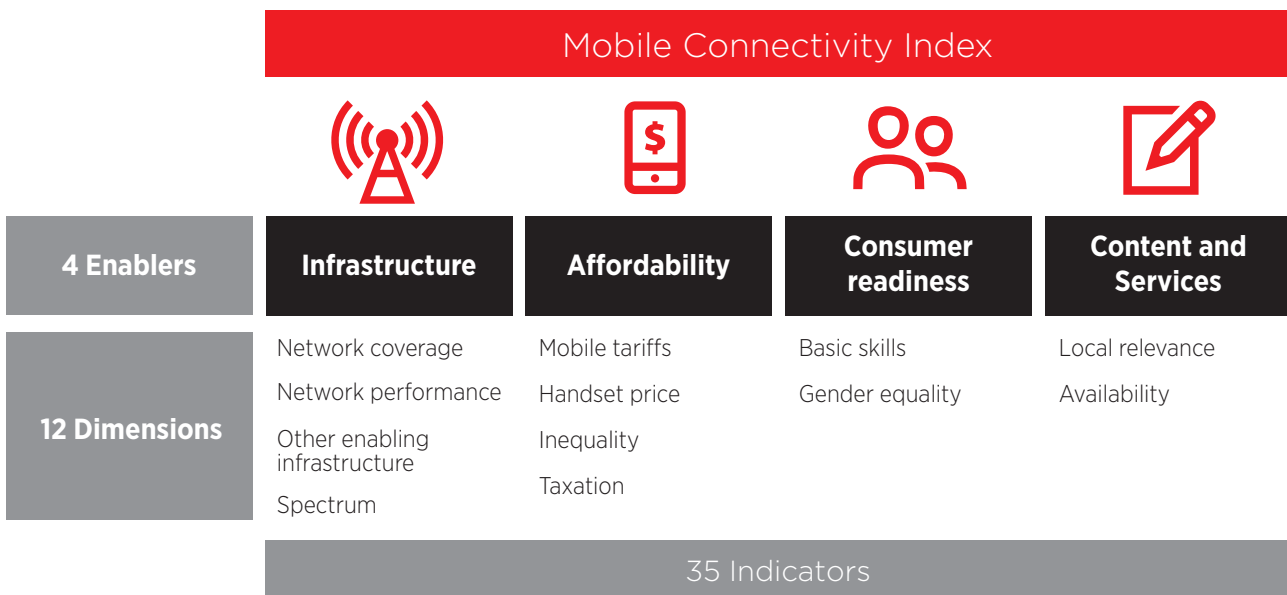
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[12] See for example https://www.gsma.com/betterfuture/
[13] The web tool is available at www.mobileconnectivityindex.com
[14] See, for example, Digital Inclusion, GSMA, 2014; Internet For All: A Framework for Accelerating Internet Access and Adoption, World Economic Forum, 2016; Connecting the Unconnected, ITU, 2017

Figure 3

Mobile Connectivity Index structure

	Mobile Connectivity Index			
4 Enablers	**Infrastructure**	**Affordability**	**Consumer readiness**	**Content and Services**
12 Dimensions	Network coverage Network performance Other enabling infrastructure Spectrum	Mobile tariffs Handset price Inequality Taxation	Basic skills Gender equality	Local relevance Availability
	35 Indicators			

Source: GSMA

The Mobile Connectivity Index is an input index. It measures the performance of a range of metrics that are essential to create an effective enabling environment for mobile internet adoption. The corresponding output measure is the number of people accessing the internet via mobile.

As an input index, it is important to note that the Index does not measure the sophistication or advancement of mobile ecosystems across countries, nor does it measure the different ways consumers engage with mobile technology. For example, it does not measure the extent to which consumers use mobile for financial services or e-commerce. Neither does it measure how intensively they use mobile as part of their everyday lives. Rather, the focus is on measuring the enablers that will allow each country's offline population to connect to the internet via mobile, regardless of what they use it for and how much they use it. [15]

What makes the Mobile Connectivity Index different

There are other indices measuring certain aspects of connectivity and the broader ICT sector – for example, the ITU's ICT Development Index, the WEF Networked Readiness Index and the Alliance for Affordable Internet Affordability Report. The Mobile Connectivity Index is distinct but complements other indices by focusing specifically on mobile technology. This is because the digital inclusion gap in the developing world will be addressed to a significant extent by mobile, given the commercial challenges of deploying fixed networks (especially in rural and remote areas). It is therefore important to understand the enablers of mobile connectivity specifically; the unique mobile-specific indicators that are used in the Index reflect this focus. Indeed, more than half the indicators that make up the Mobile Connectivity Index are not available or used in other indices.
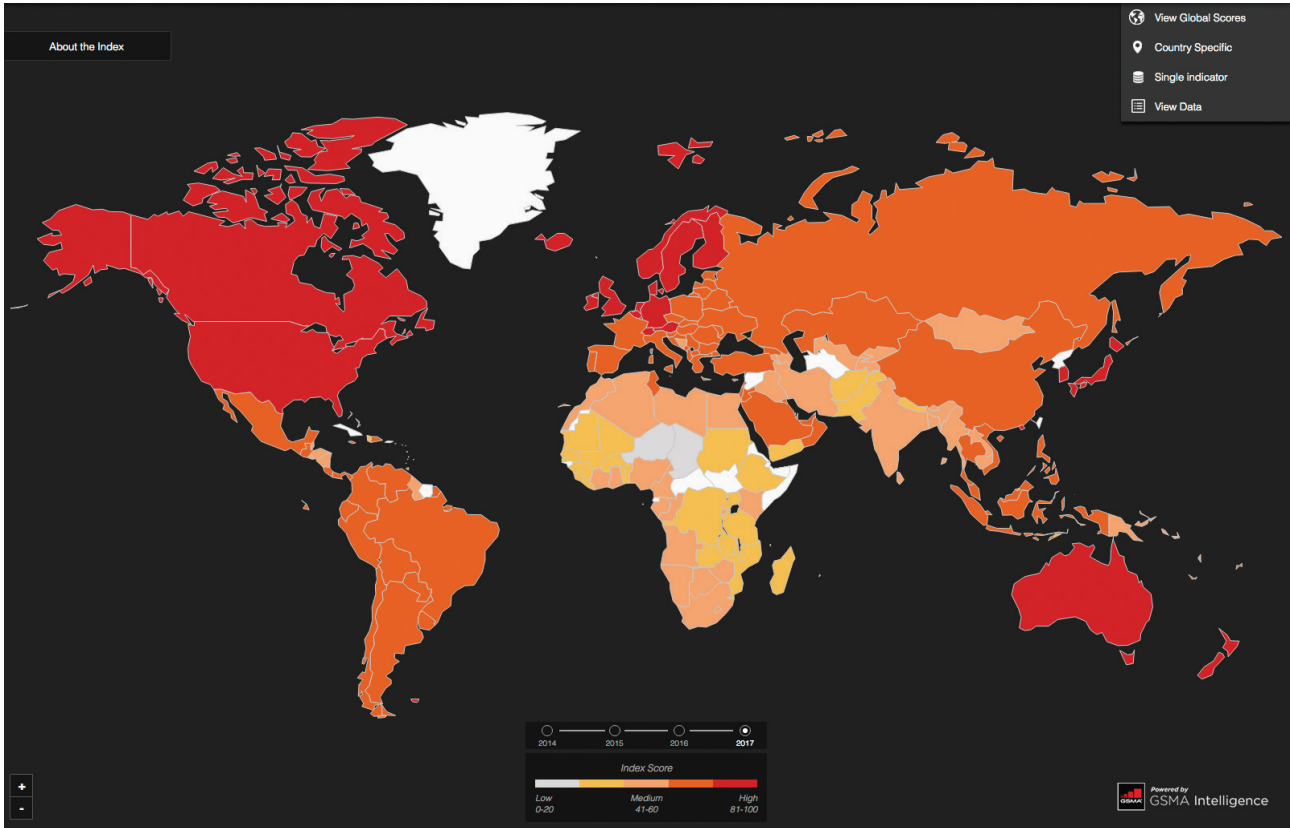
The Mobile Connectivity Index web tool

The Index is accessible through a web-based interface that allows users to explore in detail the performance of individual countries, compare countries against each other and investigate the different dimensions and indicators that feed into each of the enablers. The tool can be found at www.mobileconnectivityindex.com.

Figure 4

Mobile Connectivity Index web tool

2. Results and findings from the 2018 Mobile Connectivity Index

Global analysis

The top 10 countries in the Index have remained similar over time

Figure 5 presents the top 10 countries in the Index globally and by region for 2017. The overall top 10 remains similar to 2016, but as discussed later in the report there has been more movement within regions.

Figure 5

Top 10 countries in the Index (globally and by region), 2017

GLOBAL	AMERICAS	ASIA-PACIFIC	EUROPE	MENA	SUB-SAHARAN AFRICA
Australia	Canada	Australia	Iceland	Israel	Mauritius
New Zealand	US	New Zealand	Norway	Qatar	South Africa
Iceland	Bahamas	Singapore	Denmark	UAE	Cabo Verde
Singapore	Uruguay	South Korea	Sweden	Bahrain	Ghana
Norway	Chile	Hong Kong	Finland	Saudi Arabia	Botswana
Denmark	Barbados	Japan	UK	Kuwait	Kenya
Sweden	Mexico	China	Netherlands	Oman	Angola
Canada	Argentina	Thailand	Switzerland	Turkey	Gabon
Finland	Peru	Malaysia	Ireland	Lebanon	Nigeria
UK	Ecuador	Philippines	Austria	Jordan	Côte d'Ivoire

Source: GSMA Intelligence

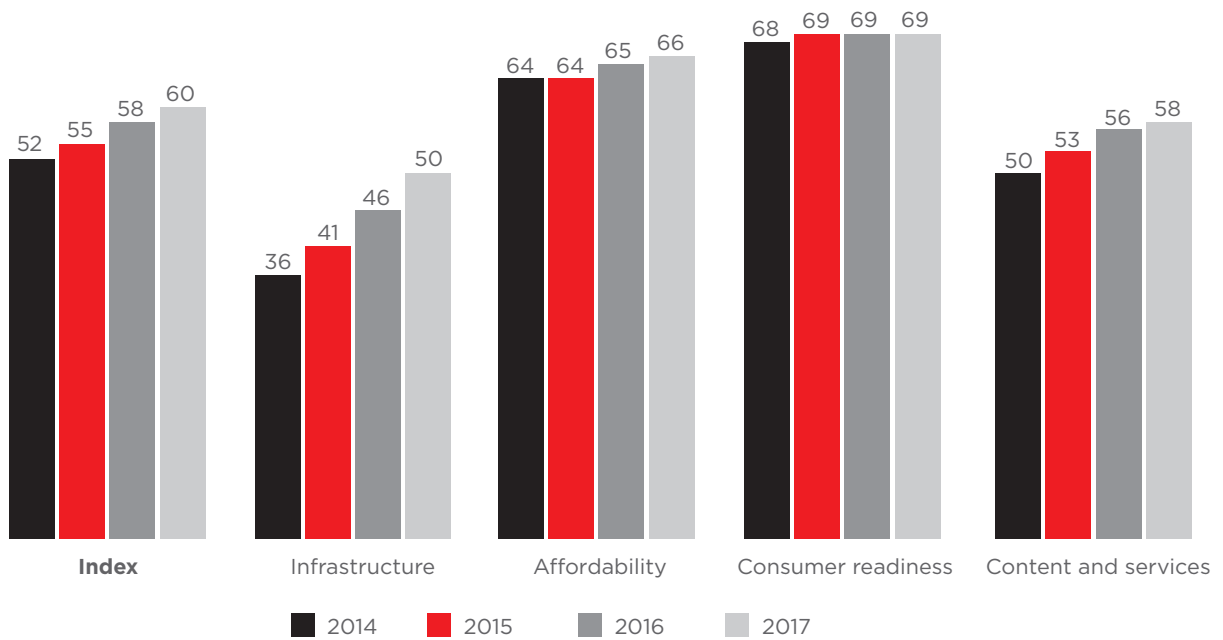## All four enablers have improved; infrastructure the most

Figure 6 shows how global average scores for the Index and four enablers have developed since 2014 (analysis of the four regions that account for the vast majority of unconnected populations[16] is presented later in this section). In 2017, the infrastructure score grew the most, though it remains the lowest scoring of the four enablers. Many of the proxy indicators used to measure consumer readiness do not vary significantly year-to-year (e.g. literacy, gender parity in schooling), so little change over time is observed. Nevertheless, they are important to understand as they represent some of the key barriers to mobile internet adoption in many countries.

Figure 7 presents the average dimension scores for each of the enablers. The scores for infrastructure are particularly revealing: while network coverage scores are relatively high (consistent with the reduced coverage gap), network quality and spectrum assignments are key barriers to increased mobile internet adoption.

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[16] Throughout this report, 'unconnected' populations refers to those that are not connected to the mobile internet (i.e. individuals that use mobile but do not have access to mobile internet are counted among the 'unconnected')
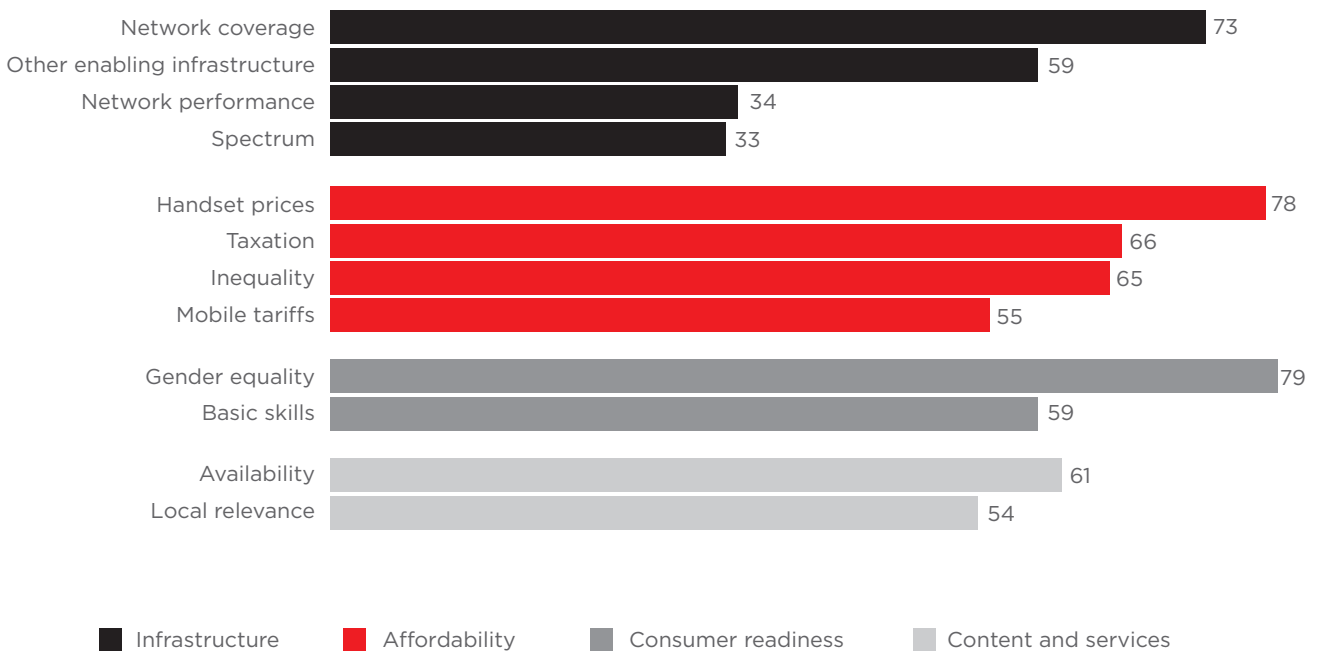
Figure 6

Global Index and enabler scores (average across all countries)

	Index	Infrastructure	Affordability	Consumer readiness	Content and services
2014	52	36	64	68	50
2015	55	41	64	69	53
2016	58	46	65	69	56
2017	60	50	66	69	58

Source: GSMA Intelligence

Figure 7

Global dimension scores (average across all countries)

Dimension	Score
Network coverage	73
Other enabling infrastructure	59
Network performance	34
Spectrum	33
Handset prices	78
Taxation	66
Inequality	65
Mobile tariffs	55
Gender equality	79
Basic skills	59
Availability	61
Local relevance	54

Legend: Infrastructure, Affordability, Consumer readiness, Content and services

Source: GSMA Intelligence

Several factors explain improvements in Index and enabler scores

The increased index score is consistent with mobile internet connectivity steadily increasing. Drivers for growth between 2014 and 2017 include the following:

Infrastructure

- 3G population coverage increased from 75% to 87%, covering an additional 1.1 billion people.

- 4G population coverage increased from 36% to 72%, covering an additional 2.8 billion people.

- Improvements in network quality, with average download speeds increasing from 2.6 Mbps to 8.6 Mbps and average upload speeds increasing from 0.9 Mbps to 3.3 Mbps.
  (Source: GSMA Intelligence calculations based on analysis by Ookla® of Speedtest Intelligence® data)

Affordability

- Average monthly cost of 100 MB data fell from 3.0% to 1.6% of monthly GDP per capita.
  (Source: GSMA Intelligence calculations based on data from Tarifica)

- Average monthly cost of 500 MB data fell from 4.8% to 2.5% of monthly GDP per capita.
  (Source: GSMA Intelligence calculations based on data from Tarifica)

- Average cost of an entry-level internet-enabled device fell from 2.6% to 2.3% of GDP per capita.
  (Source: GSMA Intelligence calculations based on data from Tarifica)

Consumer readiness

- Global adult literacy increased from 86% to 87%, with more than 200 million adults becoming literate.
  (Source: UNESCO)

- Years of people in education improved – for example, the average amount of schooling received by adults increased by almost 2% to 8.6 years.
  (Source: UNESCO)

- Gender gap in financial account access shrunk from 11% to 10%.
  (Source: World Bank Findex)

Content and services

- Penetration of mobile social media use, which can provide a platform to generate content that local populations need or are interested in, increased from 23% to 40%, an increase of more than 1 billion accounts.
  (Source: We Are Social)

- There was an increase of 3 million active mobile applications over the past four years, bringing the total to 5.8 million across the most popular operating systems (including iOS and Google Play).
  (Source: Appfigures)

- Content is being produced from more diverse sources. In 2014, there were approximately 2.9 million active mobile applications, with 28% of these developed outside North America and Europe and 15% developed in low- or middle-income countries. In 2017, these percentages were 34% and 25% respectively. This has also generated significantly more mobile content in non-European based languages, including Vietnamese, Indonesian, Malay, Filipino, Bengali, Swahili, Amharic and Afrikaans.
  (Source: Appfigures)

Many countries still face significant challenges

Despite this progress, there remain significant barriers to connecting the next 4 billion people. Key challenges include the following:

Infrastructure

- Network coverage remains limited in rural and remote areas. We estimate that in low-income countries, around a third of rural populations are covered by 3G networks.

- There is substantial variation in network quality across countries. While the leading performers have average download speeds approaching 40 Mbps, the vast majority (75%) of other countries have not achieved speeds of even a quarter of this, while a significant proportion (almost 25%) have average download speeds of less than 2 Mbps.
  (Source: GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data).

Affordability

- The cost of accessing 500 MB of data is almost 10% of monthly GDP per capita in low-income countries while the cost of an entry-level internet-enabled device costs 7.5% of annual GDP per capita.
  (Source: Tarifica)

- For those in the bottom 40% of a country's income distribution, the cost is often several times this.

Consumer readiness

- A significant proportion of the unconnected continue to lack the skills to access and engage with mobile technology, with 40% of adults in low-income countries not literate.
  (Source: UN)

- In low-income countries, adults have generally completed only 4 years of formal education compared to almost 9 years globally.
  (Source: UN)

- There remains a significant gender gap in mobile internet use in low- and middle-income countries, with women 26% less likely than men to use mobile internet services (this equates to 327 million fewer women using mobile internet than men).[17]

Content and services

- The development of locally relevant content remains a significant barrier in many countries – for example, low-income countries only accounted for the creation of 0.2% of all active mobile applications in 2017.
  (Source: Appfigures)

- As a result, there is a significant lack of content in local languages in many countries, particularly Sub-Saharan Africa, as well as in ethnic minority languages in low-, middle- and even some high-income countries.

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[17] The Mobile Gender Gap Report 2018, GSMA, 2018

Spectrum and tax policy are crucial in enabling increased mobile internet connectivity

These challenges can be addressed through a variety of means. The Index highlights two of the most important in terms of spectrum and tax policy. In order to widen access to affordable mobile services, it is important that sufficient spectrum is licensed to support high-speed mobile broadband, and that this should comprise coverage (below 1 GHz) and capacity (above 1 GHz) spectrum. It should ideally also include the digital dividend bands (600, 700 and/or 800 MHz) as this is often the only mobile broadband spectrum available below 1 GHz.[18]

Of the 163 countries included in the Index, 23 have assigned digital dividend spectrum since 2014, bringing the total to just over half of all countries (86). However, the proportion is less in low- and middle-income countries (40%), which also have a lower average spectrum dimension score (26) compared to high-income countries (48) because the latter tend to assign a greater amount of spectrum by operator within relevant bands.

The benefits of assigning digital dividend spectrum are significant, as shown in Figure 8. Countries that assigned these bands between 2014 and 2017 have much higher 3G and 4G coverage levels than those that did not.

Figure 8

Coverage comparisons (2017)

	ASSIGNED DIGITAL DIVIDEND SPECTRUM BETWEEN 2014 AND 2017	DID NOT ASSIGN DIGITAL DIVIDEND SPECTRUM BETWEEN 2014 AND 2017
3G coverage (percentage of population)	88%	75%
4G coverage (percentage of population)	70%	42%

Source: GSMA Intelligence

The removal of sector-specific consumer taxes is also a key enabler for driving higher mobile internet connectivity. When special tax rates apply only to the mobile sector, they distort the functioning of the mobile market compared to the rest of the economy and can lead to underinvestment in the industry. Furthermore, taxes levied on mobile services exacerbate affordability barriers, especially for those on the lowest incomes.

In 2017, more than half of the low- and middle-income countries in the Index imposed sector-specific consumer taxes. These on average accounted for around 7% of the total cost of mobile ownership in these countries (in some markets, this proportion exceeded more than a fifth of the cost of mobile to the consumer). The majority of countries with sector-specific taxes are in Africa, where six out of 10 countries have at least one sector-specific levy. On average, countries that impose sector-specific consumer taxes in the region have less affordable mobile internet services than those that do not (See Figure 9).

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[18] 850 and 900 MHz bands are often used for 2G

Figure 9

Affordability comparisons in Sub-Saharan Africa (2017)

	NO SECTOR-SPECIFIC CONSUMER TAX IS LEVIED	SECTOR-SPECIFIC CONSUMER TAX IS LEVIED
Average affordability of 100 MB data basket (price as a percentage of monthly GDP per capita)	3.5%	4.1%
Average affordability of 500 MB data basket (price as a percentage of monthly GDP per capita)	5.4%	6.3%

Source: GSMA Intelligence and Tarifica

Rebalancing such sector-specific consumer taxes where they exist will help promote connectivity and the social and economic benefits it can enable. Analysis undertaken by the GSMA has shown that the removal of sector-specific taxes can increase demand for mobile and drive higher investment, while boosting tax revenues over the medium term.[19]

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[19] See Taxing Mobile Connectivity in Sub-Saharan Africa, GSMA Intelligence, 2017; Taxing Mobile Connectivity in Latin America, GSMA Intelligence 2017; and Taxing Mobile Connectivity in Asia-Pacific, GSMA Intelligence, 2018

Country analysis and clusters

When looking at individual countries, it is better to consider the top-level results in sets of country clusters rather than place too much emphasis on an individual country score or position in isolation.

The country with the highest index score, Australia, is not materially different in its overall enabling environment to the next 10 or more countries (the difference in score between Australia and 10th place UK is less than 5 points). Equally, the country with the lowest index score, Niger, is not materially different in overall enabling environment to the 10 or more countries above it; they all share broadly similar characteristics inhibiting the adoption of the mobile internet.

We have defined five 'clusters' to group countries with similar enabling environments:
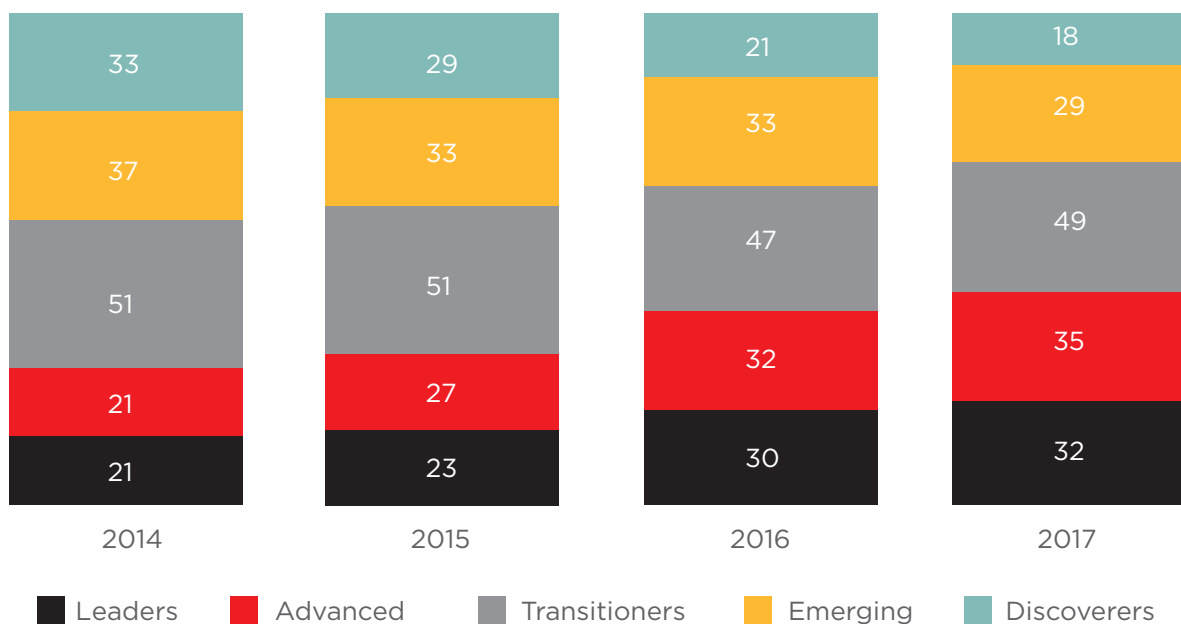
- **Leaders** (score above 75) generally perform very well across all enablers and have very high levels of mobile internet penetration (almost all above 60% and the majority above 70%).

- **Advanced** (score above 65) perform well on three enablers and usually have high penetration rates (above 50%).

- **Transitioners** (score above 50) perform well on at least two enablers and generally have mobile internet penetration rates between 30% and 50%.

- **Emerging** (score above 35) countries perform fairly well on one or two enablers but show room for improvement on others. Mobile internet adoption generally ranges between 20% and 30%.

- **Discoverers** (score below 35) show room for improvement across all four enablers and have correspondingly low levels of mobile internet penetration below 20%.

Since 2014, there has been a strong positive shift in the Mobile Connectivity Index for many countries. This means they have progressed up a cluster to significantly reduce the overall size of the two lower clusters, the Discoverers and Emerging clusters (the former by almost a half), and increase the size of the Leaders and Advanced clusters. See Figure 10.

Figure 10

Number of countries per cluster (2017)

	2014	2015	2016	2017
Discoverers	33	29	21	18
Emerging	37	33	33	29
Transitioners	51	51	47	49
Advanced	21	27	32	35
Leaders	21	23	30	32

■ Leaders　■ Advanced　■ Transitioners　■ Emerging　■ Discoverers
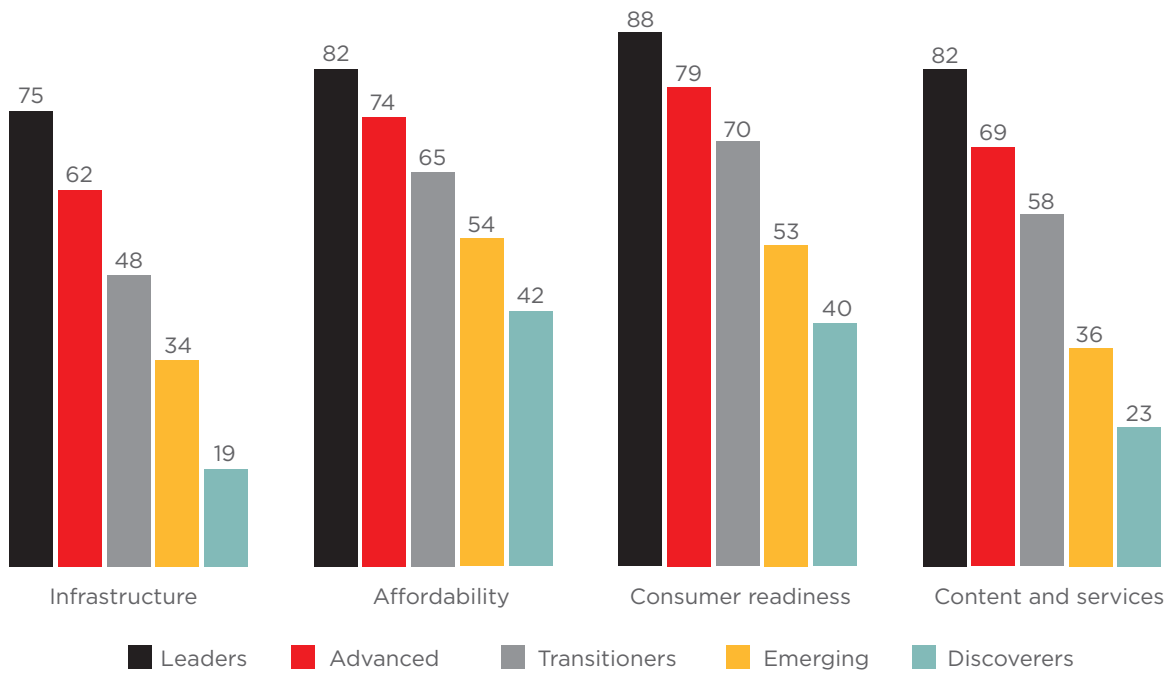
Source: GSMA Intelligence

Countries in different clusters face different challenges

To provide further insight into some of the key barriers by cluster, Figure 11 presents average enabler scores by cluster in 2017. While infrastructure and content generally have lower scores than the other two enablers, the gaps between clusters are similar or sometimes larger for other enablers. For example, in the case of the Emerging cluster, the difference in the average consumer readiness score compared to the next Transitioner cluster is larger than the difference in infrastructure score. In the case of the Discoverers cluster, the difference in the average affordability score compared to the next Emerging cluster is almost the same as it is for content and services, while the difference in the average consumer readiness score is larger.

This shows that while most countries have higher consumer readiness and affordability scores compared to infrastructure and content, in relative terms consumer readiness and affordability are just as important (in some cases more important) for many low-scoring countries. It is therefore essential that policies to enhance literacy, digital skills, close the gender gap and improve affordability remain priorities in these markets, in addition to the development of infrastructure and content and services.
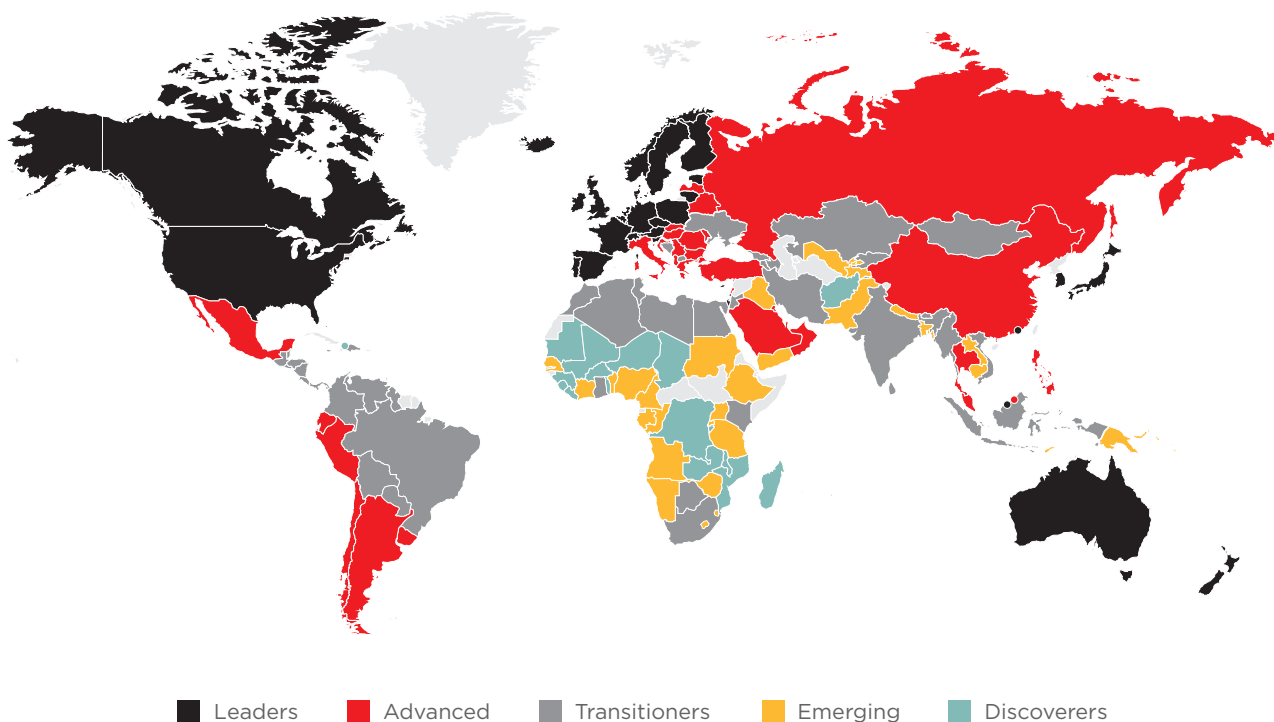
Figure 11

Enabler scores by cluster (2017)

Source: GSMA Intelligence

Figure 12

Global view of Mobile Connectivity Index clusters

| ■ Leaders | ■ Advanced | ■ Transitioners | ■ Emerging | ■ Discoverers |

Source: GSMA Intelligence

MCI and mobile internet penetration

Figure 13 shows the relationship between the Mobile Connectivity Index score and unique mobile internet subscriber penetration for the 163 countries included in the Index. There is a strong, positive correlation between the two metrics, demonstrating that the Index is an effective tool to identify priorities to drive mobile internet adoption.

Figure 14 shows the relationship between the growth in Index score and mobile internet penetration between 2014 and 2017, again illustrating that the two are strongly linked.

Figure 13

Mobile internet penetration and Index score (based on 2017 data)
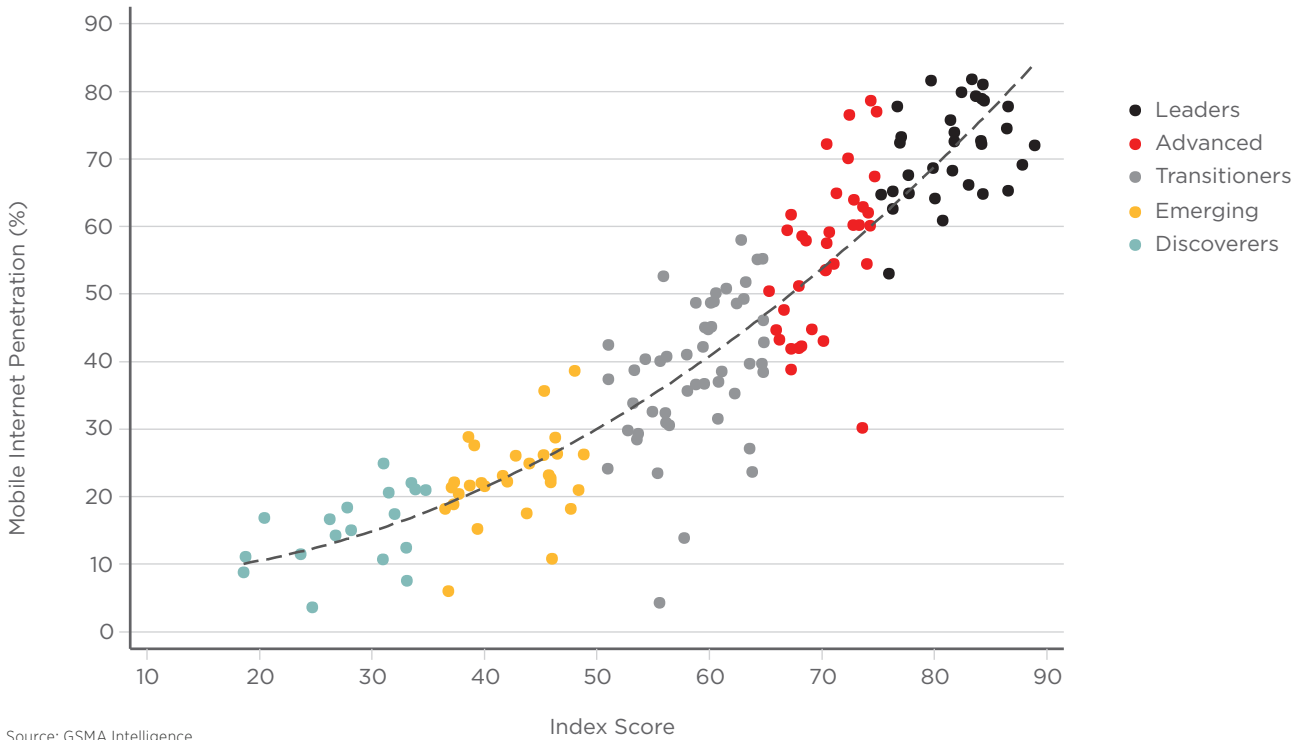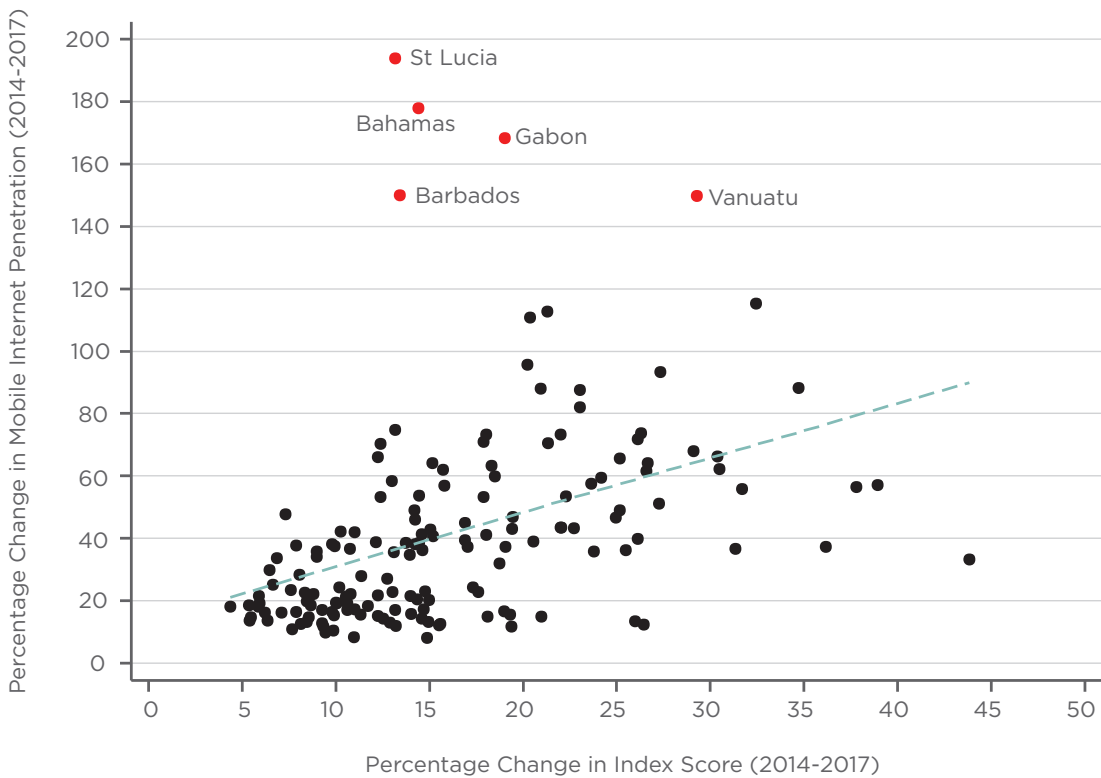

Source: GSMA Intelligence

Figure 14

Changes in mobile internet penetration and Index scores (2014–2017)

Source: GSMA Intelligence. Five outliers have been removed with more than 200% increases in mobile internet adoption.

Aside from the general relationship between changes in the Index score and mobile internet adoption, certain outliers stand out in Figure 14, where countries achieved a significant increase in mobile internet penetration but a more limited change in the Index score between 2014 and 2017. Five countries in particular are highlighted – Bahamas, Barbados, Gabon, Saint Lucia and Vanuatu.

To explore the reasons behind this, we define a measure of 'performance' as a country's adoption of mobile internet relative to its Index score.[20] A lower score is associated with 'underperformance', i.e. a country has a low mobile internet adoption rate given its relatively high Index score.

Figure 15 presents changes in mobile internet adoption in 2017 against 2014 performance scores. Some of the countries with strong mobile internet penetration growth in 2017 (including the five countries above) had low performance scores three years beforehand, but by 2017 their performance scores were in line or closer to the overall average. This highlights that, for some countries, there can be a lag in in terms of creating the right enabling environment and observing increases in mobile internet adoption.

Figure 15

Underperformance in 2014 compared to growth in mobile internet penetration (2014–2017)
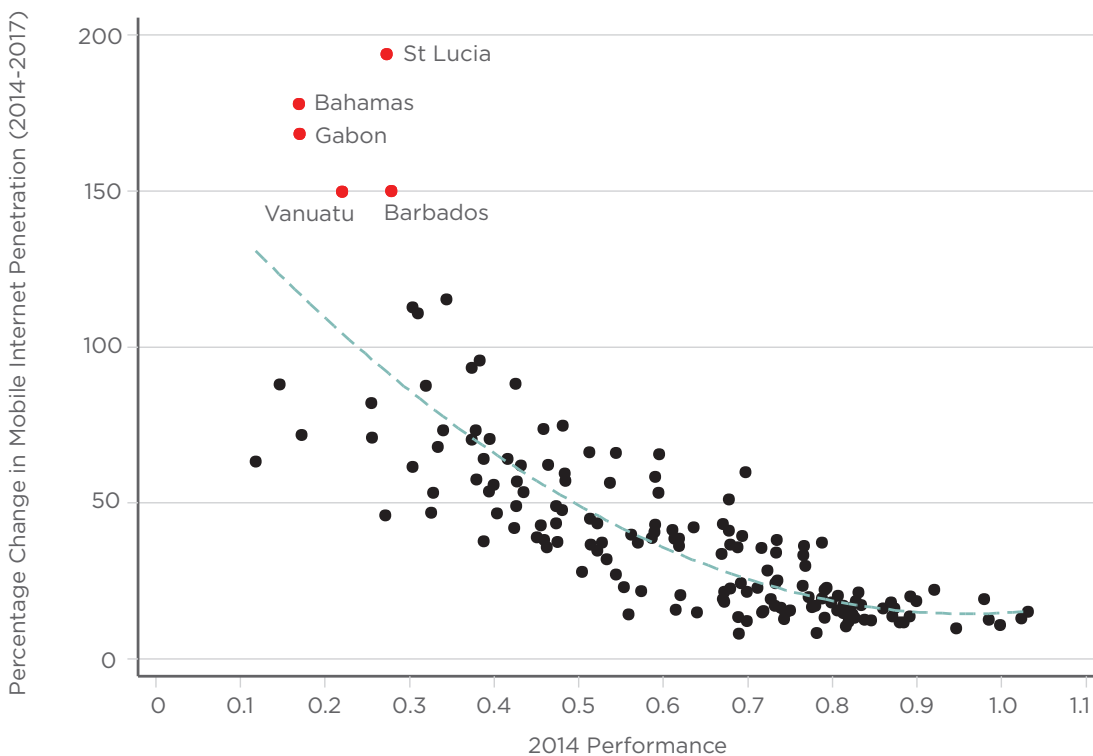
Source: GSMA Intelligence. Five outliers have been removed with more than 200% increases in mobile internet adoption.

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[20] Mobile internet penetration divided by index score

Regional analysis

Asia-Pacific

Asia-Pacific achieved the largest increase in average Index score between 2014 and 2017 (compared to other regions), bringing it close to the global average. The increase in infrastructure score was the largest of the enablers and resulted in the region surpassing the global score. Improvements in affordability also resulted in a small but significant positive gap compared to the global average. The biggest barrier remains in Content and Services: despite good progress, the region continues to lag on this enabler. This is primarily driven by the dimension score for availability, which suggests a lack of content in local languages for many countries.

The region continues to be led by Australia, New Zealand, Singapore, South Korea, Hong Kong and Japan. However, several countries have moved into the Advanced cluster over the previous three years, and China is close to meeting the threshold for the Leaders cluster. The majority of countries are now in the first three clusters, whereas in 2014 half were in the Emerging cluster. Only Afghanistan remains in the Discoverers cluster.

Mobile internet adoption trends

	2014	**2015**	**2016**	**2017**
Mobile internet subscribers (m)	1,190	1,373	1,555	1,735
Mobile internet penetration (%)	29%	34%	38%	42%

Source: GSMA Intelligence

Average Index and enabler scores
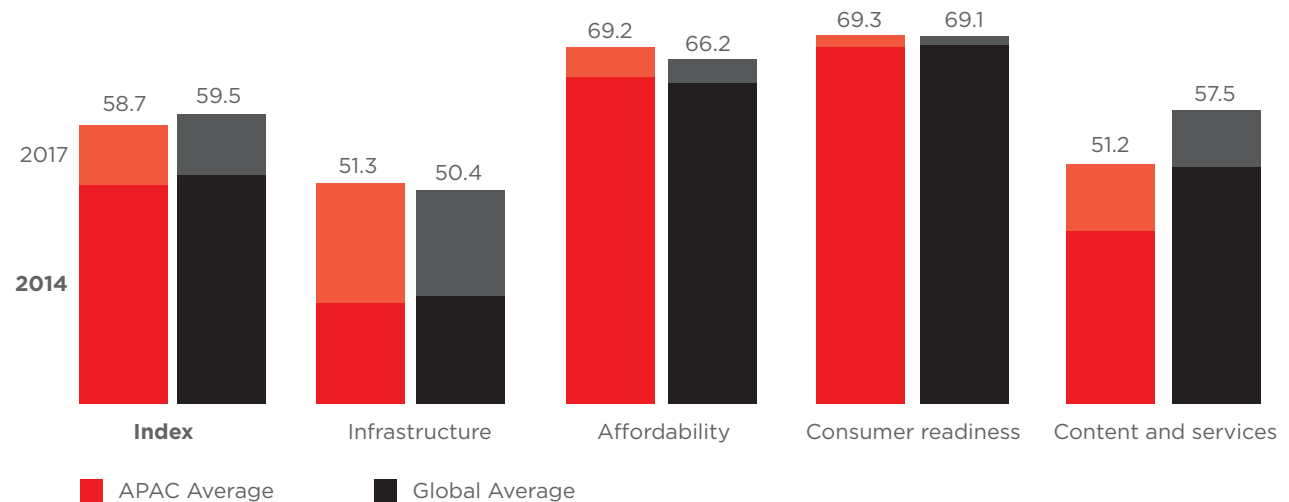
Source: GSMA Intelligence

MOBILE INTERNET CONNECTIVITY IN ASIA-PACIFIC:
2014-2017

INFRASTRUCTURE

3G population coverage

75% > 91%

an additional 750 million people

4G population coverage

36% > 80%

an additional 1.9 billion people

(Source: GSMA Intelligence)

Average download speeds increased from
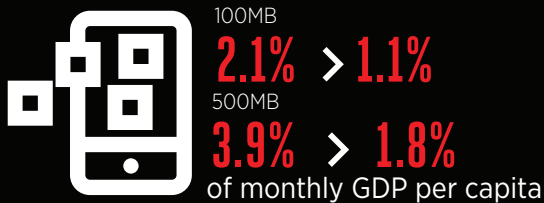
3.0 Mbps to 8.9 Mbps

Average upload speeds increased from

1.2 Mbps to 3.6 Mbps

(Source: GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data)

AFFORDABILITY

Fall in average monthly cost of data

100MB
2.1% > 1.1%
500MB
3.9% > 1.8%
of monthly GDP per capita

(Source: GSMA Intelligence calculations based on data from Tarifica)

Fall in average cost of entry-level internet enabled device from

4.0% > 2.7%

of GDP per capita

Inequality – average Gini coefficient

36

(Source: World Bank)

CONSUMER READINESS[21]

Adult literacy is

86%
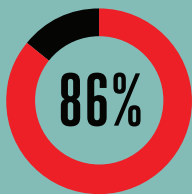
(Source: UN)

Adults have completed an average of

8.7 years

years of schooling

(Source: UN)

Mobile internet gender gap

4% East Asia and Pacific

70% South Asia

(Source: GSMA)

CONTENT AND SERVICES

Mobile social media penetration

22%   41%

840 million additional accounts
(Source: We Are Social)

Increase of **900,000** active mobile applications developed locally, bringing total to **1.5 million.**

27% of all active mobile apps in the world in 2017 developed in the region

(Source: Appfigures)

[21] With regards to consumer readiness indicators, no trends are presented as there has been little change since 2014

Country scores by cluster

| Cluster	Country	Score	
Leaders	Australia	88.94	
	New Zealand	87.85	
	Singapore	86.55	
	South Korea	83.37	
	Hong Kong	80.73	
	Japan	80.04	
Advanced	**China**	**73.98**	▲
	Thailand	**70.66**	▲
	Malaysia	**67.97**	▲
	Philippines	**67.25**	▲
	Brunei Darussalam	**66.93**	▲
Transitioners	Samoa	63.79	
	Kazakhstan	63.58	
	Vietnam	63.03	
	Indonesia	**61.12**	▲
	Georgia	**60.20**	▲
	Fiji	60.13	
	Mongolia	**58.79**	▲
	Tonga	**57.77**	▲
	Sri Lanka	**55.63**	▲
	Vanuatu	**55.39**	▲
	Armenia	**54.27**	▲
	India	**53.67**	▲
	Bhutan	**53.57**	▲
	Azerbaijan	**53.31**	▲
	Myanmar	**53.22**	▲
	Kyrgyzstan	**51.03**	▲
Emerging	Bangladesh	48.35	
	Cambodia	47.99	
	Uzbekistan	46.31	
	Papua New Guinea	46.03	
	Solomon Islands	45.91	
	Laos	45.31	
	Tajikistan	43.77	
	Nepal	**39.11**	▲
	Timor-Leste	**38.70**	▲
	Pakistan	**37.08**	▲
Discoverers	Afghanistan	20.41	

▲ = moved up a cluster since 2014

Most improved countries – Myanmar, India, Bhutan, Indonesia and Vietnam

2017 Score
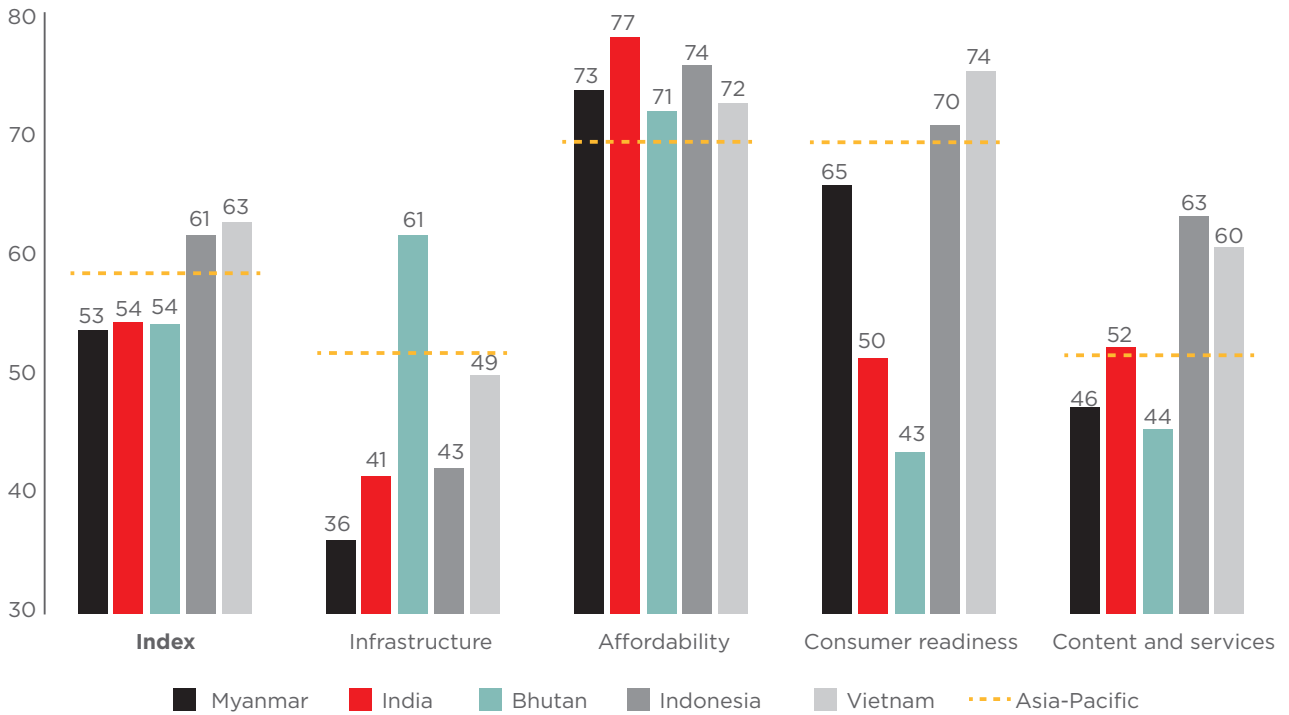
Change in score (2014-2017)
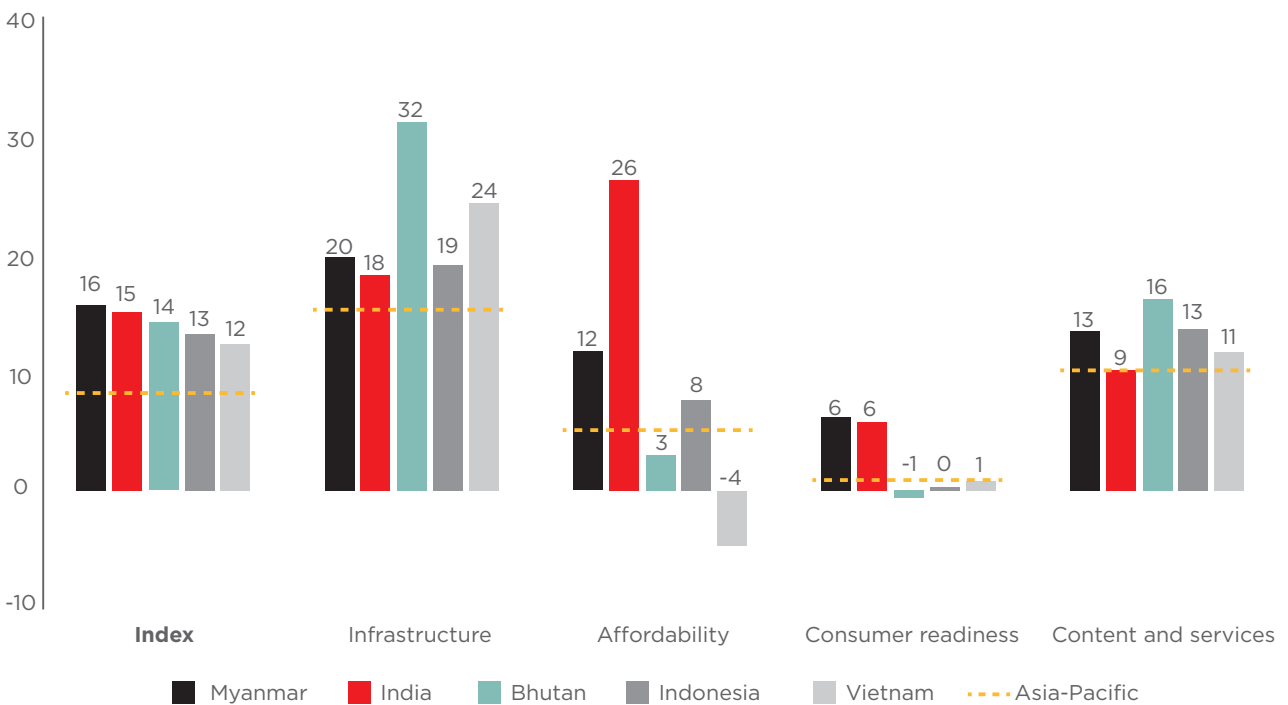
Source: GSMA Intelligence

Bhutan

Bhutan's improved performance between 2014 and 2017 was driven by infrastructure in particular, pushing it above the regional average. The Bhutan Infocomm & Media Authority (BICMA) assigned two 2x20 MHz lots in the 700 MHz spectrum band to operators in 2016 and 2017 respectively, increasing its dimension score for spectrum. As a result, network coverage expanded rapidly, with 4G coverage increasing from 10% in 2014 to more than 70% in 2017, and 3G coverage increasing from 50% to more than 80%. At the same time, Bhutan's operators were able to provide better quality services, with download and upload speeds substantially improving. Bhutan's mobile internet adoption rate consequently increased from 21% in 2014 to 29% in 2017.

In order to achieve further progress, consumer readiness should remain an important area of focus as Bhutan scores well below the regional average. This is caused by relatively lower literacy rates and school attendance as well as high levels of gender inequality in education, financial inclusion and income, which are a barrier to the adoption of mobile internet among women. Furthermore, while the country made significant progress on the development of locally relevant content and services (particularly mobile applications and social media), its overall score remains below the regional average. It is therefore important that momentum on this enabler is maintained.

Vietnam

Vietnam's improvement in its infrastructure score was driven by exceptionally rapid rollout of 4G networks to 95% of the country's population in 2017.[22] This also improved the quality of service experienced by mobile users, with download and upload speeds doubling in 2017 compared to the previous year and latencies falling by 30%.[23] There was however a fall in affordability, specifically for handset devices.

Nevertheless, with enhanced network coverage, quality of service, a high consumer readiness score (relative to the Asia-Pacific average) and a significant increase in local content and services (for example, the number of apps available in Vietnamese increased from around 35,000 in 2014 to more than 120,000 in 2017[24]), mobile internet adoption in the country increased from 34% in 2014 to almost 50% in 2017.

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[22] Source: GSMA Intelligence. Also see "Viettel launches 4G with 'nationwide' coverage", TeleGeography, April 2017; and "VNPT-Vinaphone installed 15,000 4G BTS in 2017", TeleGeography, April 2018
[23] Source: GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data
[24] Source: Appfigures

MENA

MENA achieved the second largest increase in average Index score between 2014 and 2017 (after Asia-Pacific), bringing it slightly higher than the global average. The increase in content and services score was particularly significant when compared to the relatively smaller global increase. This was driven by strong improvements in both the local relevance and availability dimensions, as countries in the region produced more local content in local languages. The biggest gap remains consumer readiness, both with respect to basic skills and especially gender equality. Scores for the latter reflect a significant gender gap for mobile internet usage in the region, which stood at 21% in 2017. [25]
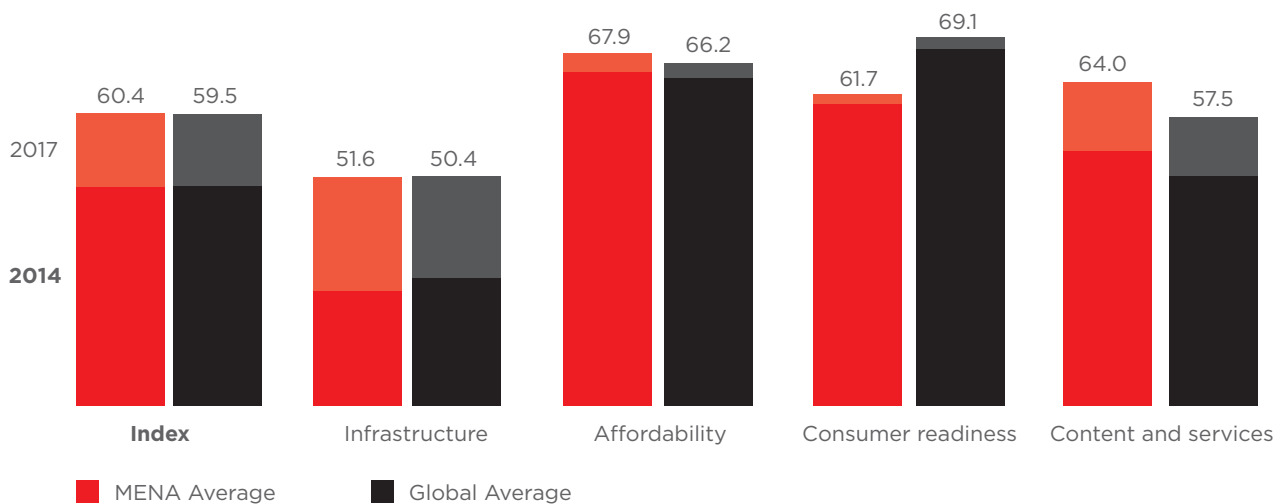
The stronger performers remain Israel and high-income Gulf states, with Qatar and UAE close to joining the Leaders cluster. The majority of countries are in the Advanced and Transitioners clusters, with notable improvements by Iran, Turkey and Libya. Only Mauritania remains in the Discoverers cluster.

Mobile internet adoption trends

	2014	2015	2016	2017
Mobile internet subscribers (m)	162	183	204	222
Mobile internet penetration (%)	29%	33%	36%	38%

Source: GSMA Intelligence

Average Index and enabler scores

	Index	Infrastructure	Affordability	Consumer readiness	Content and services
MENA Average	60.4	51.6	67.9	61.7	64.0
Global Average	59.5	50.4	66.2	69.1	57.5

■ MENA Average ■ Global Average

Source: GSMA Intelligence

[25] Source: GSMA

MOBILE INTERNET CONNECTIVITY IN MENA:
2014-2017

INFRASTRUCTURE

3G population coverage

69% > 85%

an additional **120 million** people

4G population coverage

11% > 51%

an additional **240 million** people

(Source: GSMA Intelligence)

Average download speeds increased from
2.0 Mbps to 7.6 Mbps
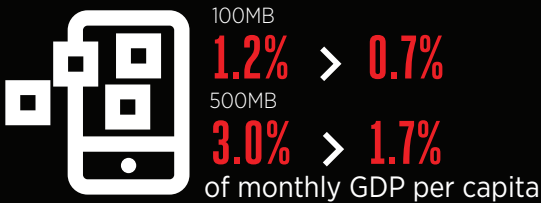
Average upload speeds increased from
0.6 Mbps to 3.2 Mbps

(Source: GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data)

AFFORDABILITY

Fall in average monthly cost of data

100MB
1.2% > 0.7%
500MB
3.0% > 1.7%
of monthly GDP per capita

(Source: GSMA Intelligence calculations based on data from Tarifica)

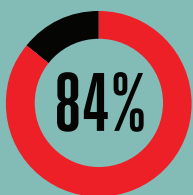**Average cost of entry-level internet enabled device** stable at

2.5%

of GDP per capita

Inequality – average Gini coefficient

36

(Source: World Bank)

CONSUMER READINESS[21]

Adult literacy is

84%

(Source: UN)

Adults have completed an average of

7.8 years

years of schooling

(Source: UN)

Mobile internet gender gap

21%

(Source: GSMA)

CONTENT AND SERVICES

Mobile social media penetration

19%   43%

150 million additional accounts

(Source: We Are Social)

Increase of **110,000** active mobile applications developed locally, bringing total to **185,000.**

3% of all active mobile apps in the world in 2017 developed in the region

(Source: Appfigures)

[21] With regards to consumer readiness indicators, no trends are presented as there has been little change since 2014

Country scores by cluster

Cluster	Country	Score	
Leaders	**Israel**	**77.08**	▲
Advanced	Qatar	74.35	
	UAE	74.27	
	Bahrain	71.07	
	Saudi Arabia	**70.41**	▲
	Kuwait	**70.40**	▲
	Oman	**69.12**	▲
	Turkey	**68.21**	▲
	Lebanon	**67.29**	▲
Transitioners	Jordan	60.84	
	Tunisia	60.38	
	Iran	**59.43**	▲
	Libya	**58.79**	▲
	Morocco	**58.04**	▲
	Egypt	56.45	
	Algeria	**55.93**	▲
Emerging	Iraq	46.46	
	Sudan	**39.71**	▲
	Yemen	**36.81**	▲
Discoverers	Mauritania	33.48	

▲ = moved up a cluster since 2014

Most improved countries – Iran, Turkey, Libya, Jordan, Morocco
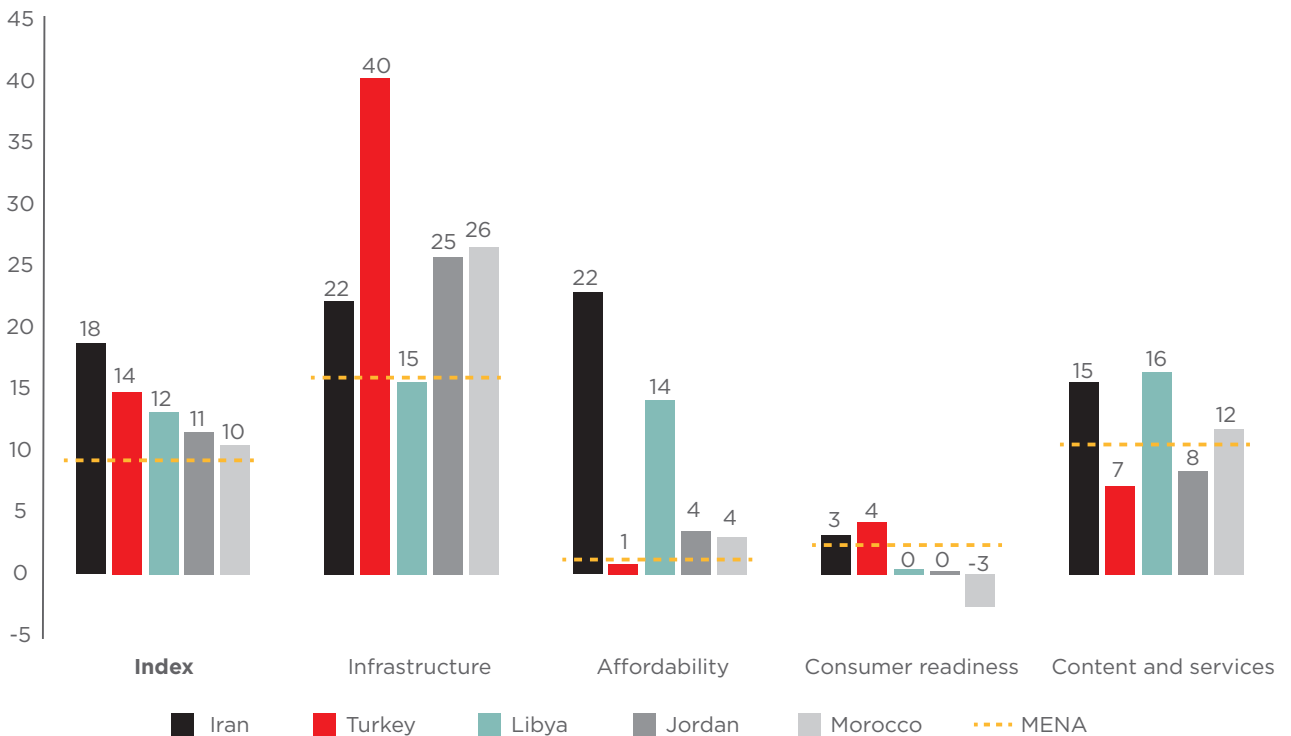
2017 Score
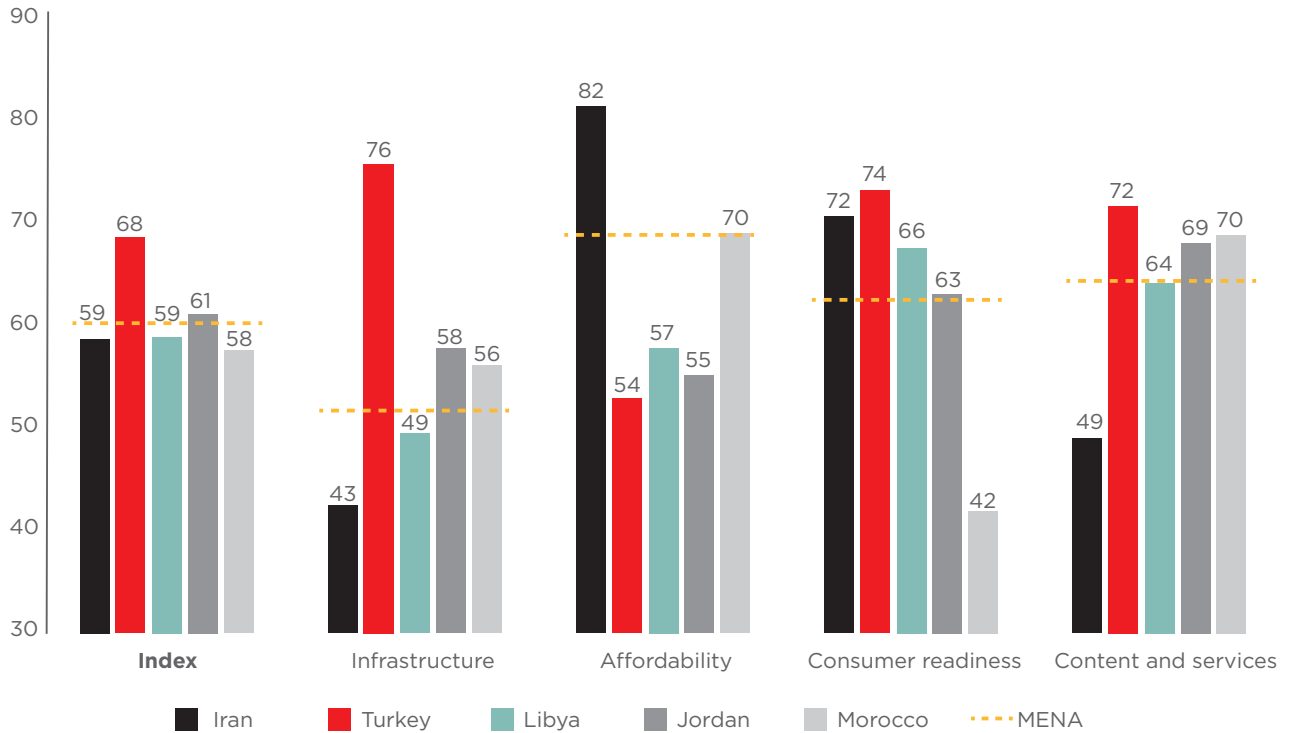
Change in score (2014-2017)

Source: GSMA Intelligence

Turkey and Jordan

Turkey increased its Index score to almost 70, driven by an improvement in its infrastructure score, which was the largest of all countries in the Index between 2014 and 2017. Following the assignment of 800 MHz spectrum in 2015, operators quickly rolled out 4G networks to 90% of the population by 2017. The assignment of spectrum in the 2600 MHz capacity band also helped operators improve network quality for users, with average download speeds almost tripling between 2015 and 2017 to 28 Mbps.[26]

The improvement in Jordan's performance was also primarily due to a significant increase in its infrastructure score, with 4G coverage reaching more than 90% of the population and download and upload speeds more than doubling between 2015 and 2017.[27]

The improvement in infrastructure, along with consumer readiness and content scores that are above the regional average, resulted in mobile internet penetration increasing from 37% in 2014 to 42% in 2017 in Turkey and from 32% to 37% in Jordan.

Going forward, the most significant barrier to further mobile internet adoption in both countries is affordability. In particular, their taxation scores are among the lowest in the world, with sector-specific taxes that account for more than one-fifth of the total cost of mobile ownership for consumers. Rebalancing sector-specific consumer taxes would therefore drive a significant improvement in the Index score for both Turkey and Jordan by making mobile more affordable for consumers, especially those on low incomes.

26 Source: GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data
27 Source: GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data

Latin America and the Caribbean

Latin America and the Caribbean continues to perform above the global average in terms of the overall Index score. The region compares especially well in terms of consumer readiness and the availability of locally relevant content and services. The two largest barriers (relative to other regions) remain infrastructure and especially affordability. The latter is primarily driven by higher levels of inequality – the average Gini-coefficient in the region is higher than all others – and taxation. Consumers and operators are subject to a substantial tax burden, with the region's average score for the tax dimension (61) the second lowest after Sub-Saharan Africa. Rebalancing sector-specific consumer taxes and regulatory fees will therefore be important to promote greater internet connectivity. [28]

A large number of countries in the region have improved their performance since 2014, when only Chile was in the Advanced cluster. There are now eight countries in this cluster, with Bahamas, Uruguay and Chile close to the threshold for joining the Leaders. With the exception of Haiti, which remains in the Discoverers cluster, all countries are in the Advanced or Transitioners clusters.

Mobile internet adoption trends

	2014	2015	2016	2017
Mobile internet subscribers (m)	249	274	299	321
Mobile internet penetration (%)	40%	44%	47%	50%

Source: GSMA Intelligence

Average Index and enabler scores
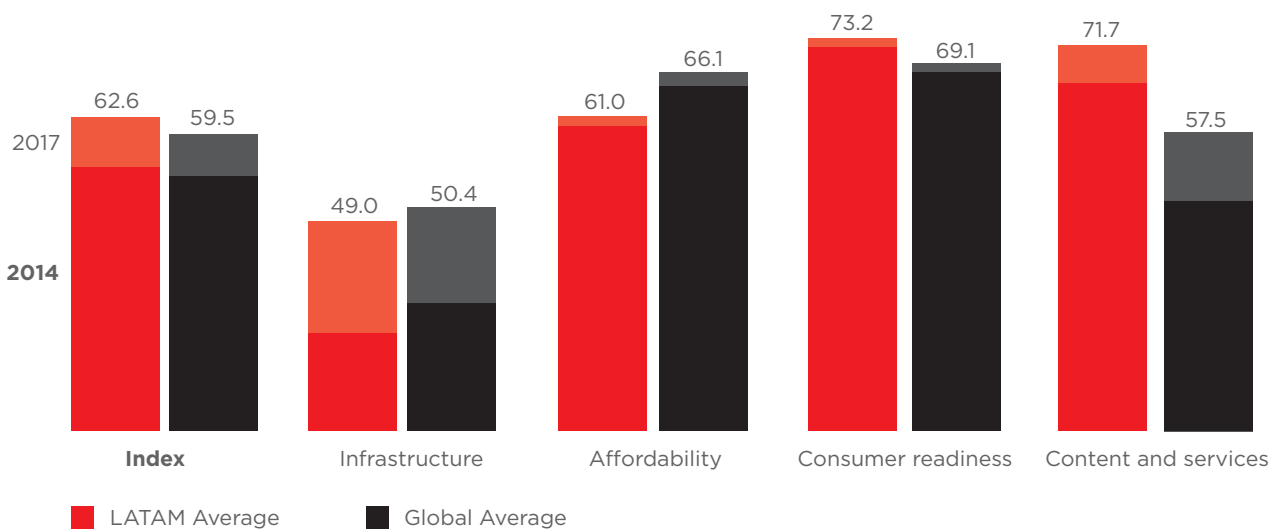
Source: GSMA Intelligence

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[28] For further details, see Taxing mobile connectivity in Latin America, GSMA Intelligence, 2017

MOBILE INTERNET CONNECTIVITY IN LATIN AMERICA:
2014-2017

INFRASTRUCTURE

3G population coverage

83% > 92%

an additional 70 million people

4G population coverage

31% > 78%

an additional 300 million people

(Source: GSMA Intelligence)

Average download speeds increased from
0.9 Mbps to 5.6 Mbps
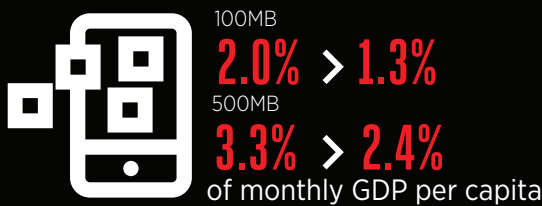
Average upload speeds increased from
0.3 Mbps to 2.5 Mbps

(Source: GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data)

AFFORDABILITY

Fall in average monthly cost of data

100MB
2.0% > 1.3%
500MB
3.3% > 2.4%
of monthly GDP per capita

Average cost of entry-level internet enabled device
stable at
0.8%
of GDP per capita

(Source: GSMA Intelligence calculations based on data from Tarifica)

Inequality – average Gini coefficient
45

(Source: World Bank)
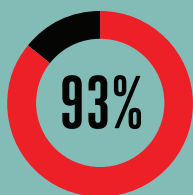
CONSUMER READINESS[21]

Adult literacy is
93%

(Source: UN)

Adults have completed an average of
8.7 years
years of schooling

(Source: UN)

Mobile internet gender gap
4%

(Source: GSMA)

CONTENT AND SERVICES

Mobile social media penetration

36%   56%

135 million additional accounts
(Source: We Are Social)

Increase of **160,000** active mobile applications developed locally, bringing total to **240,000.**

4% of all active mobile apps in the world in 2017 developed in the region

(Source: Appfigures)

[21] With regards to consumer readiness indicators, no trends are presented as there has been little change since 2014

Country scores by cluster

Advanced	Bahamas	**73.61** ▲
	Uruguay	**73.34** ▲
	Chile	72.81
	Barbados	**70.15** ▲
	Mexico	**67.94** ▲
	Argentina	**67.28** ▲
	Peru	**66.61** ▲
	Ecuador	**66.23** ▲
Transitioners	Trinidad and Tobago	64.86
	Colombia	64.81
	Paraguay	64.78
	Brazil	64.76
	Costa Rica	64.27
	Bolivia	63.57
	Panama	62.83
	Venezuela	62.40
	Jamaica	62.23
	Dominican Republic	61.50
	Guatemala	60.75
	Belize	59.55
	Saint Lucia	57.99
	El Salvador	56.20
	Nicaragua	**56.08** ▲
	Guyana	**55.59** ▲
	Honduras	**54.91** ▲
Discoverers	Haiti	33.85

▲ = moved up a cluster since 2014

Most improved countries – Guatemala, Guyana, Uruguay, Bahamas and Panama

2017 Score

Legend: Guatemala, Guyana, Uruguay, Bahamas, Panama, Latin America

	Index	Infrastructure	Affordability	Consumer readiness	Content and services
Guatemala	61	50	63	63	69
Guyana	56	31	64	66	73
Uruguay	73	65	71	80	78
Bahamas	74	63	72	79	81
Panama	63	48	59	76	72

Change in score (2014-2017)

Legend: Guatemala, Guyana, Uruguay, Bahamas, Panama, Latin America

	Index	Infrastructure	Affordability	Consumer readiness	Content and services
Guatemala	10	16	0	9	12
Guyana	10	13	10	0	8
Uruguay	9	23	1	1	6
Bahamas	9	21	2	1	7
Panama	9	16	8	0	6

Source: GSMA Intelligence

Guatemala

Guatemala was the region's most improved country between 2014 and 2017, increasing its score by 10 points. Whereas the majority of countries that have made good progress in the Index have done so with exceptional gains in one or two enablers, Guatemala achieved strong progress on three enablers. It improved its infrastructure score with the rollout of 4G networks (from 10% population coverage in 2014 to more than 50% in 2017) and enhanced network quality.[29] This was accompanied by the development of more locally relevant content and services, including e-government, social media platforms and mobile applications. Lastly, Guatemala achieved an almost 10-point increase in its consumer readiness score, the largest gain of all countries in the Index.

This was driven by improvements in skills, with increases in education outcomes (such as adult literacy and schooling); and gender equality, with increases in gender parity ratios for education and financial inclusion.[30]

As a result, mobile internet adoption increased from 23% in 2014 to 32% in 2017.[31] However, despite achieving strong progress, Guatemala's overall Index score remains below the regional average. It is therefore important that its infrastructure score continues to improve and that mobile is made more affordable, especially to those in the bottom 40% by income distribution.

Uruguay

Uruguay has consistently been one of the region's best performers across all four enablers. Between 2014 and 2017, 3G and 4G population coverage reached 95% and 88% respectively[32], while download speeds and upload speeds more than quadrupled to 10 Mbps and 5 Mbps respectively.[33] The assignment of 700 MHz spectrum in 2017 should also allow operators to maintain their progress on network coverage and quality metrics. Compared to most other countries in the region, Uruguay's tax policy is better aligned with best-practice principles of taxation, with no sector-specific taxation on mobile usage. As a result, its affordability score is much higher than the majority of other countries in the region; for example, the cost of a 500 MB data plan is around 1% of monthly GDP per capita compared to a regional average of 2.4%.

Combining these factors with above-average scores for consumer readiness and the development and availability of locally relevant content, in 2017 Uruguay had one of the highest levels of mobile internet adoption in the region at 60% (an increase from 53% in 2014)[34] and is now close to joining the Leaders cluster.

[29] Source: GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data
[30] Source: UNESCO and World Bank Global Findex
[31] Source: GSMA Intelligence and GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data
[32] Source: GSMA Intelligence and GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data
[33] Source: GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data
[34] Source: GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data

Sub-Saharan Africa

Sub-Saharan African continues to perform below the global average across both the Index and the four enablers. However, countries in the region have started to reduce the gap on consumer readiness and affordability. The latter was driven by improved scores for handset and mobile data affordability in particular. Going forward, the region will need to maintain its progress in this area while also accelerating improvements in infrastructure and the development of local content and services.
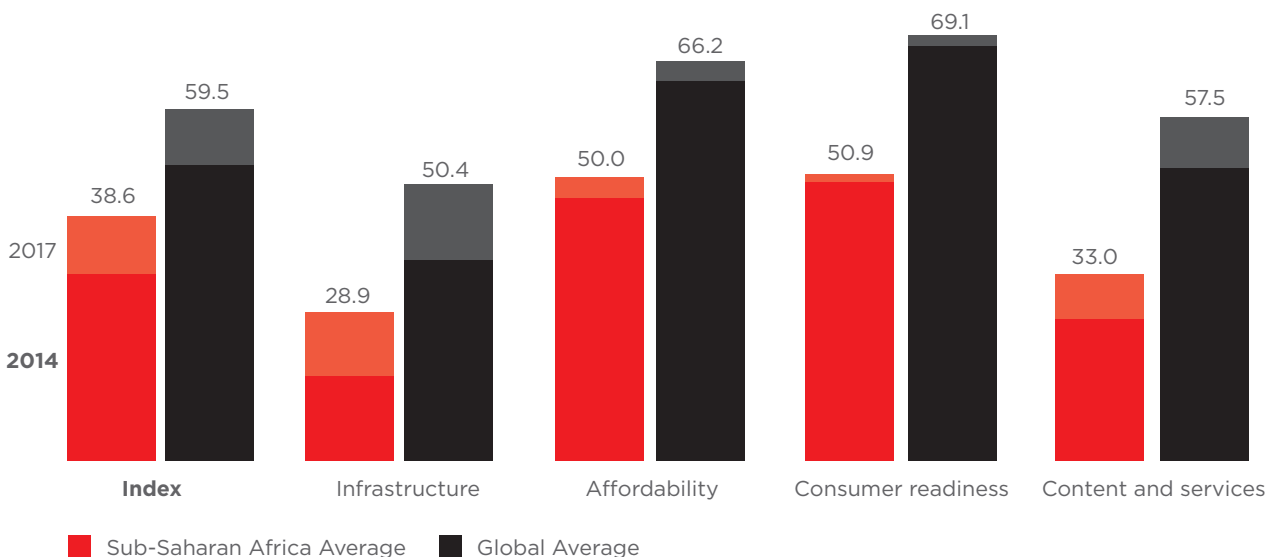
Although no country in Sub-Saharan Africa is in the Advanced cluster, Mauritius is close to the threshold. Furthermore, several other countries have improved their performance since 2014, with four joining the Transitioners cluster (Cabo Verde, Ghana, Botswana and Kenya) and 10 moving from the Discoverers to the Emerging cluster. As a result, fewer than half of the countries in the region are now in the Discoverers cluster (compared to two thirds in 2014).

Mobile internet adoption trends

	2014	2015	2016	2017
Mobile internet subscribers (m)	126	154	180	211
Mobile internet penetration (%)	14%	16%	19%	21%

Source: GSMA Intelligence

Average Index and enabler scores

	Index	Infrastructure	Affordability	Consumer readiness	Content and services
Sub-Saharan Africa Average (2017)	38.6	28.9	50.0	50.9	33.0
Global Average	59.5	50.4	66.2	69.1	57.5

Sub-Saharan Africa Average   Global Average

Source: GSMA Intelligence

MOBILE INTERNET CONNECTIVITY IN SUB-SAHARA AFRICA:
2014-2017

INFRASTRUCTURE

3G population coverage

48% > 60%

an additional **150 million** people

4G population coverage

8% > 28%

an additional **200 million** people

(Source: GSMA Intelligence)

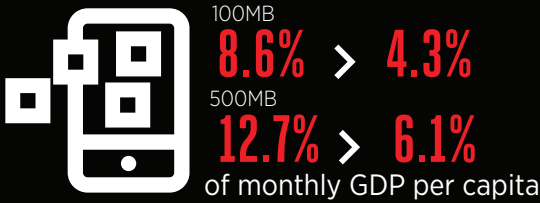Average download speeds increased from
0.5 Mbps to 2.4 Mbps

Average upload speeds increased from
0.2 Mbps to 0.9 Mbps

(Source: GSMA Intelligence calculations based on analysis by Ookla of Speedtest Intelligence data)

AFFORDABILITY

Fall in average monthly cost of data

100MB
8.6% > 4.3%

500MB
12.7% > 6.1%

of monthly GDP per capita

Fall in average cost of entry-level internet enabled device

5.3% > 4.6%

of GDP per capita

Inequality – average Gini coefficient

44

(Source: GSMA Intelligence calculations based on data from Tarifica)
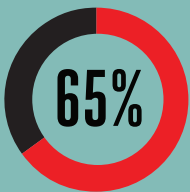
(Source: World Bank)

CONSUMER READINESS[21]

Adult literacy is

65%

(Source: UN)

Adults have completed an average of

5.2 years

years of schooling

(Source: UN)

Mobile internet gender gap

34%

(Source: GSMA)

CONTENT AND SERVICES

Mobile social media penetration

5.5%   9.0%

40 million additional accounts

(Source: We Are Social)

Increase of **30,000** active mobile applications developed locally, bringing total to **40,000.**

0.7% of all active mobile apps in the world in 2017 developed in the region

(Source: Appfigures)

[21] With regards to consumer readiness indicators, no trends are presented as there has been little change since 2014

Country scores by cluster

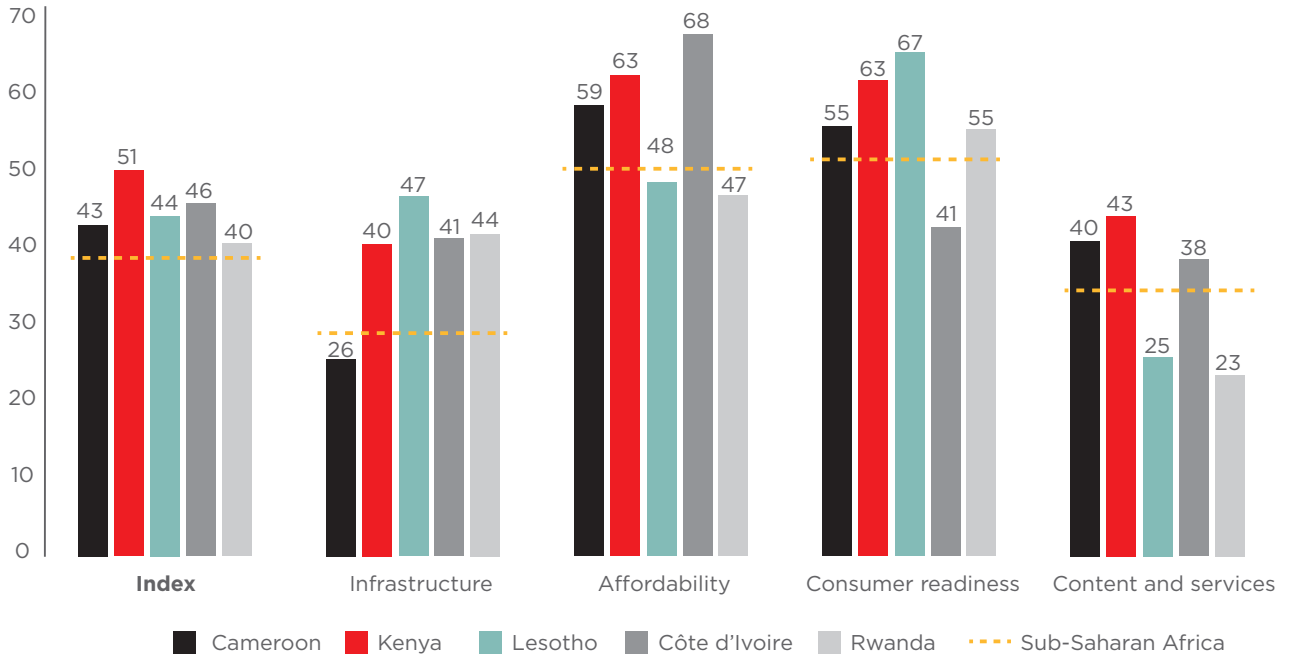|		
Transitioners	Mauritius	64.66
	South Africa	59.89
	Cabo Verde	**56.17** ▲
	Ghana	**52.73** ▲
	Botswana	**51.00** ▲
	Kenya	**50.95** ▲
Emerging	Angola	48.84
	Gabon	47.68
	Nigeria	45.91
	Côte d'Ivoire	45.73
	Namibia	45.25
	Lesotho	**43.99** ▲
	Cameroon	**42.76** ▲
	Congo	42.04
	Zimbabwe	**41.63** ▲
	Rwanda	**40.01** ▲
	Tanzania	**39.40** ▲
	Swaziland	**38.59** ▲
	Ethiopia	**37.68** ▲
	Senegal	**37.30** ▲
	Benin	**37.25** ▲
	Uganda	**36.49** ▲
Discoverers	Sierra Leone	34.75
	Liberia	33.08
	Madagascar	33.01
	Togo	31.97
	Zambia	31.48
	Mozambique	31.03
	Gambia	30.95
	Guinea	28.14
	Mali	27.81
	Congo, Democratic Republic	26.76
	Burkina Faso	26.24
	Burundi	24.67
	Malawi	23.66
	Chad	18.73
	Niger	18.56

▲ = moved up a cluster since 2014

Most improved countries – Cameroon, Kenya, Lesotho, Côte d'Ivoire, Rwanda

2017 Score

Legend: Cameroon · Kenya · Lesotho · Côte d'Ivoire · Rwanda · Sub-Saharan Africa

Change in score (2014-2017)

Legend: Cameroon · Kenya · Lesotho · Côte d'Ivoire · Rwanda · Sub-Saharan Africa
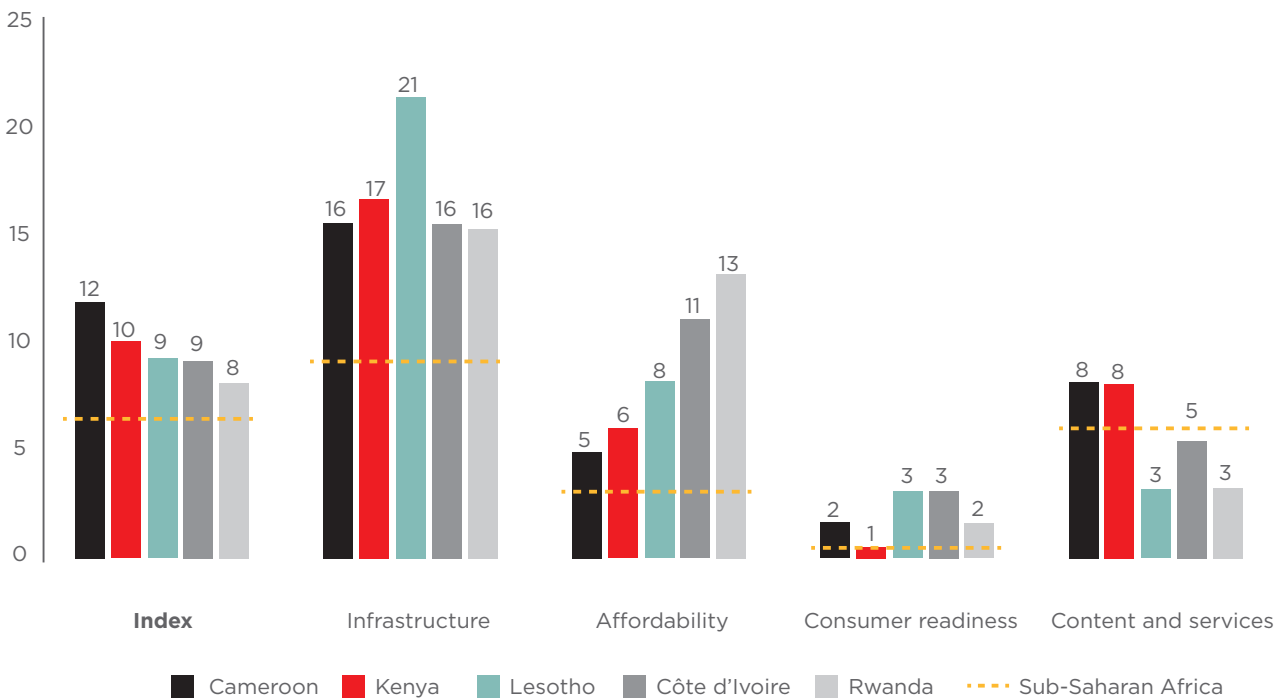
Source: GSMA Intelligence

Kenya

Kenya's improved performance on infrastructure and affordability pushed it into the Transitioners cluster in 2017. The former was driven by improved network coverage, with 3G coverage increasing from 67% in 2014 to 85% in 2017 and 4G coverage reaching more than a third of the population. Network quality was enhanced, notably in terms of latencies. The country also improved the enabling infrastructure that supports mobile connectivity: more than half the population now have access to electricity, compared to around 30% in 2014.[35] The country has also established additional Internet Exchange Points.[36] The affordability of mobile data baskets improved, especially for a 500 MB allowance; in 2017, this cost 1.3% of monthly GDP.

per capita compared to 3.7% in 2014.[37] Lastly Kenya, along with Uganda and Tanzania, has benefitted from exponential 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.[38] More than 4 million people in Kenya connected to the mobile internet between 2014 and 2017, increasing adoption from 16% to 24%.

Compared to its peers in the Transitioners cluster, Kenya's key areas for improvement are the continued improvement of infrastructure (in particular the widespread rollout of 4G and improving network quality), content and enhancing digital skills.

Rwanda

In 2017, Rwanda achieved the highest level of 4G coverage in Sub-Saharan Africa, reaching more than 90% at the start of 2018.[39] Improvements in affordability also meant the cost of purchasing mobile data plans ranged from 1.8% of GDP per capita (for 100 MB of data) to 8.53% (for 1 GB data and an allowance of voice minutes and SMS). This compares to 9% and more than 50% respectively in 2014.[40] As a result, more than 1 million people in Rwanda connected to the mobile internet between 2014 and 2017, increasing adoption from 13% to 22%.

Moving forward, Rwanda still has progress to make in terms of local content development compared to the regional average, especially by facilitating more content in Kinyarwanda. Also, despite progress, affordability in Rwanda remains a barrier, especially for the poorest 40% by income distribution.

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35 Source: Sustainable Energy For All
36 Source: Packet Clearing House
37 Source: GSMA Intelligence calculations based on data from Tarifica and ITU
38 Source: Appfigures
39 Source: GSMA Intelligence. Also see "Rwandan 4G network hits 95% coverage", TeleGeography, January 2018
40 Source: GSMA Intelligence calculations based on data from Tarifica and ITU

Rural connectivity and the gender gap

Many factors help to explain the spread of performance in the Index across different countries. In some instances it is due to controllable factors, such as positions on specific policies (e.g. spectrum allocation or sector-specific taxation). In other instances, it is due to less controllable factors such as geography, the proportion of the population living in rural locations or strong social norms that limit female internet adoption.

Negative correlation between Index score and size of rural population

In low- and middle-income countries there is a negative correlation between the Index scores and the size of a country's rural population (see Figure 16). Certain markets that are achieving relatively high scores despite having large rural populations can, however, be highlighted and potentially learned from. Of course each market is different and not all examples can be copied; for example, many of the predominantly rural countries that perform well on the Index are small Caribbean and Pacific Island states whose experience cannot be repeated in most African and Asian countries. Connectivity will also be impacted by factors such as population density, geography and terrain. Nevertheless, there are still several countries that can potentially offer lessons to others, such as Vietnam, the Philippines, Bhutan and Kenya. There are also potential lessons from other markets that have explored alternative policies and initiatives to expand network coverage in rural areas. Examples include infrastructure sharing in Brazil, tax rebates on capital investment in rural areas in Malaysia[41] and national roaming in Tanzania.[42]

Figure 16

Relationship between Index scores and rural population in low- and middle-income countries
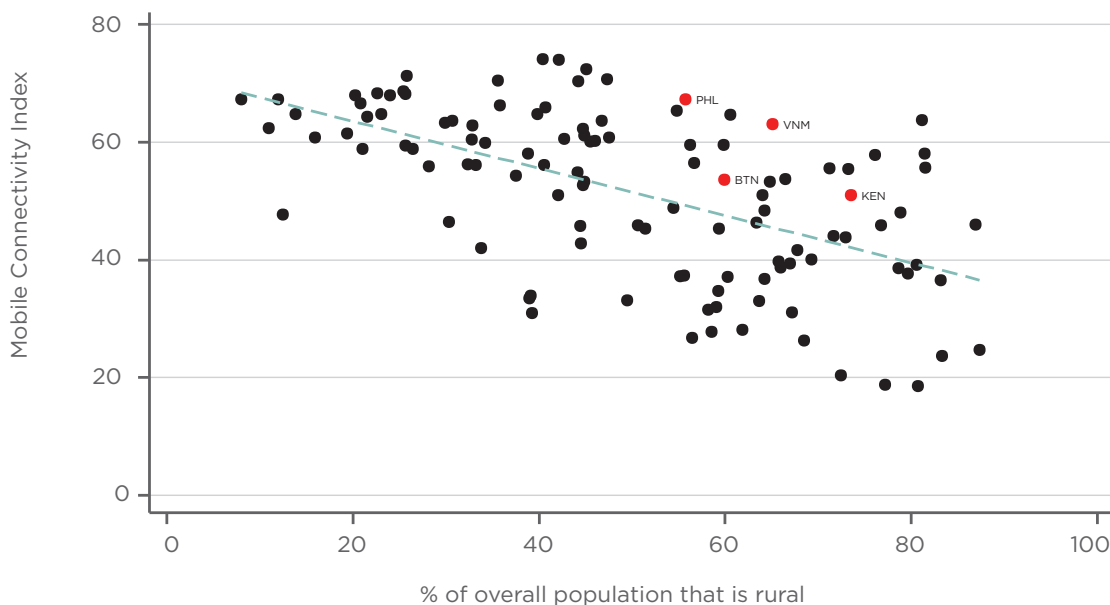
Source: GSMA Intelligence

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[41] For a further discussion on these, see Enabling Rural Coverage, GSMA, 2018
[42] For a further discussion on this, see Tanzania rural coverage pilots: Performance report, GSMA, 2018

A large mobile internet gender gap negatively affects a country's Index score

Within the consumer readiness enabler is the gender equality dimension. This in turn is comprised of five individual indicators. All these indicators are strong predictors of the mobile internet gender gap – they include gender parity ratios for literacy, schooling, financial inclusion, labour force participation and income. Figure 17 shows there is a strong relationship between the gender equality dimension and the gender gap in internet access for low- and middle-income countries.[43] It also highlights certain markets that have been able to shrink the gender gap in internet access despite wider gender inequalities in the country (i.e. the extent of gender inequality in these countries would suggest a much bigger gender gap for internet access than is actually the case).

As with the analysis for rural connectivity, certain countries could be outperforming on the gender gap given their gender equality score due to factors that are not directly controllable by ICT policymakers (for example, income levels). Nevertheless, countries that have been able to shrink the gender gap in mobile internet usage may offer lessons for other countries with larger gender gaps.
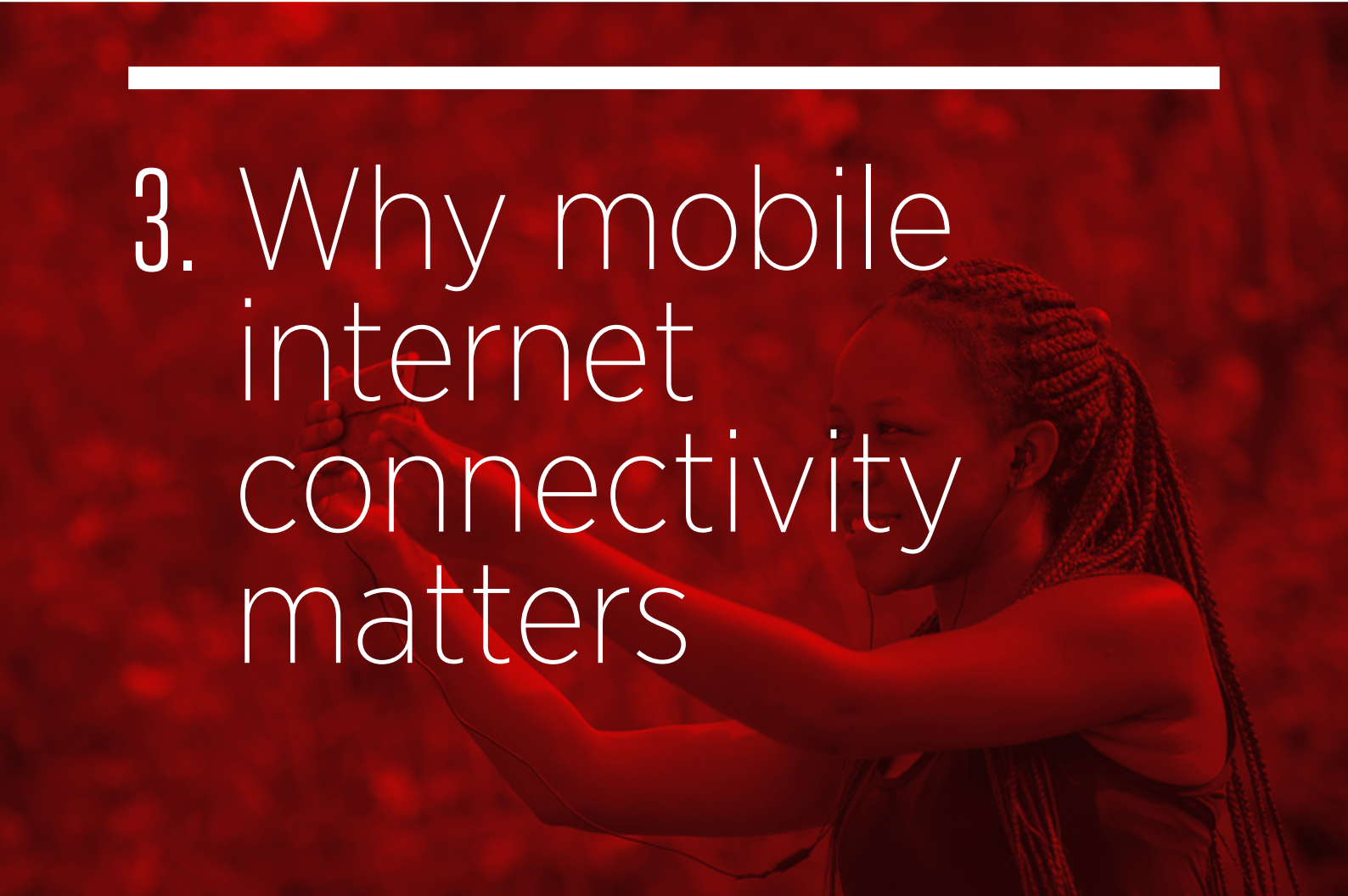
Figure 17

Relationship between gender equality score in Index and internet access gender gap in low- and middle-income countries, 2017
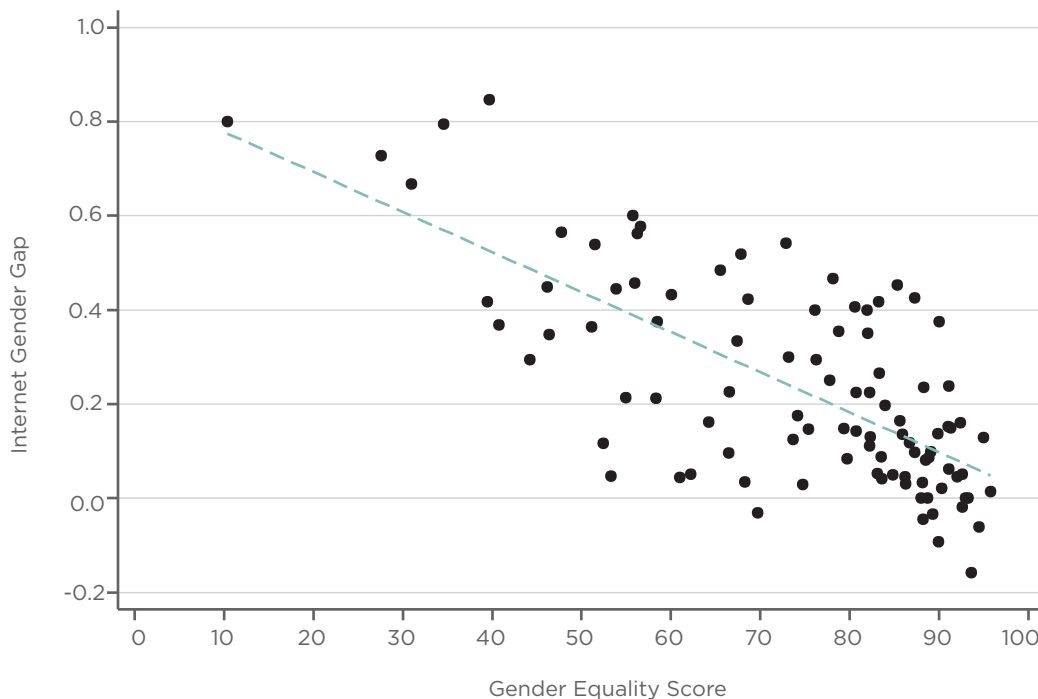
Source: GSMA Intelligence and Gallup World Poll

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[43] While this is not mobile-specific, in practice the majority of users in low- and middle-income countries access the internet via mobile.

3. Why mobile internet connectivity matters

Economic benefits

The economic benefits of connectivity and access to the internet have been well documented by, for example, the World Bank[44] (subsequently updated by Scott[45]), Czernich[46], Zaballos[47] and Edquist et al.[48] A number of studies also demonstrate the specific benefits of mobile, such as those by the GSMA[49] and Gruber.[50] These show that mobile internet connectivity has brought about material increases in productivity, providing more efficient ways for consumers, workers and businesses to trade, communicate and access information.

The economic impact of mobile is also reflected in the industry's contribution to the global economy, which in 2017 amounted to $3.6 trillion or 4.5% of total GDP.[51] In many low- and middle-income countries, this proportion is even higher – for example, in Sub-Saharan Africa it accounted for 7.1% of total GDP in 2017.[52]

[44] Economic Impacts of Broadband, World Bank, 2009
[45] Does Broadband Internet Access Actually Spur Economic Growth?, Colin Scott, 2012
[46] Broadband Infrastructure and Economic Growth, CESifo, 2009
[47] Socioeconomic Impact of Broadband in Latin American and Caribbean Countries, Inter-America Development Bank, 2012
[48] How important are mobile broadband networks for global economic development?, Imperial College Business School, 2017
[49] What is the impact of mobile telephony on economic growth?, GSMA, Deloitte and Cisco, 2012.
[50] Mobile telecommunications and the impact on economic development, Gruber and Koutroumpis, 2011
[51] Mobile Economy 2018, GSMA, 2018
[52] Mobile Economy Sub-Saharan Africa, GSMA, 2018

Social benefits

In addition to the economic impact, mobile internet can drive material improvements in social outcomes (health, education and personal freedoms) and overall quality of life. For example, a study published by the GSMA and Gallup found that mobile phone ownership supplemented with internet access is associated with an improvement in peoples' lives, with increases in average life evaluations and net positive emotions.[53] The GSMA's annual Mobile Industry Impact Report highlights how mobile technology contributes to the achievement of the UN Sustainable Development Goals.[54]

The importance of mobile and internet access to society is also reflected in the Social Progress Index (SPI), developed by the Social Progress Imperative.[55] The SPI is a unique tool that measures social progress in a systematic and comprehensive way, incorporating a wide range of social outcomes that matter to people, for example personal safety, personal freedom, access to water and sanitation, health and wellness (further details of the SPI are provided in Appendix 2).

Mobile internet is viewed as an important platform to freely access and exchange information, and therefore can be considered a fundamental building block of social progress. As stated in the Social Progress Index report, *"the ability of one individual to connect with others via phone or internet facilitates learning, an exchange of ideas, social fabric, and exposure to different views and cultures".* [56] It also allows citizens to educate themselves about their community, their country and the world, promoting broader cooperation and understanding. For these reasons, one of the components that constitutes the SPI is Access to Information and Communications, which includes measures of mobile adoption and internet access.

To illustrate the broader association between mobile internet connectivity and social progress, Figure 18 presents the overall relationship between the SPI and Mobile Connectivity Index in 2017. This shows that countries with higher mobile connectivity scores, and therefore high mobile internet adoption rates, have also achieved the greatest degree of social progress.

Figure 19 presents the relationship between changes in the SPI and Mobile Connectivity Index scores between 2014 and 2017. Countries that improved in the Index have also achieved strong improvements in the SPI.[57] Appendix 2 provides further analysis, which shows that this relationship holds even when a country's income per capita is controlled for.

Although it is not possible to infer any causal links from this analysis alone,[58] taking it into consideration with the other evidence discussed above shows that connectivity of societies is integral to quality of life and advancing social progress.

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[53] The Impact of Mobile on People's Happiness and Well-Being, GSMA, 2018

[54] 2017 Mobile Industry Impact Report: Sustainable Development Goals, GSMA, 2017

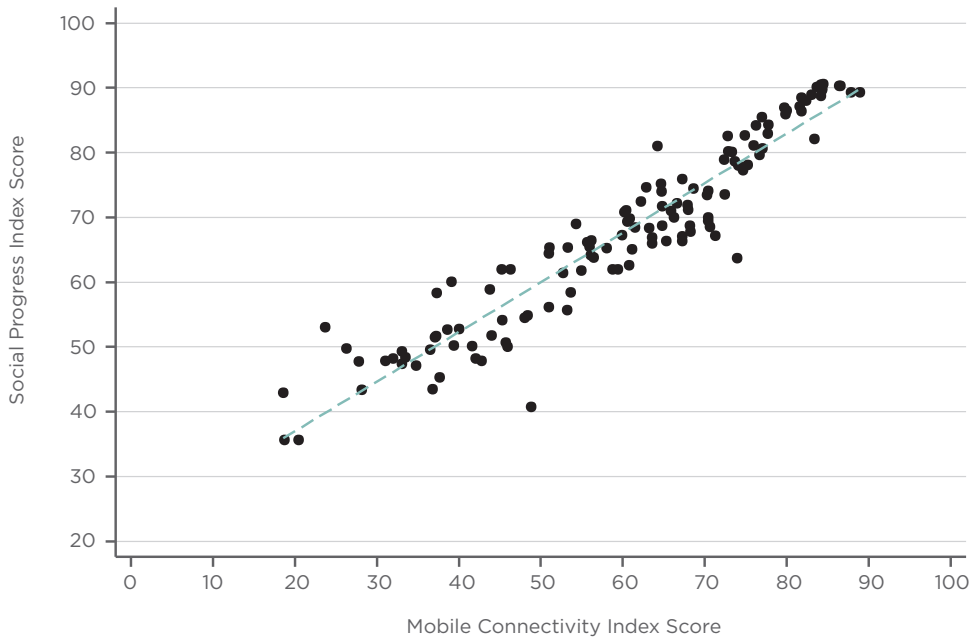[55] Social Progress Imperative, Social Progress Index 2017 Report. The index can be found at https://www.socialprogressindex.com/

[56] Social Progress Index 2017, Social Progress Imperative, 2017

[57] Both the SPI and Mobile Connectivity Index include indicators on adult literacy, while the SPI also includes indicators on the adoption of mobile and internet usage in its Access to Information and Communications component. This means there is some overlap between the two indices. As a sensitivity check, we carried out the analysis excluding the overlapping indicators also excluding the Access to Information and Communications component and the overall results did not change (i.e. there remains a positive and statistically significant correlation between the Mobile Connectivity Index and SPI both in terms of levels and changes).

[58] This is due to the likely bidirectional relationship between social progress and mobile internet connectivity, in that both are expected to drive each other (mobile connectivity may improve social outcomes but equally, one would expect mobile connectivity to be driven by levels of social progress).

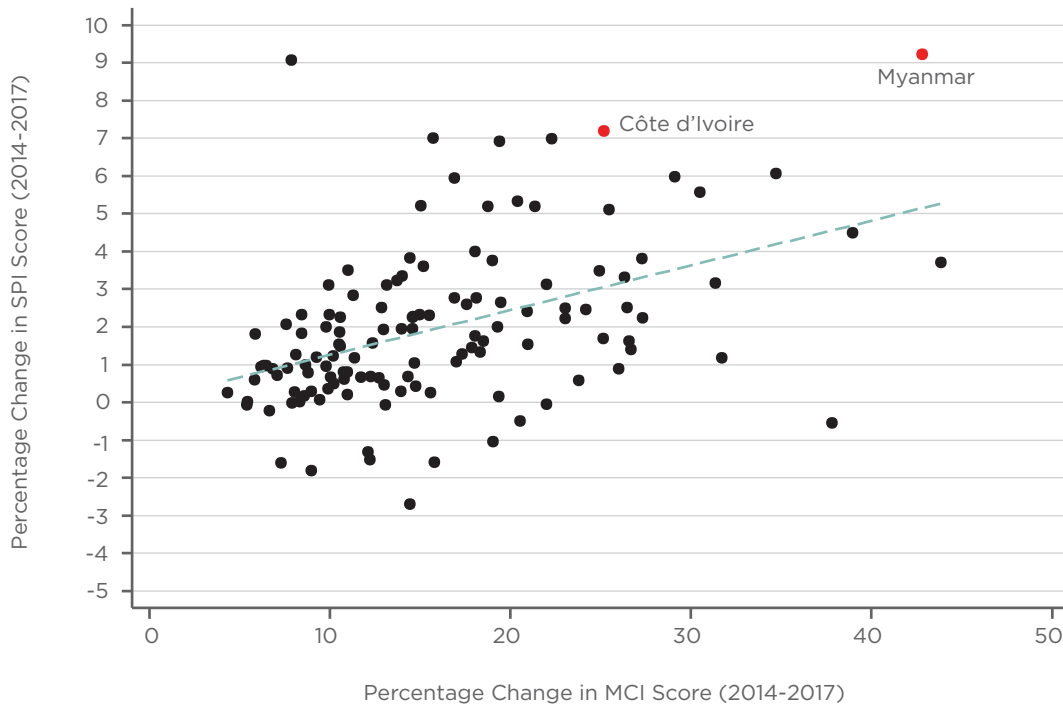## Relationship between Mobile Connectivity Index and SPI, 2017

Source: GSMA Intelligence and Social Progress Imperative

Changes in Mobile Connectivity Index and SPI scores, 2014–2017

Source: GSMA Intelligence and Social Progress Imperative

Myanmar

Myanmar was one of the most improved countries on both the Mobile Connectivity Index and SPI between 2014 and 2017. The government introduced a new telecommunications law in 2013 that led to the liberalisation of the sector and two new entrants. Spectrum was assigned in a transparent progress with technology- and service neutral licence conditions. The impacts materialised quickly: in 2013 a mobile subscriber had to pay $150 for a SIM card but two years later the cost had fallen to $1.50.[59] In 2013, 3G network coverage stood at 10% but increased to 90% by 2017. Over the same period, mobile internet adoption increased from around 10% to 34%.[60] The assignment of 1800 MHz in 2017 also allowed operators to begin rolling out 4G networks. The Mobile Connectivity Index also shows a strong increase in the country's content score from 2014 to 2017 (by 20 points), which was driven by the development of mobile applications; in 2017 there were almost 50,000 mobile apps available in Burmese, more than four times what was available in 2014.[61]

Between 2014 and 2017, Myanmar also saw strong growth across all dimensions of the SPI. Beyond Access to Information and Communications, the country experienced a number of particularly strong improvements: fewer deaths from infectious and non-communicable diseases, greater availability of affordable housing, better education outcomes – notably primary school enrolment – as well as advances in political rights, the elimination of corruption, and people's satisfaction with their life choices. While further research will be needed to determine the extent to which these advancements were induced by greater Access to Information and Communications, it is evident that in Myanmar overall gains in social progress go hand in hand with better Access to Information and Communications.

Going forward, given that Myanmar remains in the 'Low Social Progress' cluster of countries, it is important that progress is not only maintained but accelerated across all components of the SPI. On the Mobile Connectivity Index, all enabler scores (with the exception of affordability) are still below the average in Asia-Pacific, particularly for infrastructure. Further improvement is needed in terms of 4G rollout, network quality and enabling infrastructure such as electricity access, servers and IXPs. Myanmar's consumer readiness score also reflects a significant gender gap in mobile internet usage, which in 2017 stood at more than one third.[62] It is therefore important to enhance digital skills, especially for women, and support the development of more locally relevant content and services.[63]

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[59] Case study: Delivering affordable internet in Myanmar, Alliance for Affordable Internet, 2015
[60] Source: GSMA Intelligence
[61] Source: Appfigures
[62] The Mobile Gender Gap Report 2018, GSMA, 2018
[63] Mobile phones, internet and gender in Myanmar, GSMA and LIRNEasia, 2015

Côte d'Ivoire

Côte d'Ivoire was one of the most improved countries in Sub-Saharan Africa in the Mobile Connectivity Index between 2014 and 2017, with significant improvements in infrastructure (by 2017, 4G coverage reached almost half the population[64]), affordability (the cost of a 500 MB data plan in 2017 was less than a third of what it was in 2014[65]) and content development. As a result, mobile internet adoption reached almost 25% by 2017.[66]

Meanwhile, Côte d'Ivoire's increase in its SPI score was one of the largest worldwide, with improvements across all dimensions. Besides advancements in Access to Information and Communications, the country achieved remarkable decreases in deaths from infectious diseases as well as maternal mortality, higher primary school enrolment and literacy rate, lower perception of corruption and greater satisfied demand for contraception.

A contributory factor to Côte d'Ivoire's improved SPI performance was the extent to which mobile connectivity enabled the rollout of mobile money services in the country. With penetration among adults at 34% in 2017, this represents the eighth highest worldwide.[67] This has impacted a variety of social outcomes in the country; for example, by 2015, 99% of school registration fee payments were made digitally, 94% of which were made by mobile money. Operators have also started to offer pay-as-you-go solar products for customers to generate electricity in rural areas, providing an affordable solution to generate and access clean energy.[68]

Côte d'Ivoire still faces challenges in terms of advancing social progress (it falls in the SPI's 'Low Social Progress' cluster[69]) as well as increasing mobile internet connectivity. Many of those living in areas of network coverage in the country do not use mobile internet. In addition to continuing its progress on infrastructure, affordability and the development of content and services, it will also be essential to accelerate progress on consumer readiness, as it is currently the lowest enabler score both in absolute terms and relative to the average in Sub-Saharan Africa. The barriers to mobile internet adoption are explored in more detail in the GSMA report *Triggering mobile internet use in Côte d'Ivoire and Tanzania*.

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[64] Source: GSMA Intelligence
[65] Source: GSMA Intelligence calculations based on data from Tarifica
[66] Source: GSMA Intelligence
[67] Source: World Bank Findex 2017
[68] Country Overview: Côte d'Ivoire, GSMA, 2017
[69] Social Progress Index 2017, Social Progress Imperative, 2017

4. Accelerating mobile internet adoption

The Mobile Connectivity Index has been developed to support the efforts of the mobile industry and international community to deliver on the ambition of universal access to the internet and the benefits this can bring.

Significant progress in driving digital inclusion has been achieved; since 2014 almost 1 billion additional people have come online via the mobile internet. However, based on current trends, almost 50% of the world's population will still be offline by 2020 and 40% will still be offline by 2025. The cause of the mobile digital divide is complex and rooted in a range of social, economic and cultural factors. Achieving universal internet access requires an acceleration of efforts by the mobile industry, policymakers and the international community.

The benefits of overcoming the barriers to mobile internet adoption and delivering universal access will be transformative. Mobile internet connectivity has already been established as an important enabler of economic growth. This report has also presented evidence highlighting the strong relationship between mobile and social outcomes, and shows that connecting the offline population has the potential to offer significant advancements to people's quality of life.

The findings from the 2018 Mobile Connectivity Index indicate that action by the industry, governments and other stakeholders in the following areas will help accelerate mobile internet adoption and usage:

Infrastructure

- Focus on closing the coverage gap by continuing to develop and invest in alternative operating models and technology innovations that can unlock the revenue potential in rural areas, for example:[70]
    - infrastructure sharing deals to decrease the capital intensity of rural rollout
    - pursuing initiatives to identify the geographic location of unserved or underserved populations
    - deploying low-cost rural-specific sites to improve return on investment in targeted areas of low revenue potential.
- Enable mobile network operators to have timely and affordable access to spectrum, comprising both coverage and capacity bands.

Affordability

- Improve understanding of affordability issues: investigate the ways in which diverse population segments are affected by affordability issues and develop strategies for achieving affordable access based on this understanding.[71]
- Build on existing innovative approaches, and investigate new ones, to improve the affordability of mobile data plans (e.g. service-specific data bundles and earned data).
- Design solutions to make internet-enabled handsets more affordable: e.g. reduce the burden of the 'one-off payment' for consumers by providing microloans or instalment repayment plans with third parties (e.g. solar pay-as-you-go providers).[72]
- Review sector-specific taxes that can distort the market, to drive increased demand and investment.

Consumer readiness

- Understand the difference in mobile internet adoption between different demographics, especially women versus men and rural versus urban, then establish strategies and targets to close any gaps.
- Work to improve general literacy and school attendance as this will help establish the basic tools people often require to use the internet.
- Integrate ICT technical/literacy skills and digital skills into education.[73]
- Build digital skills; for example operators could do so by leveraging their agent network and equipping them to provide education, advice and training where necessary, recognising that women may need additional support.[74] [75]

Content and services

- Focus on developing content and services that are locally relevant (including using local languages), in particular those that appeal to currently unconnected groups.
- Design and/or encourage others to design mobile internet products and services that are user friendly and meet the needs of those who are less confident and literate: e.g. clear user menus with fewer steps, simplified content (websites, apps), comprehensible terminology, local language, icons/symbols/pictures/comic-style stories in addition to (or instead of) text.
- Ensure that online government services are accessible to all, including individuals with lower levels of literacy and digital skills.

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[70] For a further discussion on these, see Enabling Rural Coverage, GSMA, 2018
[71] This is a recommendation from the Broadband Commission Working Group on the Digital Gender Divide in Recommendations for action: bridging the gender gap in Internet and broadband access and use
[72] Accelerating affordable smartphone ownership in emerging markets, GSMA, 2017
[73] This is a recommendation from the Broadband Commission Working Group on the Digital Gender Divide in Recommendations for action: bridging the gender gap in Internet and broadband access and use
[74] An example of this can be found in Mobile Internet Skills Training Toolkit: Tigo Rwanda Pilot Evaluation, GSMA, 2018
[75] Triggering mobile internet use among men and women in South Asia, GSMA, 2017

Appendix 1: Indicators in the Mobile Connectivity Index

Figure A1 provides a list of indicators for each dimension in the Index along with the weightings that have been used to aggregate the indicators into dimensions, the dimensions into enablers, and the enablers into an overall index score. The weightings chosen for the enablers, dimensions and indicators reflect a combination of statistical analysis, consumer survey evidence and expert opinion.

With respect to consumer readiness, we would ideally include measures of *digital skills and awareness* but comparable and accurate measures of this are currently lacking across a large number of countries. We therefore use more traditional educational metrics as proxies for digital skills, while for gender equality we incorporate metrics that are strong predictors of the gender gap in mobile internet connectivity. As better data is collected over time, we will update the indicators and methodology accordingly.

Each indicator is normalised to ensure consistent units of measurement, before being aggregated to produce scores at the dimension, enabler and overall index level. For the Mobile Connectivity Index, indicators are normalised, such that each country has a score within a range of 0 to 100, with a higher score representing stronger performance.

Details of how the weights are calculated, the normalisation method as well as other methodological considerations are set out in a technical methodology note (available on the Mobile Connectivity Index web tool[76]).

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[76] www.mobileconnectivityindex.com

Figure A1

Index structure, weights and sources

ENABLER	DIMENSION	INDICATOR	SOURCE
Infrastructure (25%)	**Mobile infrastructure (30%)**	2G Coverage (20%)	ITU
		3G Coverage (40%)	GSMA Intelligence
		4G Coverage (40%)	
	Network performance (30%)	Average mobile download speeds (33%)	Speedtest Intelligence Data from Ookla
		Average upload speeds (33%)	
		Average latencies (33%)	
	Other enabling infrastructure (20%)	Access to electricity (% of population) (30%)	SE4ALL
		International internet bandwidth per internet user (30%)	ITU
		Secure Internet Servers per 1 million people (30%)	World Bank
		Internet Exchange Points (IXPs) per 10 million people (10%)	Packet Clearing House
	Spectrum (20%)	Digital dividend spectrum #per operator (45%)	GSMA Intelligence
		Other sub-1GHz spectrum per operator (20%)	
		Above 1GHz spectrum per operator (35%)	
Affordability (25%)	**Mobile tariffs (25%)**	Cost of 100MB data (% of monthly GDP per capita) (40%)	Tarifica
		Cost of 500MB data (% of monthly GDP per capita) (40%)	
		Cost of 1GB data (% of monthly GDP per capita) (20%)	
	Handset price (25%)	Cost of cheapest internet-enabled device (% of GDP per capita) (100%)	Tarifica
	Taxation (25%)	Tax as a % of total cost of mobile ownership (50%)	GSMA Intelligence
		Sector-specific tax as a % of TCMO (50%)	
	Inequality (25%)	Gini co-efficient (100%)	World Bank
Consumer readiness (25%)	**Basic skills (50%)**	Literacy (25%)	UNESCO
		School life expectancy (25%)	
		Years of schooling (25%)	
		Tertiary enrollment (25%)	
	Gender equality (50%)	Gender parity index for literacy (25%)	UNESCO
		Gender parity index for mean years of schooling (30%)	
		Gender parity ratio for financial account access (25%)	World Bank Findex
		Gender parity index for labour participation ratio (10%)	ILO
		Gender parity index for income (10%)	UNDP
Content and services (25%)	**Local relevance (50%)**	Generic Top-Level Domains (gTLDs) and Country Code Top-Level Domains (ccTLD) per person (20%)	ZookNIC
		Online Service Index score for E-Government (20%)	UN
		Mobile social media penetration (30%)	We Are Social
		Mobile apps developed per person (30%)	AppFigures
	Availability (50%)	No. of mobile apps available in national language(s) (50%)	AppFigures and Ethnologue
		Accessibility of the most popular mobile apps (50%)	

Appendix 2: Analysis of Mobile Connectivity Index and Social Progress Index

This appendix provides additional background on the Social Progress Index (SPI) and more detailed analysis on the relationship between the Mobile Connectivity Index and SPI.

Social Progress Index

The SPI defines social progress as the *"capacity of a society to meet the basic human needs of its citizens, establish the building blocks that allow citizens and communities to enhance and sustain the quality of their lives, and create the conditions for all individuals to reach their full potential."*

It is explicitly focused on non-economic outcomes and treats traditional economic measures such as income per capita as distinct from (though still associated with) social progress.

In order to fully capture the multidimensional nature of social progress, the SPI follows a conceptual framework that outlines three broad categories of social progress (referred to as dimensions):

- Basic Human Needs
- Foundations of Wellbeing
- Opportunity.

Each of these is further broken down into four underlying components, set out in Figure A2. These are in turn composed of several social and environmental indicators, for example the 'Nutrition and Basic Medical Care' component is constructed using indicators that measure undernourishment, maternal mortality, child mortality, deaths from infectious diseases and the depth of food deficit.[77]

Figure A2

Social Progress Index framework

BASIC HUMAN NEEDS

- Nutrition and Basic Medical Care
- Water and Sanitation
- Shelter
- Personal Safety

FOUNDATIONS OF WELLBEING

- Access to Basic Knowledge
- Access to Information and Communications
- Health and Wellness
- Environmental Quality

OPPORTUNITY

- Personal Rights
- Personal Freedom and Choice
- Tolerance and Inclusion
- Access to Advanced Education

The SPI is therefore a unique tool that measures social progress in a systematic and comprehensive way and helps countries move 'beyond GDP' to measure outcomes that matter to people.

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[77] Further details can be found at https://www.socialprogressindex.com/methodology
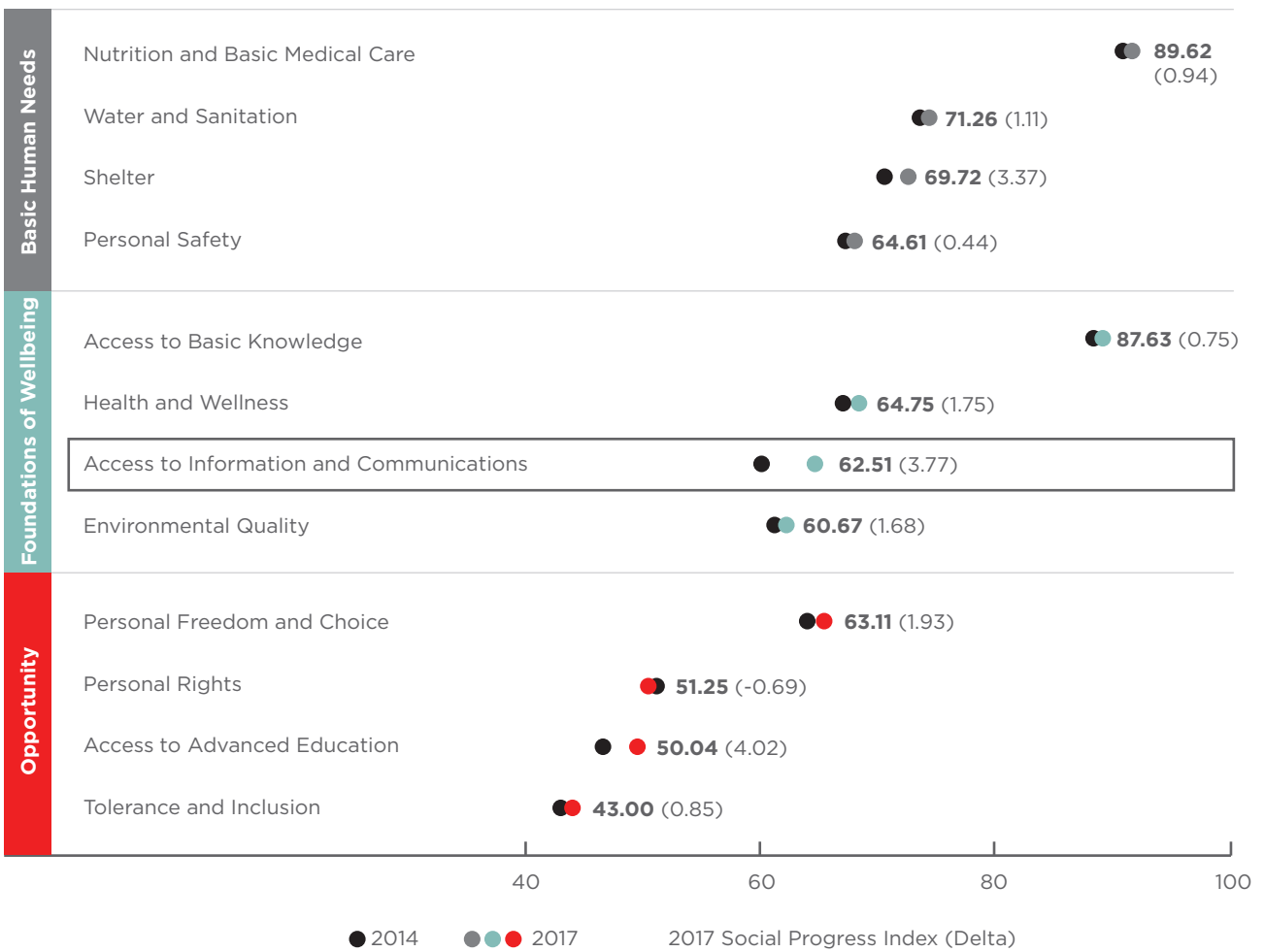
Trends in SPI

The 2017 SPI report highlighted overall improvements over time in the SPI score, and found that this positive change was mainly driven by two components, one of them Access to Information and Communications[78] (see Figure A3). The component experienced the second-largest component-level gains over the past four years and this advancement was mainly generated in lower-income countries by achievements in widespread access to mobile phone coverage and an increase in the number of subscriptions. This highlights the direct impact that mobile technology has had on social progress over the past four years.

Figure A3

Changes in SPI component scores (2014–2017)

Basic Human Needs	
Nutrition and Basic Medical Care	**89.62** (0.94)
Water and Sanitation	**71.26** (1.11)
Shelter	**69.72** (3.37)
Personal Safety	**64.61** (0.44)

Foundations of Wellbeing	
Access to Basic Knowledge	**87.63** (0.75)
Health and Wellness	**64.75** (1.75)
Access to Information and Communications	**62.51** (3.77)
Environmental Quality	**60.67** (1.68)

Opportunity	
Personal Freedom and Choice	**63.11** (1.93)
Personal Rights	**51.25** (-0.69)
Access to Advanced Education	**50.04** (4.02)
Tolerance and Inclusion	**43.00** (0.85)

● 2014   ●●● 2017   2017 Social Progress Index (Delta)

Source: Social Progress Imperative

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[78] The second component being Access to Advanced Education.

Relationship between Mobile Connectivity Index and SPI

Figure A4 presents the correlation coefficients for each of the SPI dimensions with the Mobile Connectivity Index and its enablers.[79] Given the potential for income to explain scores in both indices (i.e. the key driver of both high mobile internet connectivity and social progress could be a country's income level), it also presents partial correlations that control for the effect of GNI per capita. All correlations remain positive and statistically significant,[80] with the exception of the relationship between the Affordability enabler and Opportunity dimension.

Looking at the correlations between the Mobile Connectivity Index and the SPI dimensions, the relationship is strongest with Basic Human Needs and Foundations of Wellbeing. However, all three correlations are very high and still hold when income per capita is controlled for, so we can conclude that mobile connectivity is strongly linked to the three key aspects of social progress.

Similarly, all of the enablers in the Mobile Connectivity Index are strongly correlated with the SPI – affordability is weaker when controlling for GNI per capita but this is because the latter is a direct input into some of the indicator calculations.[81] The results therefore highlight that not only is mobile connectivity strongly linked with all components of social progress, but that this relationship is driven by both the quality of infrastructure and the availability of locally relevant content.

Figure A4

Correlation between Mobile Connectivity Index enablers and SPI dimensions, 2017

	SOCIAL PROGRESS INDEX	BASIC HUMAN NEEDS	FOUNDATIONS OF WELLBEING	OPPORTUNITY
Mobile Connectivity Index	0.95	0.92	0.92	0.85
partial correlation	0.66	0.54	0.65	0.53
Infrastructure	0.92	0.90	0.88	0.83
partial correlation	0.55	0.51	0.49	0.46
Affordability	0.76	0.80	0.75	0.65
partial correlation	0.07	0.33	0.15	0.02
Consumer readiness	0.88	0.85	0.84	0.79
partial correlation	0.50	0.43	0.47	0.43
Content and services	0.86	0.80	0.84	0.79
partial correlation	0.48	0.23	0.46	0.39

Source: GSMA Intelligence and Social Progress Imperative

[79] Similar to the analysis in Section 3 of the report, we carried out the analysis in this Appendix excluding the overlapping indicators between the Mobile Connectivity Index and SPI as well as the Access to Information and Communication component of the SPI. All the results in this Appendix still hold when that sensitivity is carried out (i.e. all positive and statistically significant correlations remain so).
[80] At the 1% level
[81] The price of mobile and handsets is expressed as a proportion of income per capita.

In addition to looking at the static relationship, we also used the availability of trend data to look at the relationship between changes in social progress and mobile connectivity between 2014 and 2017. Figure A5 presents correlations and partial correlations (controlling for income) between changes in the Mobile Connectivity Index and the SPI dimensions. While weaker than for static levels, it remains positive and statistically significant.[82]

Figure A5

Correlation between changes in Mobile Connectivity Index and SPI dimensions, 2014–2017

	SOCIAL PROGRESS INDEX	BASIC HUMAN NEEDS	FOUNDATIONS OF WELLBEING	OPPORTUNITY
Mobile Connectivity Index – full correlation	0.45	0.26	0.49	0.14
Mobile Connectivity Index – partial correlation	0.27	0.17	0.28	0.10

Source: GSMA Intelligence and Social Progress Imperative

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[82] The positive relationship also holds if SPI and its dimensions are regressed on the Mobile Connectivity Index score controlling for income and country-specific factors.

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