



Country overview: Colombia

Mobile industry collaborating with government to promote entrepreneurship and innovation





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Contents

Executive summary	4
1. Context	8
2. Mobile market overview	11
3. Economic contribution of the mobile sector in Colombia	18
4. Innovation: government supporting infrastructure and entrepreneurship	24
5. Policy: modernising taxation and future-proofing regulation	29
Appendix	36

Executive summary

Well-developed mobile infrastructure

Colombia, Latin America's third largest country by population and fourth largest economy, has performed well economically over the past decade. Government initiatives and policies under the Vive Digital (Live Digitally) plan have played a part in the economy's strong performance. The plan sets the country up for the long term in terms of the economy and improving the quality of life for citizens. The first phase promoted broadband coverage and adoption across the country – demographically, geographically and across all social classes. Mobile operators, incentivised by this digital agenda, have played their part, investing \$9 billion in networks and spectrum since the start of the decade. As a result, mobile broadband coverage in Colombia exceeds 90% for 3G, with 4G coverage expanding rapidly and now reaching nearly two-thirds of the population.

Further efforts ahead to address skills and innovation

Measures such as smartphone and mobile broadband adoption and mobile internet usage still lag in Colombia. There is a perception among potential mobile internet users that they lack the skills to use the internet. They have concerns over safety and security that need to be addressed too. Poverty and inequality are also big challenges for the country. This is reflected in a majority of non-mobile internet users citing affordability as a barrier.

The second phase of Vive Digital runs to 2018 and focuses on ICT skills, innovation and entrepreneurship.

This includes the establishment of 17 digital centres where anyone can learn digital content skills. Meanwhile, to increase the number of computer science-educated workers, the Apps.co programme has taught 67,000 Colombians how to code, in its self-styled 'bootcamps'. Additionally, the government is directly investing in and incubating start-ups through its iNNpulsa agency; from its inception in 2012 to early 2016, iNNpulsa invested around \$80 million in 1,200 ventures. There are local efforts too, such as Medellín's Ruta N, which has been incubating start-ups since 2010.

Mobile supporting the Colombian economy

In 2016, mobile technologies and services generated around \$10 billion in value-added terms, equivalent to nearly 3.8% of Colombia's total GDP. This figure is forecast to increase to more than \$13 billion or 4.2% of GDP by 2020. The mobile ecosystem overall supported around 64,000 jobs in 2016 and made a substantial contribution to the funding of the public sector, with approximately \$2.3 billion contributed in 2016 in the form of taxes and other regulatory fees.

Modernising the regulatory environment

Although the government has been supportive of the digital economy mostly through its infrastructure and innovation programmes, regulatory modernisation is needed to promote competition, raise quality of service, and ensure all ecosystem players are treated fairly. This will be key as the country seeks to be fully integrated as an OECD member. One particular issue the government should address is sector-specific taxation, which is the second highest in the region. Mobile telecoms is also taxed more heavily than fixed. These factors contribute to Colombia's lower-than-average mobile broadband and smartphone adoption rates.

COLOMBIA

Unique subscribers and connections



2016

32.3m

66% PENETRATION
(PERCENTAGE OF POPULATION)



2020

39.8m

79% PENETRATION
(PERCENTAGE OF POPULATION)



CONNECTIONS

(EXCL. M2M)

2016

51.1m

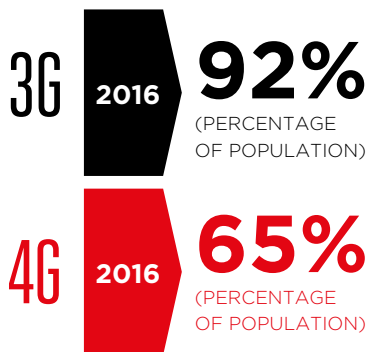
105% PENETRATION RATE

2020

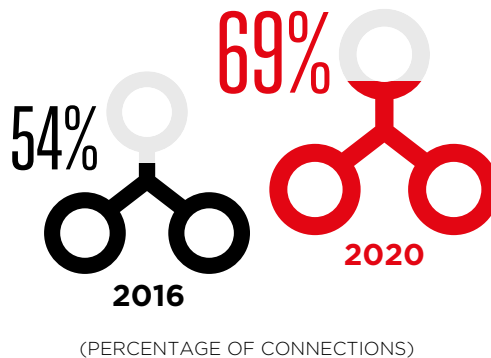
61.5m

122% PENETRATION RATE

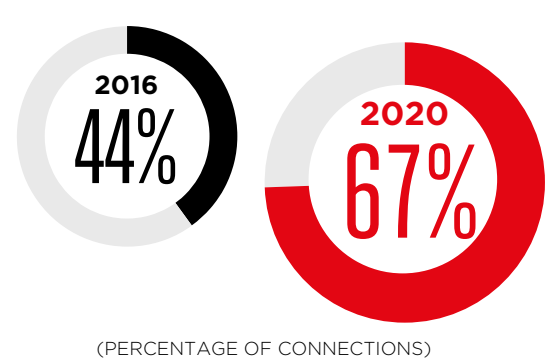
3G and 4G coverage



Mobile broadband



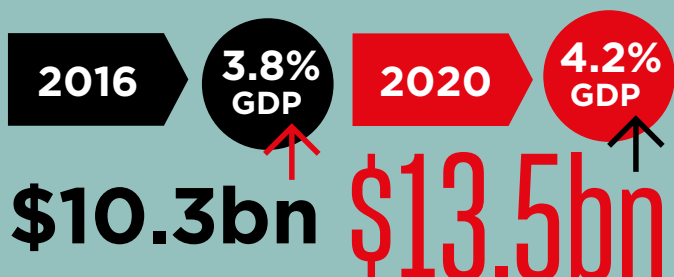
Smartphone adoption



Capital expenditure



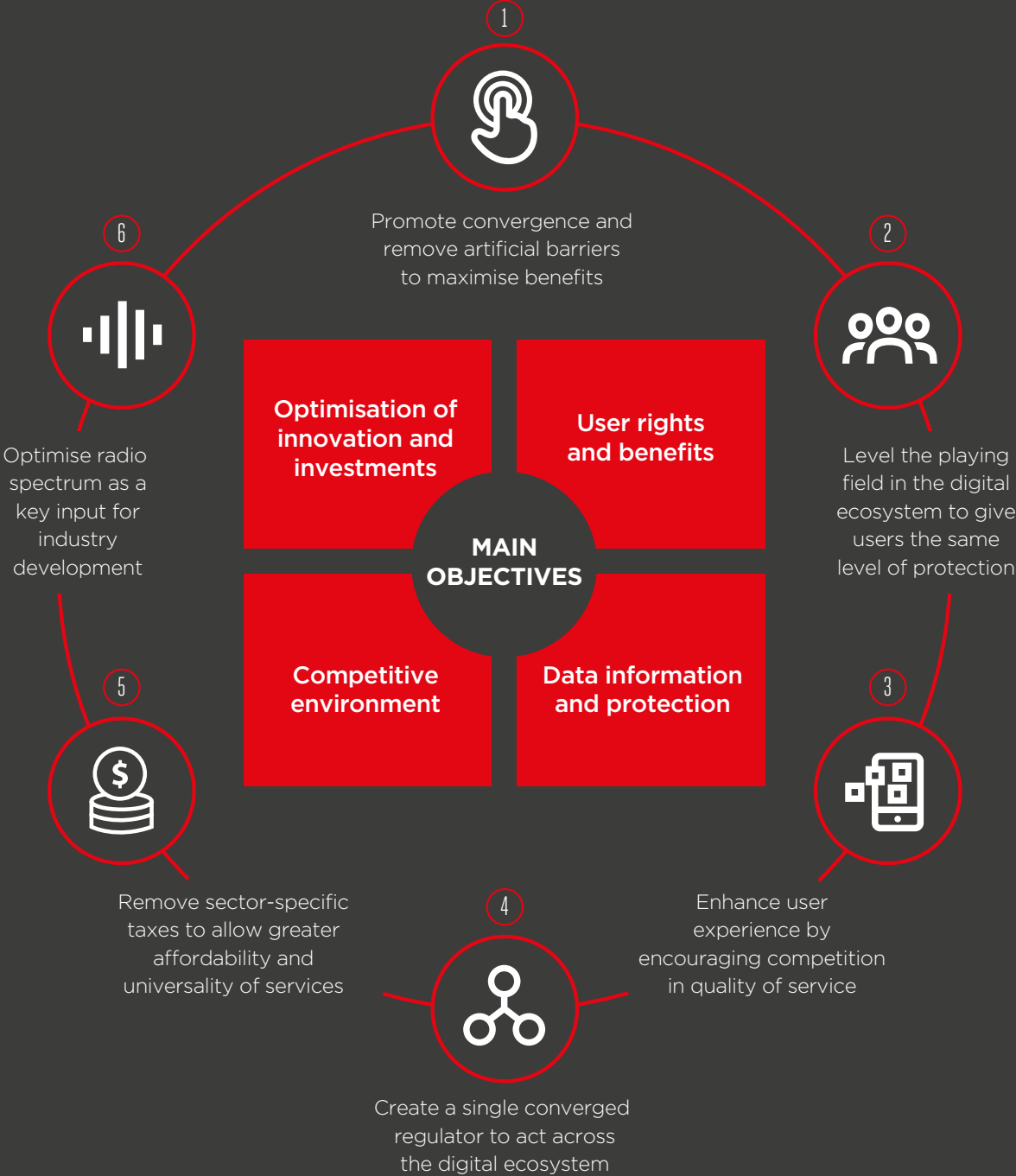
Mobile industry contribution to GDP



Employment



Modernising the regulatory environment



Potential benefits for consumers

- Greater competition in services and pricing
- Improved transparency of service offerings
- Further innovation
- Greater digital inclusion

1 Context

Economic and demographic backdrop

Colombia is the third largest country in Latin America by population and the fourth largest economy. It is divided into 32 departments and one capital district (Bogotá). Geographically, it comprises 1.14 million square kilometres with a widely varying topography, including mountainous areas, rainforests, deserts, plains and coastal flatlands. Much of the population lives at high altitude, with the three largest cities all more than 1km above sea level and the largest, Bogotá, at 2,600m. The country has coasts facing both the Pacific Ocean and the Caribbean Sea, totalling 2,900km. The urbanisation of the country is slightly below the Latin American average, at 76%, and well below the 90% or higher levels of the southern cone countries (Argentina, Chile and Uruguay).

Colombia also has the third largest Spanish-speaking population in the world, after Mexico and the US. While more than 99% of Colombians speak Castilian Spanish, a total of 101 languages are recognised in the country, including 65 Amerindian languages.

Demographically, it is a youthful country, with less than 10% of the population aged over 65, and very literate at 95%.

The country had a GDP per capita that was about 25% below the Latin American average as of 2015, and an unemployment rate well above the regional average. In comparison with regional leaders Brazil and Mexico, Colombia is poorer, with a GDP per capita about 30% below these countries. However, in recent years, Colombia has recorded an enviable economic performance, with growth well above the regional average since 2011. The country has also avoided recession despite a

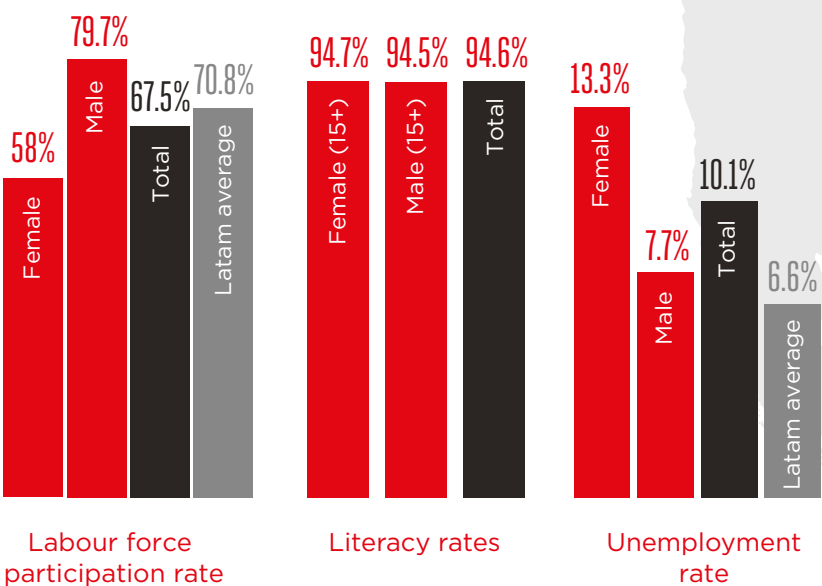
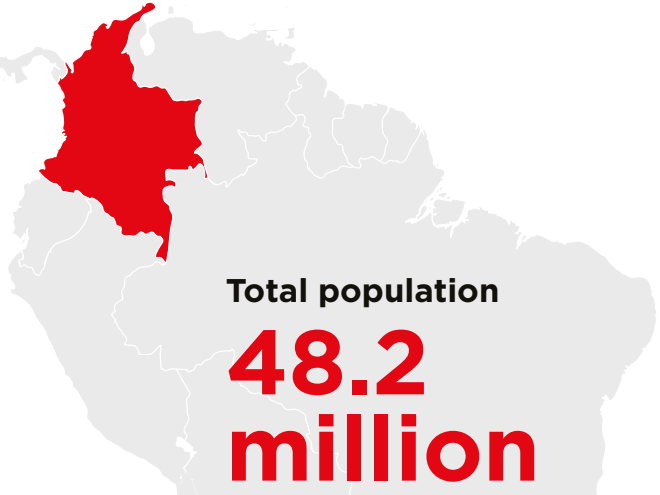
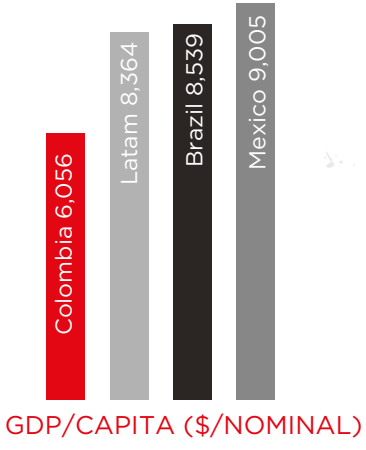
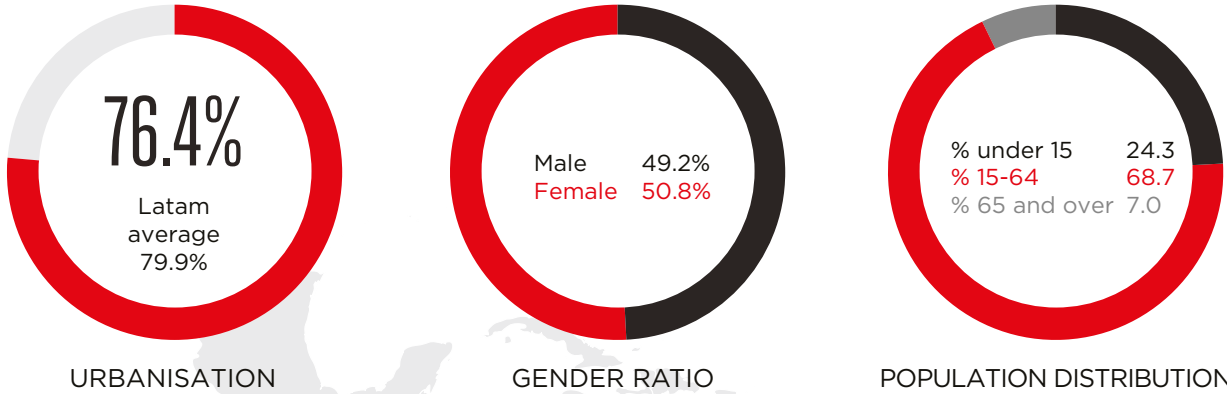
slowdown in commodities exports. The country is also considered the second most business-friendly country in Latin America, slightly behind Mexico.

Despite this recent strong growth, poverty and inequality remain a problem in the country. Although Colombia is not alone in facing these challenges, rates of poverty and measures of inequality are higher than other countries in the region and significantly above the OECD average. Colombia began the OECD accession process in 2013, which would make it the third Latin American country in the group (Chile and Mexico are current members). Recent economic growth has helped; the poverty rate dropped more than 4 percentage points between 2010 and 2014¹ but further progress is needed. Inequality, measured by the GINI coefficient and inequality-adjusted human development index (HDI), looks equally challenging.

¹ World Bank, World Development Indicators; based on benchmark \$3.10 a day at purchasing power parity

Figure 1

Colombia in numbers



2016 Ease of doing business index
(1=most business-friendly)

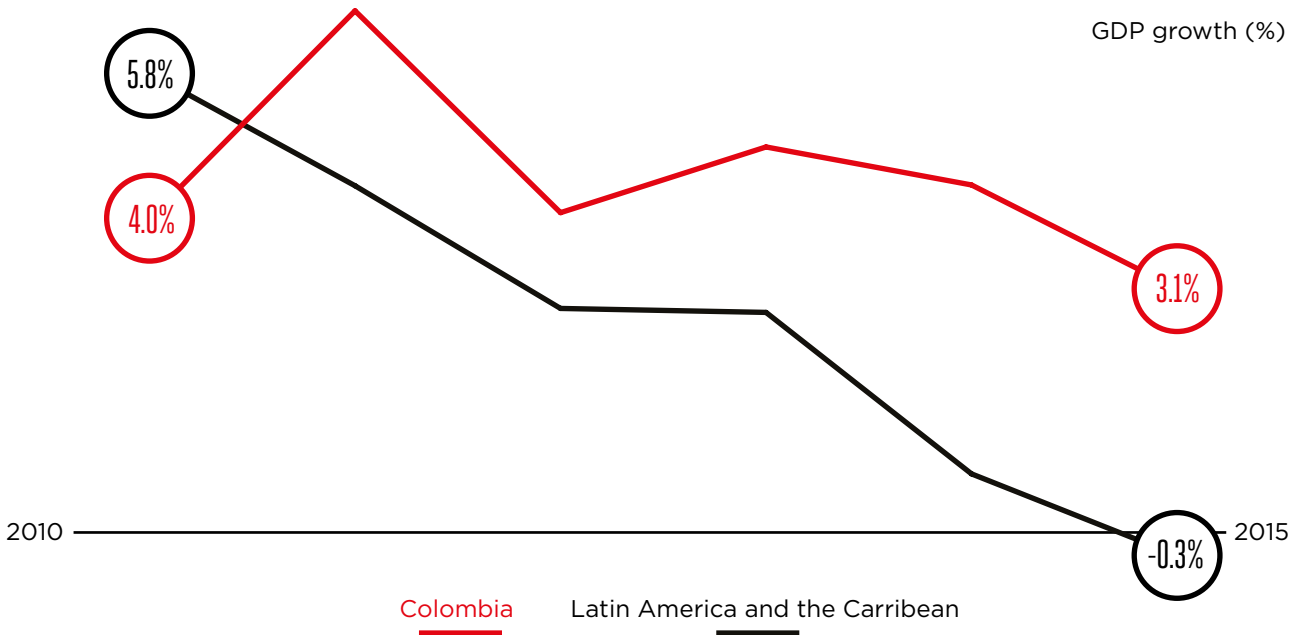
Mexico	47
Colombia	53
Peru	54
Chile	57
Latin America & Caribbean	105
Argentina	116
Brazil	123
Venezuela	187

Literacy rates in 2015; labour force and unemployment in 2014.

Source: World Bank, World Development Indicators

Figure 2

Strong recent economic performance



Sources: World Bank, World Development Indicators

Table 1

Poverty and inequality: big challenges in Colombia

METRIC	PERCENTAGE LIVING BELOW POVERTY LINE*	GINI	HDI	INEQUALITY-ADJUSTED HDI	INEQUALITY HDI LOSS
Colombia	13.2%	0.535	0.727	0.548	25%
Latin America & Caribbean	11.3%	NA	0.751	0.575	23%
Brazil	7.6%	0.515	0.754	0.561	26%
Mexico	11.0%	0.482	0.762	0.587	23%
Peru	9.0%	0.441	0.740	0.580	22%
OECD	n/a	0.318	0.887	0.776	13%

Sources: World Bank, World Development Indicators, UNDP, OECD
 *based on benchmark \$3.10 a day at 2011 purchasing power parity (PPP)
 GINI is a measure of inequality, with a higher level indicating more inequality in a country.
 HDI - the United Nations Development Programme's Human Development Index.

2 Mobile market overview



Table 2:

Key indicators for mobile market in Colombia

METRIC	2014	2015	2016	2017
Connections, excl. M2M (million)	50.0	50.8	51.1	54.3
Connection growth per year	5%	2%	1%	6%
Connections (excl. M2M) penetration of population	104%	105%	105%	110%
Percentage of connections 3G	36%	40%	39%	38%
Percentage of connections 4G	3%	8%	15%	20%
Mobile broadband (3G+4G) as a percentage of total connections	39%	47%	54%	58%
Prepaid percentage of connections	80%	79%	78%	77%
SIMs per subscriber	1.53	1.51	1.49	1.48
Unique subscribers (million)	31.3	31.9	32.3	34.3
Unique subscriber penetration of population	65%	66%	66%	70%
Unique subscriber growth per year	3%	2%	1%	6%
Mobile internet subscribers (million)	21.3	22.4	24.6	26.8
Mobile internet penetration of population	44%	46%	50%	54%
Smartphone adoption (percentage of connections excl. M2M)	29%	37%	44%	51%
Cellular M2M connections (million)	1.1	1.4	1.7	2.1
Percentage of total connections	2%	3%	3%	4%
ARPU per connection (COP)	20,751	16,906	16,246	15,878
ARPU per connection (\$, spot rate)	\$7.10	\$5.78	\$5.56	\$5.43
ARPU per unique subscriber (\$, spot rate)	\$11.71	\$9.64	\$9.19	\$8.88
Recurring revenues (COP billion)	11,974	11,085	10,209	10,355
Recurring revenues (\$ million, spot rate)	4,308	3,869	3,468	3,541
Recurring revenue growth (COP)	-3%	-7%	-8%	1%
Recurring revenue growth (\$ terms)	-9%	-32%	-18%	4%
Herfindahl-Hirschman Index (lower = more competitive)	4,306	4,028	3,962	3,781

Source: GSMA Intelligence

See appendix for details of differences between GSMA Intelligence and regulator-reported data.

Strong coverage levels; attention shifts to adoption

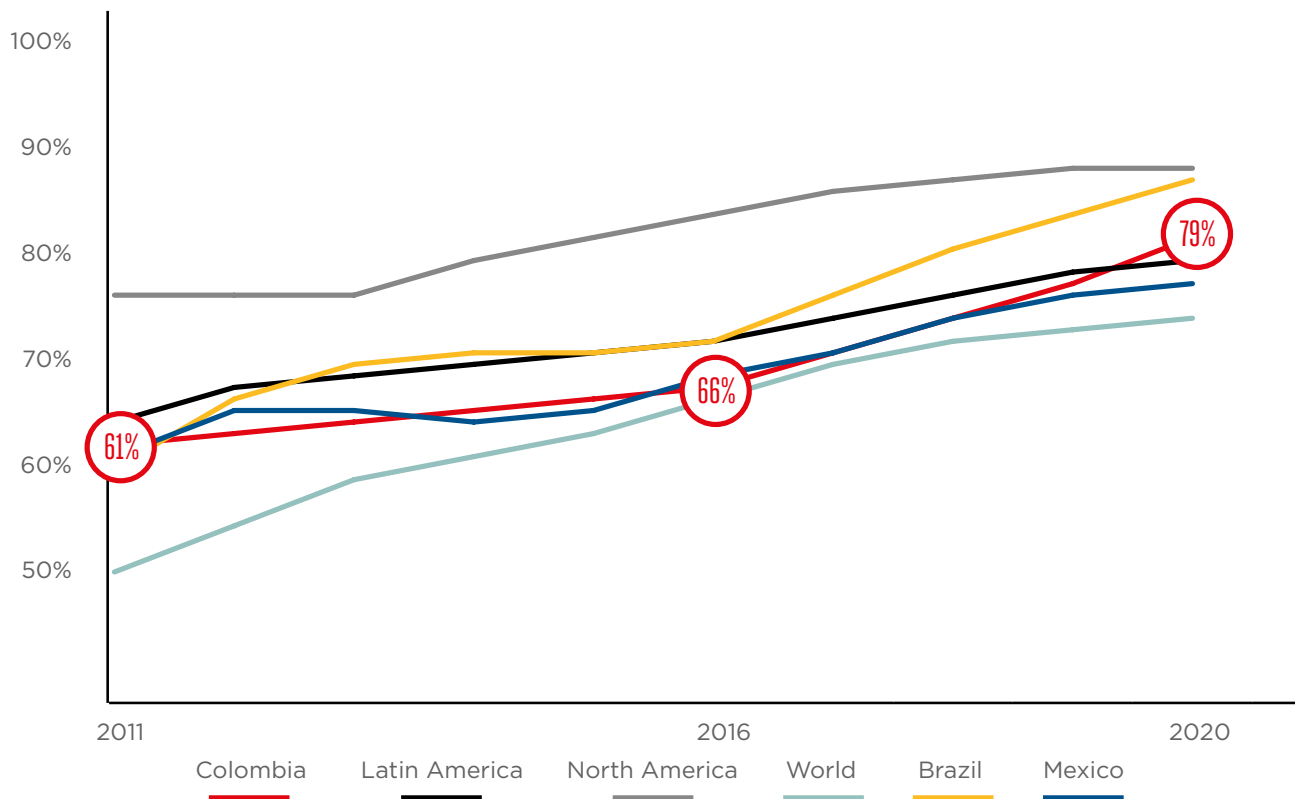
The mobile market in Colombia comprises five licensed operators, though only three have more than 5% share by connections.² The operators in descending order of market share are: América Móvil subsidiary Claro, Telefónica's Movistar, Millicom's Tigo, Avantel and ETB. (ETB has recently been put up for sale by the municipality of Bogotá).

Like the rest of Latin America, and indeed the world, growth in terms of unique subscribers and connections has slowed significantly, as penetration is nearing saturation. Having risen from 61% to 66% since 2010, unique mobile subscriber penetration – which measures mobile ownership on a personal rather than SIM card basis – will still expand over the rest of the decade, reaching 79% by 2020. There will however be single-digit subscriber and connection growth.

² GSMA Intelligence, connections excluding M2M, Q4 2016

Figure 3

Unique mobile subscriber penetration



Source: GSMA Intelligence

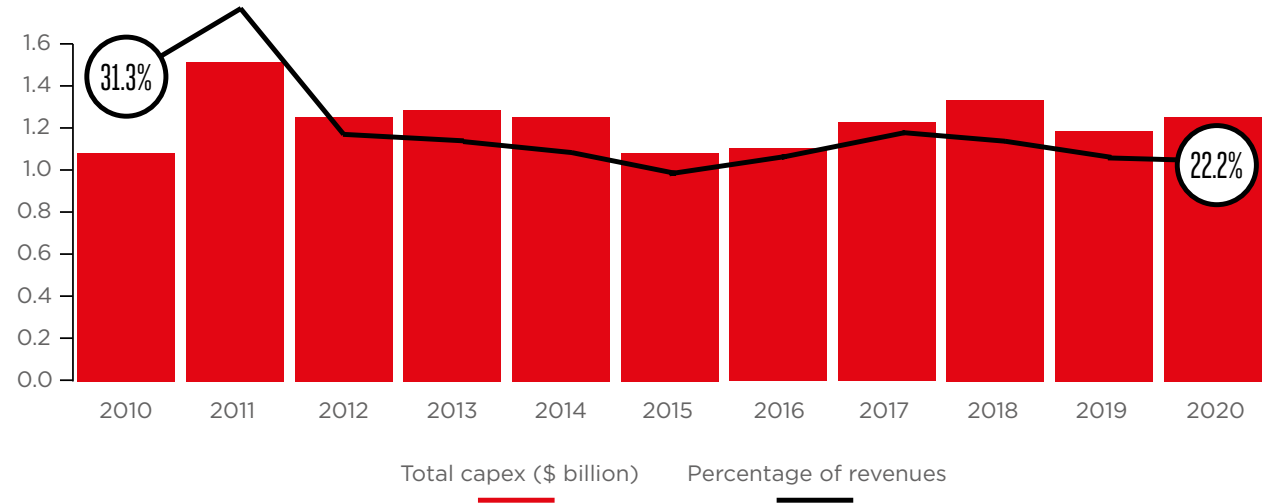
Equally important will be the shift from 2G devices to mobile broadband (3G, 4G and eventually 5G) enabled smartphones. Although Colombia lags the rest of Latin America in mobile broadband adoption, the gap will substantially close by the end of the decade except in comparison with the regional leaders - Brazil in particular.

Fundamental to this is good mobile broadband coverage compared to other Latin American countries. 3G coverage stands at more than 92% of the population as of the

end of 2016, and will reach 95% in 2017. 4G coverage is catching up, reaching 65% population coverage at the end of 2016. These compare with regional averages of 92% and 65%, respectively, at the end of 2016. Operators have invested a cumulative \$9 billion in networks and spectrum this decade, in excess of 20% of revenues and in some years over 30%. A high level of capital investment, both in absolute terms (over \$5 billion between 2017 and 2020) and as a percentage of revenues, is expected to continue to 2020 to deepen this coverage and add extra capacity.

Figure 4

Mobile industry has invested heavily to achieve high mobile broadband coverage



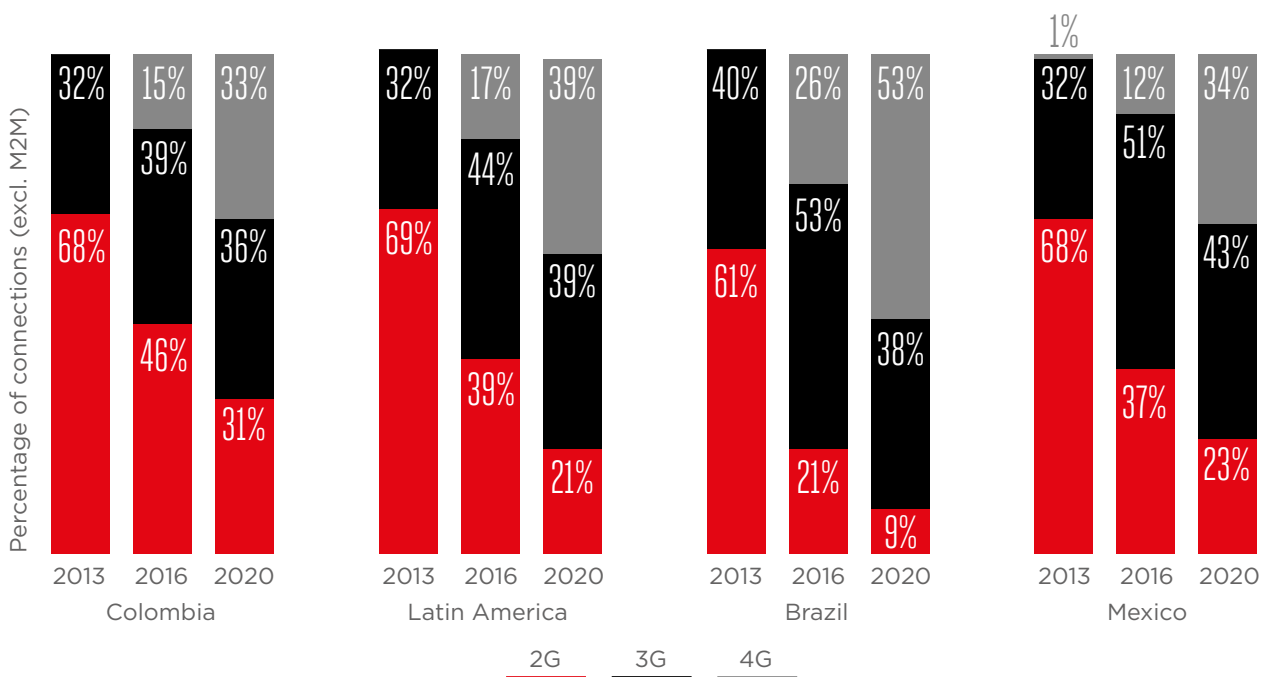
Source: GSMA Intelligence

Although Colombia has invested heavily in access and coverage, actual adoption of mobile broadband and smartphones still lags the rest of the region, and particularly Brazil. By the end of 2016, just over half of connections (excluding M2M) in Colombia were on

mobile broadband (3G and 4G) technologies. This is forecast to rise to 69% by 2020. By contrast, in Brazil, 79% of connections were already mobile broadband at the end of 2016. The gap between Colombia and its peers is nearly as stark in the adoption of smartphones.

Figure 5

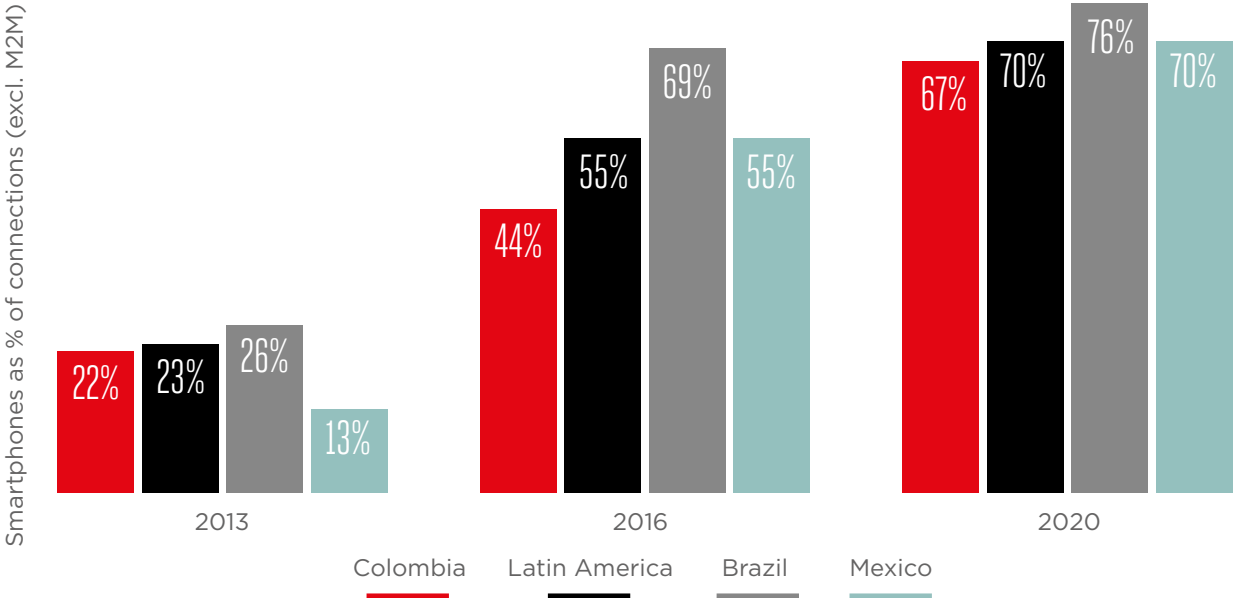
Transition from 2G to mobile broadband slower than other Latam countries



Source: GSMA Intelligence

Figure 6

Smartphone adoption: Colombia take-up slower than regional leaders

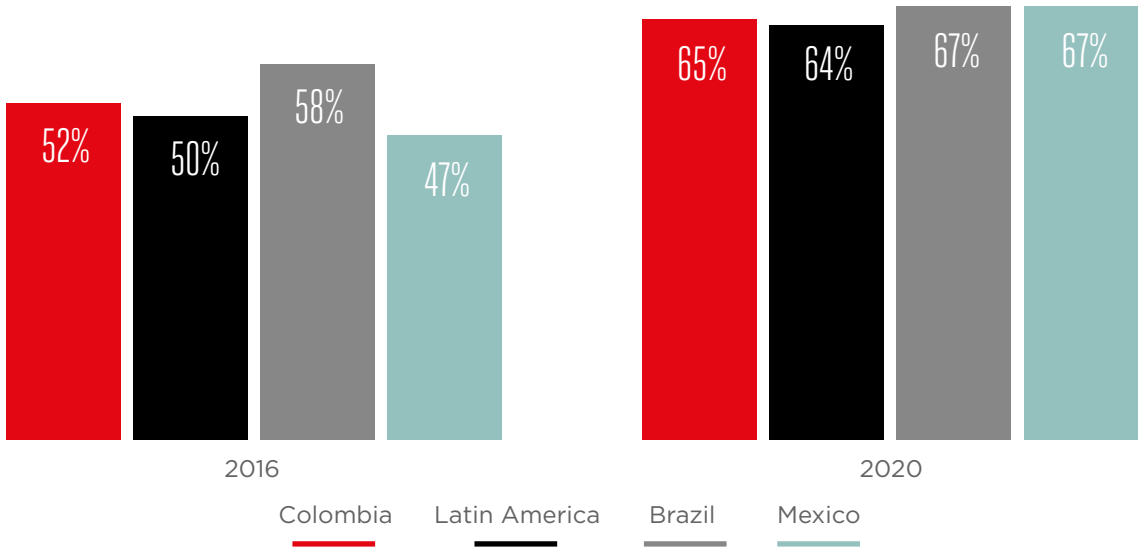


Source: GSMA Intelligence

Mobile internet usage only reached a majority level in 2016 and is broadly in line with the rest of Latin America. By 2020, Colombia will be slightly ahead of the regional average, though still overshadowed by Brazil.

Figure 7

Mobile internet penetration in line with region



Source: GSMA Intelligence

Barriers to mobile internet use remain

In Colombia, the largest barrier to mobile internet usage is safety and security. This issue can partially be mitigated by measures such as the GSMA's We Care programme, which is working with both the public and private sectors to tackle issues such as child endangerment and handset theft³, as is the government through the Vive Digital programme, which created a database of more than 7,000 authorised cellular vendors by the end of 2014. In 2016, Colombia's Communications Regulation Commission (CRC) signed an agreement with the GSMA to gain access to the GSMA Device Database on a weekly basis and to implement a device check service, which will allow consumers to check the CRC web portal to determine if a device has been reported as stolen before they purchase it, based on the information supplied by the GSMA and over 100 operators around the world⁴. However, perceptions of risk have room for improvement in this area.

In terms of affordability, the government's recent removal

of VAT on smartphones costing less than about \$225 will help, and operators are playing their part too; Tigo was the first operator in the country to offer micro-reloads and reload sharing, and to partner with Facebook in its 'Free Basics' zero-rated data programme. However, more than half of non-users cite affordability as a barrier, so more work needs to be done. Addressing Colombia's twin problems of poverty and inequality will be more important than any single government or operator initiative.

Lack of network coverage and lack of awareness/locally relevant content are not as significant as other barriers and are below the levels of other markets. In addition to ensuring broadband availability, another element of the Vive Digital plan has been to ensure that individuals and small business owners are aware of and utilising the internet for productive purposes, for example education, job search and business sales. These measures appear to be paying off, but there is still room for improvement.

Figure 8

Safety/security the highest barrier for non-mobile internet users

	SAFETY AND SECURITY CONCERNS	LACK OF DIGITAL SKILLS	AFFORDABILITY	LACK OF AWARENESS AND LOCALLY RELEVANT CONTENT	LACK OF NETWORK COVERAGE	OTHER
Colombia	68%	57%	52%	28%	8%	13%
Argentina	50%	66%	77%	43%	3%	19%
Brazil	29%	39%	41%	16%	3%	7%
Chile	73%	81%	69%	42%	2%	19%
Guatemala	71%	33%	34%	20%	6%	11%
Mexico	81%	49%	59%	38%	12%	19%
Nicaragua	42%	24%	25%	15%	5%	7%
Puerto Rico	99%	99%	91%	48%	10%	14%



Source: GSMA Intelligence Consumer Survey 2016

Note: sample size 8,000 (1,000 per market). Results shown for those who have not used the internet on a mobile phone in the past three months. Percentages for "strongly agree" to questions regarding safety, skills, affordability etc. as reason for non-usage. The number of non-users ranges from 129 (13%) in Brazil to 386 (39%) in Nicaragua; Colombia = 381.

³ See GSMA Latin America We Care | ⁴ GSMA and CRC agree to implement Device Check service in Colombia, GSMA, June 2016

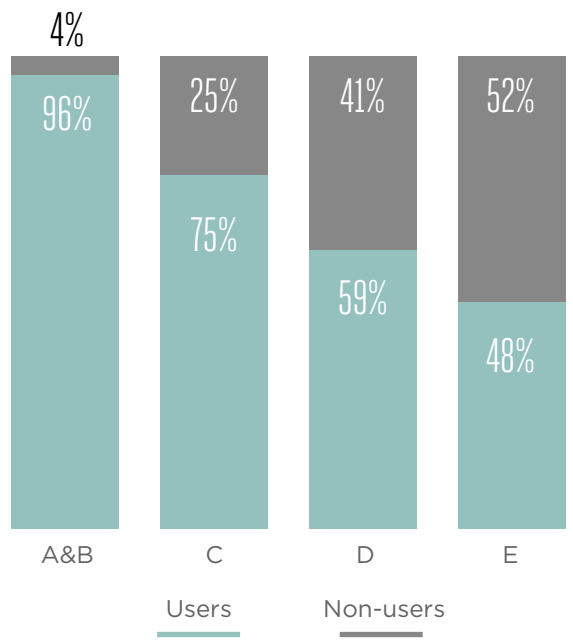
Demographically, as in most countries, mobile internet usage is higher in urban areas, among higher income levels and younger age groups. Addressing poverty and inequality issues in the country will help to narrow the digital gap among social grades as well as the

urban/rural divide. Phase two of Vive Digital, with its emphasis on digital skills, will help too. In terms of usage by gender, men and women in Colombia use the mobile internet at the same rate.

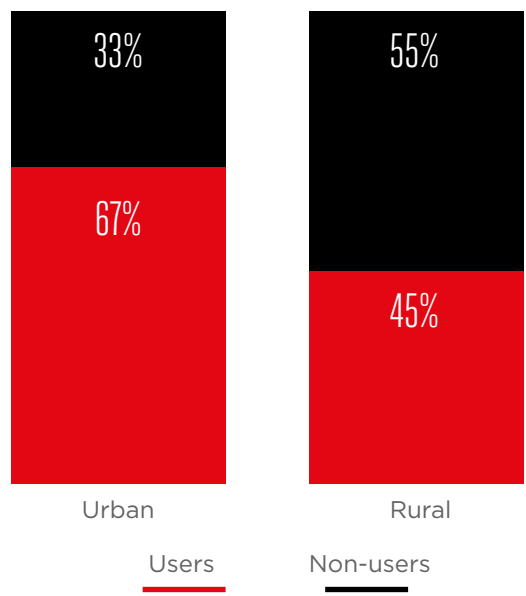
Figure 9

Mobile internet usage in Colombia

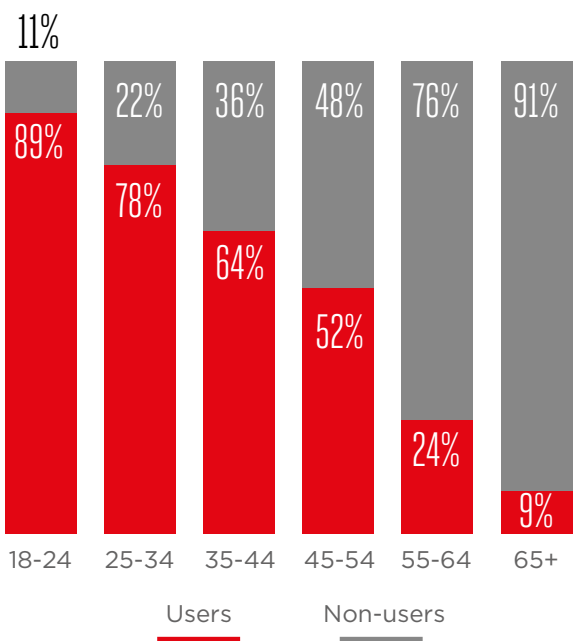
MOBILE INTERNET USAGE BY SOCIAL GRADE



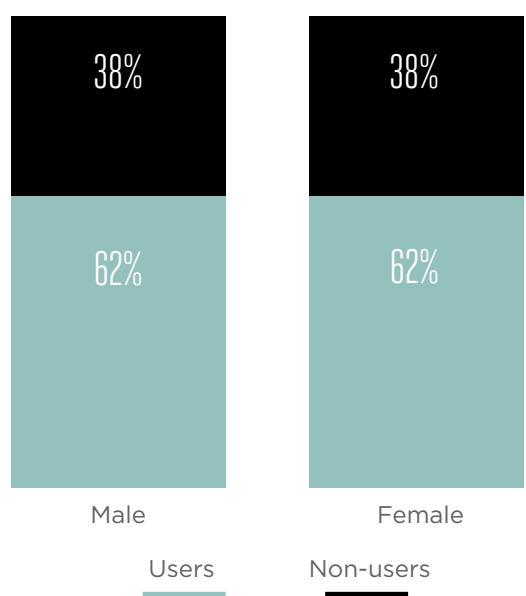
MOBILE INTERNET USAGE BY LOCATION



MOBILE INTERNET USAGE BY AGE



MOBILE INTERNET USAGE BY GENDER



Source: GSMA Intelligence Consumer Survey 2016
 Note: sample size 1,000. Results based on internet usage on a mobile phone in the past three months.

3 Economic contribution of the mobile sector in Colombia



Contribution of the mobile sector to GDP

Direct contribution:

Our definition of the mobile ecosystem in Colombia includes a set of interlinked industries that jointly made a contribution of more than 1% to national GDP in 2016, directly generating an economic value added of more than \$3 billion. Mobile operators account for most of this figure, with approximately \$2.3 billion⁵, representing three quarters of the total contribution of the mobile ecosystem in Colombia. The contribution of the rest of the mobile ecosystem put together directly accounts for approximately \$0.8 billion in value added. This latter figure includes the contribution from mobile infrastructure companies, mobile content, application and service companies, and distributors and retailers of mobile technology.^{6,7}

Indirect contribution:

Firms in the mobile ecosystem purchase inputs from their providers in the supply chain in other sectors of the Colombian economy. Furthermore, some of the profits and earnings generated by the ecosystem are spent on other goods and services, stimulating economic activity in those sectors. We estimate that in 2016 this additional economic activity generated a further \$0.5 billion in value add (or 0.2% of GDP).⁸

Productivity contribution:

The use of mobile technology also drives large improvements in productivity and efficiency by workers and firms. For example, it provides faster and easier access to information, saving time and money. It has also started to facilitate the increased digitisation of businesses in many sectors of the Colombian economy. The productivity effect of mobile technology and services represented a boost to Colombian GDP of nearly \$7 billion, or just over 2.4% of GDP.

It is important to note that the mobile ecosystem is a central part of a broader digital ecosystem that also includes fixed-line communications and the internet and software sectors. The direct contribution of this broader sector to the Colombian economy is therefore larger than the estimates presented here. For example, Katz (2015) estimates a cumulative impact of digitalisation in the Colombian economy of around 6% of GDP for the period 2005–2013.

⁵ The economic value added directly generated by mobile operators in Colombia reflects their contribution in the form of salaries paid to employees, contributions to the funding of the public sector, and profits to stakeholders. Economic value added is a different measure to the turnover of mobile operators in Colombia. GSMA Intelligence estimates total turnover of nearly \$5 billion in 2016 by Colombian mobile operators, equivalent to 1.7% of GDP.

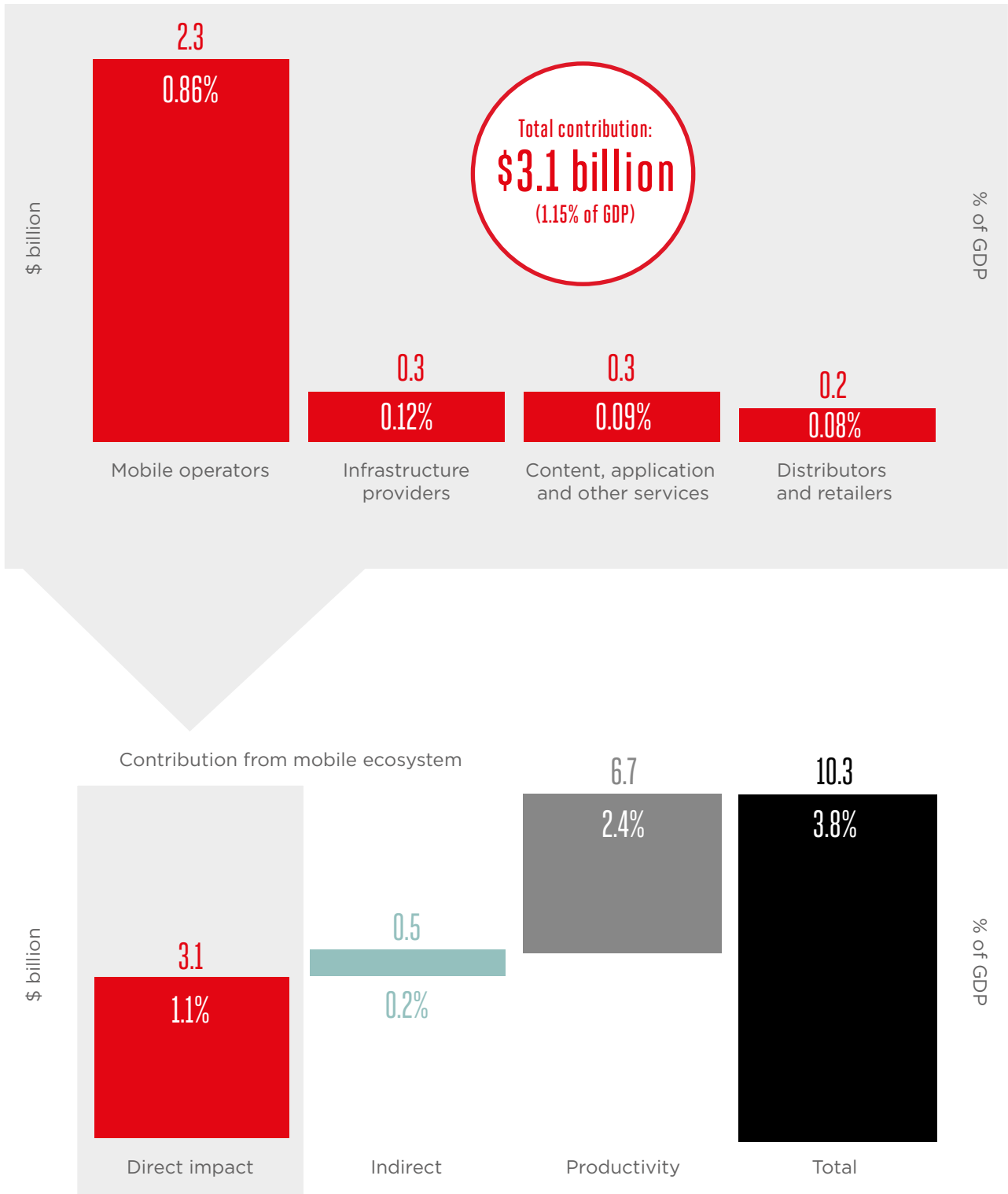
⁶ The contribution through mobile distribution excludes any sales by mobile operators through their direct retail channels, which is included in the mobile operator figure.

⁷ The manufacturing of mobile devices, which in some countries is a part of the ecosystem with a sizeable economic impact, is in Colombia virtually non-existent and has therefore a trivial impact on GDP.

⁸ The indirect impact is calculated using multiplier estimates for the Colombian economy that are derived from the input/output tables of the OECD.

Figure 10

Total contribution of mobile ecosystem to GDP in Colombia in 2016



Source: GSMA Intelligence analysis

Contribution of the mobile sector to employment in Colombia

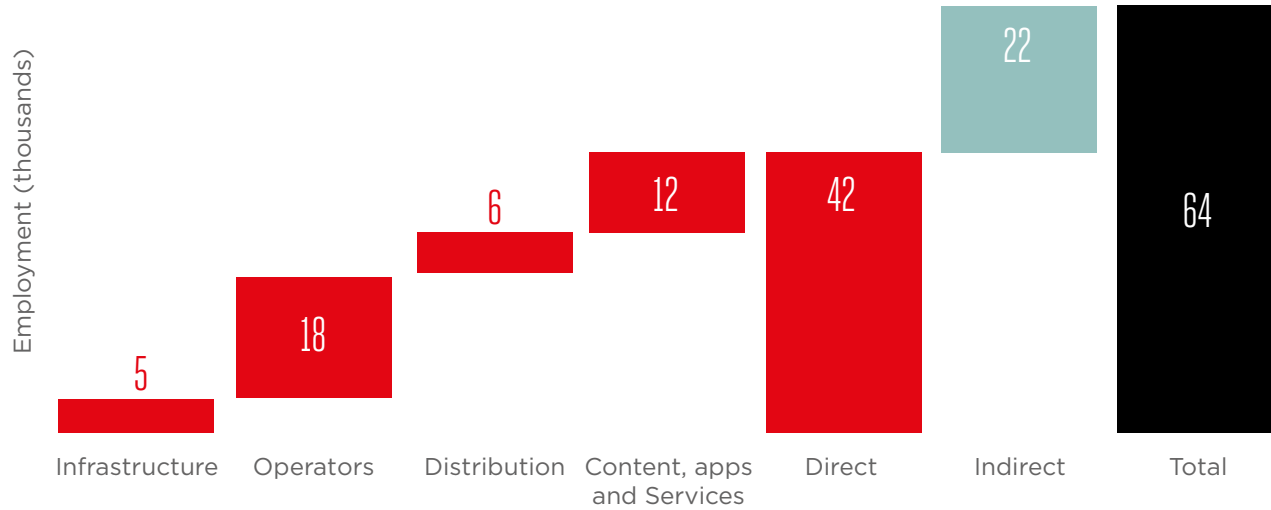
In 2016 the mobile ecosystem provided direct employment to approximately 42,000 people across the country. A large majority of these jobs are concentrated in two areas of the mobile ecosystem: mobile operators, which employ more than 18,000 people, and mobile content, applications and services, with employment of approximately 12,000. Our definition of the mobile content, applications and services sector is quite conservative as it excludes mobile ICT jobs generated in other sectors of the economy. Di Ionno and Mandel (2016)⁹, using a broader definition, estimate that around 28,000 jobs were directly supported in Colombia in mobile apps and ICT development positions.

The mobile retail and distribution sector and the mobile infrastructure sector also directly generated further jobs in Colombia, with 6,000 and 5,000 jobs respectively.

The economic activity of companies in the mobile ecosystem also generates jobs in other sectors of the economy (for example, in construction and retail), as firms that provide goods and services as production inputs for the mobile ecosystem employ more individuals as a result of the demand generated by the mobile sector. In 2016 approximately 22,000 jobs were indirectly supported in this way, bringing the total impact (both direct and indirect) of the mobile industry to approximately 64,000 jobs.

Figure 11

Total jobs (direct and indirect) created by the mobile ecosystem in Colombia, 2016



Source: GSMA Intelligence analysis. Totals may not add up due to rounding.

⁹ Tracking Colombia's App Economy, Di Ionno and Mandel, October 2016

Contribution to public sector funding in Colombia

In Colombia the mobile ecosystem makes a sizeable contribution to the funding of the public sector. In 2016 the mobile ecosystem made a total contribution in excess of \$2.3 billion to the funding of the Colombian government. This includes the following:

- nearly \$1 billion in consumer taxes on mobile services such as VAT and excise duties on consumption
- more than \$500 million in handset VAT and custom duties
- approximately \$450 million through taxation of profits of the mobile ecosystem, including general corporate income tax as well as additional taxes on companies' income such as the CREE and a CREE surtax
- around \$250 million in income tax and social security contributions for mobile ecosystem employees
- more than \$150 million in recurring regulatory fees, including contributions to FONTIC (universal service fund), annual regulatory fees and annual spectrum fees.

In addition to the above, mobile operators make further contributions in the form of one-off spectrum and licence fees.

Figure 12

Total contribution to the funding of the public sector by the mobile ecosystem in Colombia, 2016



Source: GSMA Intelligence analysis. Totals may not add up due to rounding

The contribution of the mobile ecosystem represents approximately 4% of all taxes raised by the Colombian government.¹⁰ Since the direct contribution of the mobile ecosystem is just above 1% of GDP, the ratio of tax effort to economic contribution is nearly 4:1, indicating that the sector makes a large tax effort in relation to its size in the economy. This may be partly

driven by the significant amount of special taxes applied to the sector in Colombia. In fact, as noted in GSMA/Deloitte (2016)¹¹, in Colombia, sector-specific taxation represented 37% of mobile services total tax payments in 2014; with the exception of the Dominican Republic, this represents a larger share than any other Latin American country surveyed by the GSMA.

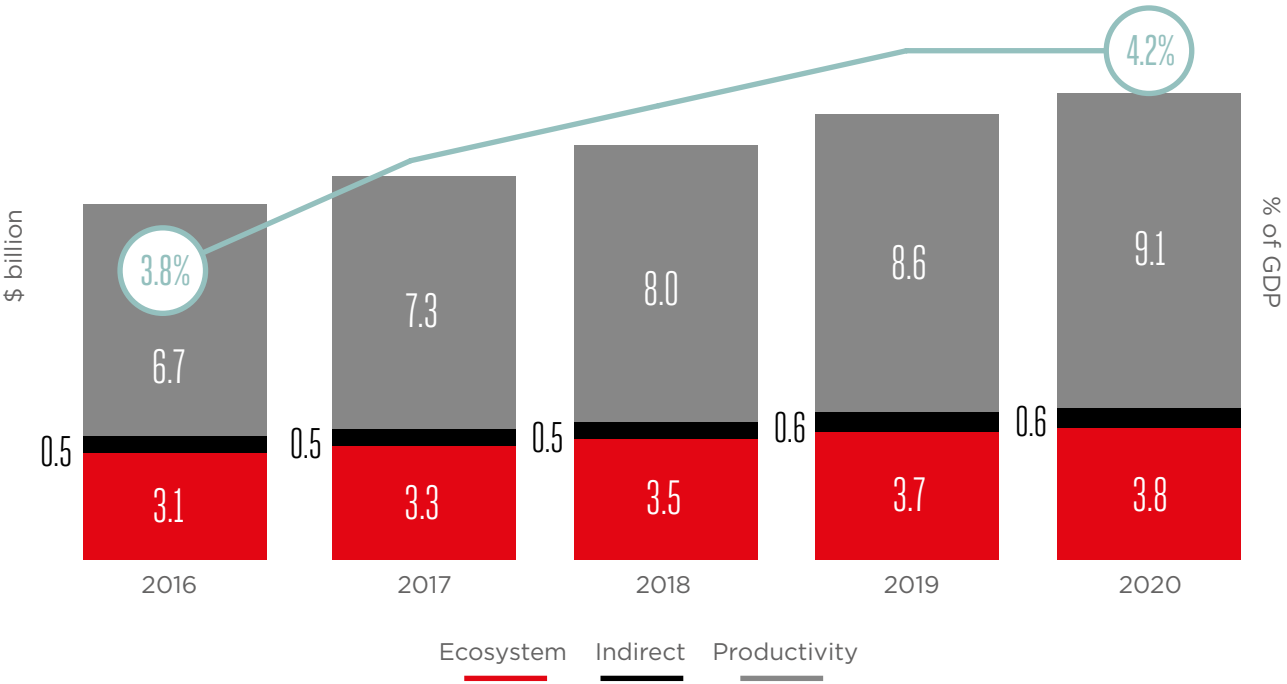
¹⁰ Estimate based on GSMA Intelligence and IMF data | ¹¹ Digital Inclusion and Mobile Sector Taxation in Colombia, GSMA, November 2016

Economic opportunities ahead

The overall economic contribution of the mobile industry in Colombia will continue to increase in the period to 2020. In value-added terms, the total economic contribution of the sector will reach \$13.5 billion in 2020, representing more than 4.2% of Colombia's GDP, up from \$10.3 billion or just under 3.8% of GDP in 2016.

Figure 13

Contribution of mobile sector to the economy: outlook to 2020



Source: GSMA Intelligence analysis

The majority of this growth will be driven by the positive effects of mobile technology on productivity growth, though the mobile ecosystem will also experience significant growth in terms of its economic value added over the period.

4 Innovation: government supporting infrastructure and entrepreneurship

The Colombian government has shown strong support for digital inclusion over this decade. This in part has helped the country grow more strongly than many of its neighbours and avoid recession. More importantly, it sets the country up well for the long term both in terms of the economy and improving the quality of life for citizens. The goals of the crafters of Vive Digital are not to create wealthy Colombian software developers but rather to reduce poverty by “developing the base of the pyramid” of social classes.¹²

¹² “Looking for a Latin American Seed Fund? Try the Colombian Government”, The Atlantic, April 2013

Colombia: Vive Digital



First proposed in 2010 in President Juan Manuel Santos' first term, the Vive Digital (Live Digitally) plan has four key goals to strengthen the country's digital ecosystem:

- expanding the infrastructure
- creating services at lower prices
- developing applications and digital content
- fostering ICT adoption and use.

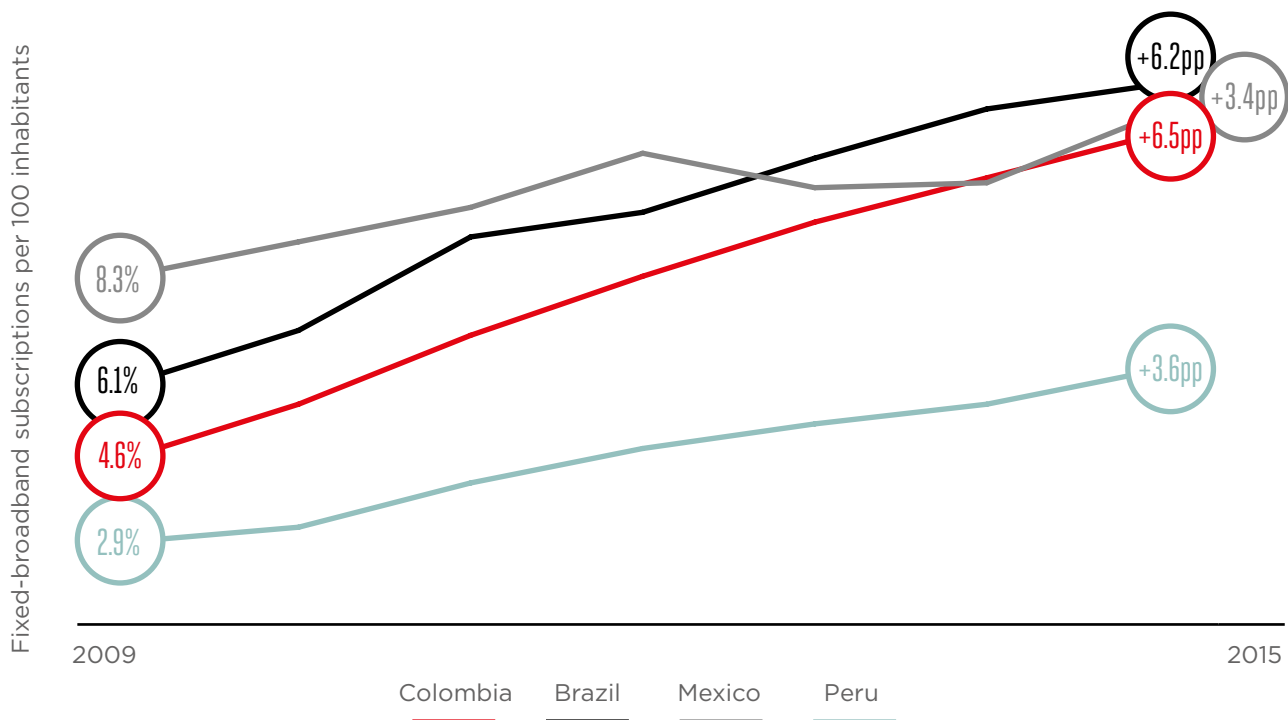
Phase one: focus on infrastructure

The first phase of the plan, which concluded in 2014, focused largely on strengthening the ecosystem through extensive infrastructure programmes. This included building out fibre or 4G mobile coverage to all towns and villages in the country with more than 100 inhabitants, including those in remote areas such as the rainforest, a goal which was 96% achieved in 2014¹³.

Mobile broadband coverage in Colombia, including 4G, is rapidly increasing. Moreover, fixed infrastructure and broadband penetration have improved significantly since the beginning of phase 1, with fixed broadband penetration per capita now broadly in line with Latin American market leaders Brazil and Mexico and far ahead of Peru, a market that demographically and economically is similar to Colombia. Since the end of 2009, Colombia has increased its fixed broadband penetration at a higher rate (6.5 percentage points) than its regional peers.

Figure 14

Fixed broadband penetration rose strongly during phase 1 of Vive Digital



Source: ITU

Partly as a result of the government's proactive stance with regards to the internet and ICT, Colombia ranked first on the Alliance for Affordable Internet (A4AI)'s 2017 Affordability Drivers Index (ADI) among emerging economies.

¹³ Plan Vive Digital Colombia, 2014-2018, MINTIC

Table 3

2017 Affordability Drivers Index rankings

	GLOBAL RANKING	ACCESS SCORE	INFRASTRUCTURE SCORE	ADI SCORE
Colombia	1	85.3	58.2	72.9
Mexico	2	87.2	53.4	71.5
Peru	3	80.5	58.9	70.8
Argentina	7	76.3	49.0	63.6
Brazil	10	68.6	51.1	60.8

Source: A4AI

Each community has at least one internet community centre for public internet access – about 8,000 in total in over 1,000 municipalities. Beyond connectivity, the centres also create leadership in digital skills within the community; each internet centre has an official leader whose responsibility is to ensure the digital skills of the community are up to prescribed standards. This element of the plan has worked well, with many leaders then becoming candidates for political office in their communities. Combined with the network infrastructure, the government has pushed through changes to regulations and taxes to benefit the ICT sector, such as eliminating taxes on PCs and tablets and, more recently, on basic smartphones.

At the start of the first phase, in 2010, the government found that 60% of small and medium-sized enterprises (SMEs) claimed the internet was not useful or relevant for them; at that time, only 7% were online. By 2015, however, 74% were connected. SMEs are critical from an economic point of view as 96% of Colombian companies are SMEs and they create the vast majority of jobs. Moreover, research has shown that ICT is an important economic catalyst, with more than two non-ICT jobs created for each additional ICT job.¹⁴

Phase two: focus on innovation and entrepreneurship

The second phase of the plan, which will continue to 2018, aims to encourage entrepreneurship in all sectors of the economy and strengthen the software industry. Entrepreneurship is a challenge across Latin America; research from the World Bank has found that Latin American firms introduce fewer new innovations than other developing nations; generate fewer patents per capita; invest less in R&D than in other regions; and export less than what would be expected given their level of development.¹⁵

One of the main elements of this phase is the establishment of 17 digital centres across the country (called Vive Labs). These will provide a place where anyone can learn digital content skills, empowering new

entrepreneurs with high-quality equipment and licensed software.¹⁶ The goal of Vive Digital is to ensure that no part of Colombia, geographically or socially, is left behind. In practical terms, every government ministry has a CIO who has responsibility for ensuring that all employees, from civil servants to doctors, teachers and others in the community, are digitally proficient. Each of the 32 departments of Colombia has a CIO with a similar remit.

Phase two also aims to deepen connectivity even further geographically. The connectivity objectives of phase two are for household internet penetration to reach 63% of Colombian households by 2018 (compared with 50% in 2014), and that, by the end of 2018, all 1,123 Colombian municipalities will have 4G mobile broadband coverage.^{17 18}

¹⁴ The Transformative Economic Impact of Digital Technology, Raúl L. Katz, May 2015

¹⁵ "World Bank: Understanding Latin America's Shortage of Innovative Entrepreneurs", World Bank, December 2013

¹⁶ The Global Information Technology Report 2013, World Economic Forum, 2013

¹⁷ Digital Colombia: Maximizing the global internet and data for sustainable and inclusive growth, Brookings, October 2016

¹⁸ Plan Vive Digital Colombia, 2014-2018, MINTIC

Apps.co: direct digital education to address skills shortage

Despite demand and earnings potential, the number of computer science graduates in Colombia has not been growing. To tackle this, the Apps.co programme seeks to develop a strong digital entrepreneurship ecosystem in Colombia. Nearly 67,000 Colombians have learnt how to code in its self-styled 'bootcamps' and the programme aims to reach at least 90,000 by 2018. The Ministry of ICT has invested about COP45 billion (over \$15 million) in this initiative, which so far has generated

about 900 new products and services. Apps.co has a further goal of reaching \$120 million in digital content exports by 2018.

Although nearly 67,000 have signed up for training with Apps.co, only 13,000 have graduated to date, so the supply of ICT-skilled labour should increase significantly in the coming years.

iNNpulsas: government funding and mentoring scheme for start-ups

iNNpulsas, an agency within the Ministry of Commerce, Industry and Tourism, was set up in 2012 to "promote entrepreneurship, innovation and productivity as the path for business development and Colombia's competitiveness". Its medium-term goal, for 2018, is to help realise the government's ambition of being one of the three most innovative and competitive economies in the region. To achieve this, it focuses on three areas: innovation and entrepreneurship, at a firm level; culture – aiming to eliminate barriers in Colombian society to innovation and greater productivity; and growth in the competitiveness of Colombian companies through ICT.

From its inception to early 2016, iNNpulsas invested around \$80 million into 1,200 ventures. Catalina Ortíz Lalinde, the then Managing Director of iNNpulsas, said that the government sees its programmes as "kickstarters, not long-term players. We want to imitate the market as best as we can, [because] we believe that this is only sustainable and viable in the long run if we have more private involvement."¹⁹

Successfully incubated start-ups include the following:

- Mprende, a magazine devoted to entrepreneurship.
- Fourier Ingeniería Inteligente SAS, a Medellín-based firm which uses applied mathematics models to solve problems in production, quality, logistics and other processes to improve productivity in various industries. Fourier also offers intelligent forecasting, inventory management, artificial

intelligence, industrial simulation, measurement systems, logistical redesign, and specialised studies of demand and design of transport protocols.

- 3Biomat, a company that develops, manufactures and markets medical devices focused on promoting tissue regeneration.
- Undertrail, an online travel booking site that integrates more than 700 airlines with terrestrial travel options in Colombia and other major Latin American countries. It booked a small profit in 2015 on revenues of \$1.6 million.
- Horus Smart Control, a smart home solution designed for Latin American homes as well as hotels and small businesses. With the support of iNNpulsas, Horus now exports to other markets, including Mexico, and has 40 distributors across the region. They are full members of the Z-Wave alliance, an international consortium of companies working with Z-Wave technology, which includes companies such as Samsung, LG, GE and Huawei.
- Waya Guajira Hotel; part of the Oxo Hotels group, the Waya Guajira Hotel on the Guajira peninsula in the Caribbean aims to be 100% sustainable.

There have also been local initiatives, such as Medellín's incubator Ruta N which started in 2010, providing funding and workspace to local entrepreneurs.

¹⁹ "Looking for a Latin American Seed Fund? Try the Colombian Government", The Atlantic, April 2013

Private venture-capital funding trends reinforce need for government support

Data on funding from venture-capital and private-equity firms shows the need for the government to support start-ups. "The market as far as possible, the state as far as needed" is the guiding principle for Vive Digital's various programmes, said former ICT minister Diego Molano Vega.²⁰

In common with other regions, funding flows disproportionately to the regional leaders. Over the past five years, venture-capital and private-equity funding into Colombia has been just over \$500 million, or about 5% of the regional total, although Colombia represents 7–8% of the region's population and unique mobile subscribers, as of 2016.

Table 4

Venture-capital and private-equity funding

	5 YEARS (2012-16)				2016					
	FUNDING (\$ MILLION)	NO. OF DEALS	% FUNDING	% DEALS	FUNDING (\$ MILLION)	NO. OF DEALS	% FUNDING	% DEALS	% POPULATION	% UNIQUE MOBILE SUBS
Brazil	5,033	484	51%	47%	919	170	44%	40%	33%	33%
Mexico	2,407	189	24%	18%	524	77	25%	18%	20%	20%
Chile	681	80	7%	8%	209	50	10%	12%	3%	4%
Argentina	658	115	7%	11%	136	49	7%	12%	7%	9%
Colombia	529	45	5%	4%	68	21	3%	5%	8%	7%
Puerto Rico	166	30	2%	3%	2	17	0%	4%	1%	1%
Peru	47	21	0%	2%	1	8	0%	2%	5%	5%
Total Latin America	9,831	1,032			2,080	426				

Sources: CB Insights, GSMA Intelligence

A few start-ups have nevertheless managed to raise significant private international capital. Among these are the following:

- on-demand multi-product delivery service Rappi, which raised \$63 million in four rounds in 2016
- Credivalores, which provides consumer finance, including microfinance, insurance and other financial services; it raised \$34 million in 2014
- business supplies firm Ofi.com.co, which recently raised \$5 million.

Operator support for start-ups



Telefónica, through its Open Future_ platform, provides various forms of support to start-ups in the region, including connecting more mature companies and investors with entrepreneurs; 'crowdworking' spaces, mentoring and incubation-style support; and digital tools and training. Currently, 30 start-ups in Colombia are participating in the initiative.

²⁰ "Looking for a Latin American Seed Fund? Try the Colombian Government", The Atlantic, April 2013

5 Policy: modernising taxation and future-proofing regulation

Colombia has a modern legal and regulatory framework. It was one of the first countries in Latin America to incorporate the concept of converging telecommunications and IT technologies.

But nearly 10 years have passed since this legislation was originally conceived, in a different technological context from today. To stay ahead internationally, legislators should consider updating and future-proofing the legal framework to ensure it captures all aspects of technological convergence. The aim should be to create clear benefits for citizens and companies, who constantly demand more and better connectivity.

One particular issue the government should address, and which runs counter to the overall digital agenda, is mobile-specific taxation and its impact on connectivity. Sector-specific taxation is the second highest in the region. Mobile telecoms is taxed more heavily than fixed. Both these factors contribute to Colombia's lower-than-average mobile broadband and smartphone adoption rates.

High taxation contributes to the cost of mobile services and can make usage and access unaffordable, particularly for poorer citizens. It also reduces the financial ability of operators to invest in infrastructure that can be crucial to develop a country's digital footprint. Colombia recently passed a fiscal reform that saw VAT levels rising from 16% to 19% and introduced a new excise duty on consumption of mobile data.

Colombia began the process of accession to the OECD in 2013. The following year, the OECD published a review²¹ of the telecoms market in Colombia, making the following recommendations:

- Strengthening the powers and independence of the regulator, including greater independence, ability to levy more significant sanctions, and creating a converged regulator by merging CRC and ANTV.
- Extending communications infrastructure and services, including giving subsidies to low-income households and phasing out the “luxury” VAT applied to mobile services.
- Promoting competition in telecommunications markets, including by preventing anti-competitive behaviour.
- Removing barriers to infrastructure deployment.
- Promoting the consumer interest.


The OECD has also criticised continued public ownership of telecoms operators given the inherent conflict of being both a shareholder of an operator in a competitive market as well as its regulator.²²

There are six key recommendations of the GSMA to modernise and update the regulatory framework: ²³

1 Promote convergence and remove artificial barriers to maximise benefits

The 2009 ICT Law should be updated, by incorporating: television service; general guidelines for modernising regulation; and the creation of a unified body that understands all aspects of the digital ecosystem. This will allow for a more holistic overview so that regulation can be better aligned with the dynamism of technological changes.

Benefits for users:
There will be greater choice of providers for a single service or substitute services, leading to an increase in consumer benefits through lower prices and higher quality.



2 Level the playing field in the digital ecosystem to give users the same level of protection

Regulation should avoid distortions that are artificially harmful for some providers to the benefit of others. To encourage innovation and competition, regulation based on minimum criteria should be established, with the same conditions for all players. It also must ensure that new digital ecosystem services give users the same level of protection and transparency as existing services.

Benefits for users:
Regulation on a level playing field that treats all providers the same will encourage competition, generating consumer benefits in the form of prices, supply, quality, diversity and innovation.



²¹ OECD Review of Telecommunication Policy and Regulation in Colombia, OECD, April 2014

²² The national government still owns a 30% stake in Telefónica's Colombian business, and municipal governments own operators in some areas as well, such as Bogotá's 86% remaining stake in ETB.

²³ Keys to the Modernisation of Digital Ecosystem Regulation in Colombia, GSMA, October 2016

3

Enhance user experience by encouraging competition in quality of service

Regulation of quality of service must focus on creating transparency in the information available to users, comparable to and in line with international standards and the market context. There should be a guarantee that new digital ecosystem services will give users the same level of protection and transparency as existing services.

Any ex-ante regulation of quality should be accompanied by studies to assess the cost-benefit ratio based on real data and market studies. Using these studies, the utility to consumers can be evaluated when a specific regulation is implemented.

Benefits for users:

Consumers will have greater transparency to be able to decide which products and providers best suit their needs.



4

Create a single converged regulator to act across the digital ecosystem

Amending the institutional framework to create a single regulator by merging communications regulator CRC and television regulator ANTV will give rise to a convergent regulator that can analyse, regulate and promote the harmonious development of the entire digital ecosystem. Under this premise, such a regulator must also incorporate the spectrum agency ANE, which administers one of the key resources for providing telecommunications and broadcasting services.

Benefits for users:

Decision making will be much quicker and easier, responding appropriately to a sector in constant evolution. There will be fewer barriers to entry and operation, and greater variety in the provision of services, resulting in incentives for innovation and competition.



5

Remove sector-specific taxes to allow greater affordability and universality of services

Sector-specific taxation is the second highest in the region and mobile telecoms is taxed more heavily than fixed. Both are factors that contribute to Colombia's lower-than-average mobile broadband and smartphone adoption rates.

To reduce affordability barriers, the Colombian government recently removed VAT on basic smartphones (those costing less than COP654,000 or about \$225), similar to the policy approach it adopted for computers. However, VAT levels rose from 16% to 19% with the new fiscal reform, and the government introduced a new 4% excise duty on consumption of mobile data plans above \$16.²⁴

In such a strategic sector for the future development of the country, taxation on telecommunications should not distort consumption and investment decisions. Abolishing the consumption tax on voice services could connect more than 310,000 Colombians to the mobile internet over a five-year timeframe.

All stakeholders in the digital ecosystem should contribute to FONTIC (The Fund for ICT). Use of the fund should focus on universal access to internet service. A rethink of the need for FONTIC and its purpose is necessary to ensure it aims to extend ICT services into unconnected areas, avoiding asymmetric tax treatment of those who already meet their obligations through other regulations (e.g. through spectrum licensing conditions).

Benefits for users:

With a transparent, rational taxation system, the prices of services will decrease and consumption will increase, incorporating more people into digital services.

While tax revenues will decline in the short term, they are likely to recover in the long term due to increased consumption.



²⁴ Colombia introduces tax exemption on basic mobile handsets despite fiscal struggles, GSMA, April 2017

6

Optimise radio spectrum as a key input for industry development



Spectrum is a scarce resource, and as such it must be used as efficiently as possible for the benefit of the people of Colombia. Use of mobile services has increased exponentially in recent years, making the mobile phone the primary means of access to the internet. Much more spectrum needs to be allocated to meet the demand for ubiquity and multiple connected devices.

700 MHz spectrum is important because most of the people left to be connected live in rural areas; this band has technical characteristics to support better coverage of these areas.

Benefits for users:

Projections indicate that use of the 700 MHz band for mobile broadband will generate substantial economic benefits globally. As an example, in Colombia, it is anticipated that it will contribute an additional \$700-900 million to the ICT industry, according to a report from TAS analysis for the GSMA.²⁵

Beyond the contribution to the ICT ecosystem, the cost-benefit of allocating spectrum to mobile broadband is apparent in other areas. First, the utilisation of the 700 MHz band allows increased speed of deployment of broadband services. If this band were not available for mobile broadband services, the deployment of 4G technology would have to be achieved using higher spectrum bands, which would require a larger number of radio base stations. A smaller number of sites also results in lower operational and maintenance costs, and reduces the level of potential conflict due to the location of towers and antennas.

High spectrum prices can also reduce investment capacity or delay the deployment of mobile broadband in the country. In addition, they may reduce the number of participants, affecting the level of competition in the market.

Mobile money in Colombia

In 2016, Colombia was joint first place with Peru in The Economist Intelligence Unit's Global Microscope, which measures the conditions and enabling environment for financial inclusion. As part of the National Financial Inclusion Strategy, led by the Financial Regulatory Unit of the Ministry of Finance, regulation has been issued to allow the use of proportional Know Your Customer (KYC) for account registration and the use of agent networks for the distribution of financial services. Traditionally, mobile money in the country has been offered exclusively by banks, notably DaviPlata (Banco Davivienda) and Ahorro a la Mano (Bancolombia).

Access to financial services in the country has increased rapidly in the last few years, according to public data: there are 283 agents for every 100,000 adults, covering almost 100% of the country's

municipalities. The percentage of adults with access to financial services is 75.4%, and 63.5% have "active products". These figures drop dramatically in the rural areas; the government has expressed concern over the reliance on cash in the economy.

In 2014, the financial inclusion law was passed by congress, allowing non-banks to offer digital financial services. In 2017, the first non-bank led mobile money licence was granted to Celuplata. More are to follow.

Recently the Financial Regulatory Unit published a white paper scoping the policy on regulating the fintech industry, taking the lead in the region and showing commitment to ICT for delivering financial services to the underserved.

²⁵ Beneficios Económicos del Dividendo Digital para América Latina, GSMA, September 2011

Sustainable Development Goals

In September 2015, the United Nations introduced its Sustainable Development Goals (SDGs) to the world — a 17-point plan to end poverty, combat climate change and fight injustice and inequality by 2030. Mobile connectivity is essential to the achievement of the SDGs: globally, the industry has already connected almost 5 billion people, enabling greater inclusion in vast cities and remote villages, transforming communities, delivering healthcare in ways never imagined, opening doors to education, employment and income opportunities, creating smarter cities, empowering people with the tools they need to thrive, and driving a more sustainable planet.

The GSMA and mobile operators are united in support for helping achieve the SDGs in Latin America and the Caribbean, leveraging the power of mobile networks to accelerate this journey in a way that no other technology can. Across the region, mobile is already playing a key role in tackling various social and economic challenges around poverty eradication, agriculture, health, education, gender equality, water resource management and sanitation, affordable energy access, employment, infrastructure, inequality reduction, safer cities and climate change.

UN SDGs and mobile operator initiatives

Colombian case studies



No poverty

We can use connectivity to bridge human divides and create socio-economic opportunity. Expanding mobile access to the internet will accelerate economic growth and create new

opportunities for every community. The industry is leading the mobile revolution to create banking solutions for the unbanked with mobile money services to help move people out of poverty.

'Pescando con Redes Móviles' (Fishing with Mobile Networks) provides an example of how technology can be used to achieve greater social inclusion, in this case for fishermen in Colombia. Launched in 2013, the project founded by the Telefónica Foundation, Qualcomm, Cintel and USAID has 200 participants. In the two years since launch it has produced an average increase in income of 15% through opening up of new business opportunities and a reduction in overfishing.



Quality education

Mobile connectivity can increase access to education and enrich learning experiences with digital content. Mobile operators are working to support students and teachers in integrating

mobile technologies into the classroom. Connectivity also enables access to education for young people in the poorest villages and most remote locations, opening new channels for learning. The ambition is to deliver best in class digital literacy learning programmes to amplify the impact of technology in learning.

Claro Colombia has implemented programmes for young people and teachers that aim to improve student achievement. Educlis is an educational platform in which primary, secondary and higher education teachers, as well as parents, can have a virtual space to share their knowledge, generating content for educational purposes in short video format and creating a teaching and learning community. Educational games and information provided by the Carlos Slim foundation, and access to the Khan Academy's Spanish content are other facets of the programme. Educlis seeks to contribute to improving the quality of education, reducing dropout rates and truancy by supporting research and development through ICT use.

Educlis received 287,000 visits in 2015. Claro Colombia has made available over 309,000 tablets to students and teachers.



Decent work and economic growth

The mobile industry creates jobs directly and indirectly through accelerating economic

growth and enabling innovation. Some 17 million jobs were directly supported by the mobile ecosystem in 2016, and this is expected to rise to 20 million by 2020. The internet is the most important enabler of social development and economic growth of our time. Mobile connectivity is the primary method for connecting to the internet today and is a key driver of innovation, creating many more jobs indirectly through accelerated growth.

The Carlos Slim Foundation launched the 'Capacitate para el Empleo' (Prepare for Employment) initiative in Colombia in February 2017 in cooperation with the Ministry of Labour. Capacitate is a digital platform that offers online tools for free and regardless of previous experience, in various trades and technical activities for different sectors. Video tutorials explain the qualities and skills that are needed in the area of interest.

UN SDGs and mobile operator initiatives

Colombian case studies

11 SUSTAINABLE CITIES AND COMMUNITIES



Sustainable cities and communities

The mobile industry is committed to leveraging technology and expertise to ensure that communication is possible in disasters and humanitarian crises. Endorsed by the United Nations OCHA, the GSMA's Humanitarian Connectivity Charter now has 103 mobile network operators across 76 countries, committed to ensuring network resilience and supporting subscribers during times of crisis.

"The Internet of bins" is a project piloted by Korean start-up Ecube Labs. The project digitally tracks waste collection in Bogotá, Ibagué and Santa Marta, helping to solve the issue of overflowing public bins in busy areas. The service can be accessed by an app used by drivers or by administrators on a computer in the office. It can reduce operational costs by up to 80% by predicting when bins will be full and optimising drivers' routes and shifts accordingly.

12 RESPONSIBLE CONSUMPTION AND PRODUCTION



Responsible consumption and production

The mobile industry enables collaboration and smart transportation, and helps all industries to innovate and reduce their environmental footprint. The mobile industry is using renewable energy sources to power new or existing off-grid base station sites, extending the reach of mobile networks to the most remote locations. The connectivity provided enables intelligent insight to help people improve their consumption patterns and reduce their environmental impact.

As part of the We Care Colombia campaign, mobile operators Claro, Telefónica Movistar and Tigo committed to support e-waste initiatives from the Ministry of Environment and Sustainable Development and the Ministry of ICT. They launched a public awareness campaign through traditional and digital media platforms, encouraging citizens to support the separation and collection of e-waste. The campaign "If you don't use it, recycle it" was launched to raise public awareness about the importance of recycling electrical and electronic equipment. The awareness campaign reached around 8 million people.

14 LIFE BELOW WATER



Conserve and sustainably use the oceans, seas and marine resources

The mobile industry helps sustain marine life and environments by monitoring solutions and connectivity between devices. Internet of Things technology using mobile networks for connectivity is being used to monitor environmental conditions in aquaculture, helping conserve and sustain marine resources.

With 2,900km of coastline on both the Caribbean Sea and Pacific Ocean and 1 million square kilometres of marine territory, Colombia is acutely aware of biodiversity as well as the fragility of marine life.

As part of the Vive Digital initiatives, the government has developed two apps that seek to educate Colombians about their marine abundance and its fragility. One is called SEAK; it allows anyone to experience marine life without having to dive or visit the coast. The other is called BOYAX, a nautical geo-referencing application that allows fishermen, navigators, marine biologists and others to store and review nautical routes and leave reviews and comments to help other navigators, both expert and inexperienced. Also included is a panic button to summon coast guard assistance in case of emergency.

Appendix

Methodology for economic estimates

The GSMA Intelligence definition of the mobile ecosystem includes mobile network operators, infrastructure service providers, retailers and distributors of mobile products and services, manufacturers of mobile devices including feature phones, smartphones, tablets and wearables, and mobile content, application and service providers. Any economic value generated through mobile commerce in Colombia is explicitly excluded, as in that case mobile technology and services are typically a contributor but not the key driver of the economic value added that is generated.

The direct economic contribution of firms in the ecosystem is estimated by measuring their value added to the economy, which includes employee compensation, profits for shareholders and tax payments. To calculate the economic contribution of the mobile ecosystem, we follow the value added approach to GDP accounting, also known as the production approach. We measure the revenues associated with each of the industries that make up the mobile ecosystem, and subtract from the value the direct cost of making those sales. Data is sourced from the analysis of company financial accounts, industry and trade bodies, local, regional and national public bodies, as well as

a variety of leading industry and economic data providers including GSMA Intelligence, Euromonitor, Strategy Analytics, and the United Nations Comtrade database.

As mobile operators and the ecosystem purchase inputs and services from their providers in the supply chain, a multiplier effect is generated, producing sales and value added in other sectors and industries. We calculate this indirect effect from the analysis of input/output tables published by the OECD. We further adjust the values of the multipliers to avoid any potential double-counting from cross-sales within the mobile ecosystem.

Finally, the use of mobile phones and mobile internet applications by workers and businesses allows more efficient ways to access information, accelerates processes and communications, and allows greater productivity. GSMA Intelligence monitors and keeps track of relevant economic literature and empirical studies in this field. Based on these, and in combination with GSMA Intelligence data on the penetration and growth of mobile and mobile internet services, we estimate the productivity effect of mobile services on GDP.

Differences between GSMA Intelligence and regulator-reported data

GSMA Intelligence connections are based on operator reports; Tigo (Millicom) only includes active users over a 60-day period.

The report from regulator MinTIC includes all Tigo connections, and includes MVNO connections separately, even though these are also reported by operators in their results.

GSMA Intelligence includes all 3G and 4G connections in its database, while the regulator's report includes only those that access the internet. Separately, GSMA Intelligence has unique mobile internet subscriber figures from its survey data, which include mobile internet subscribers on any technology generation, including 2G.



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