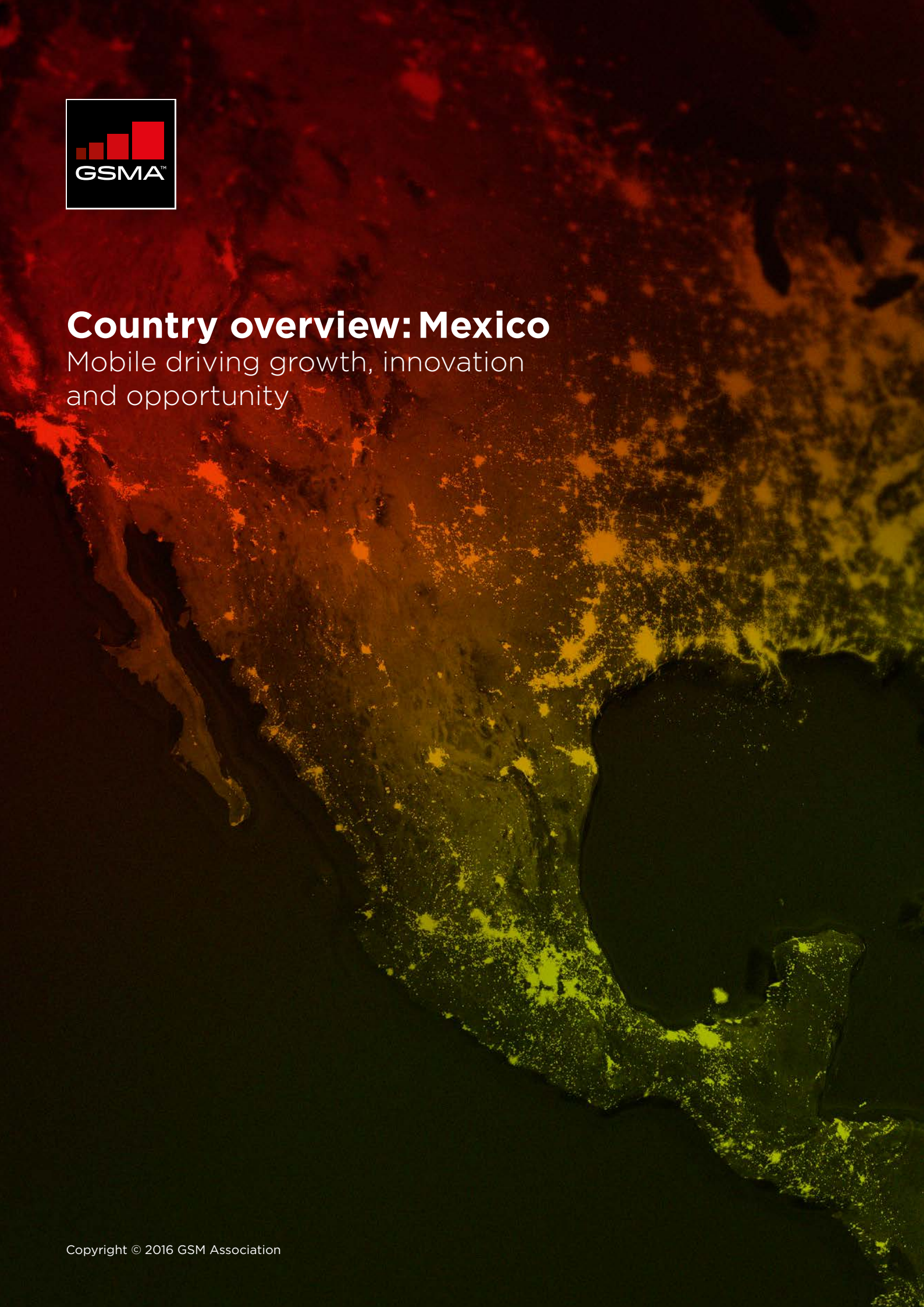

Country overview: Mexico

Mobile driving growth, innovation and opportunity

The GSMA represents the interests of mobile operators worldwide, uniting nearly 800 operators with more than 250 companies in the broader mobile ecosystem, including handset and device makers, software companies, equipment providers and Internet companies, as well as organisations in adjacent industry sectors. The GSMA also produces industry-leading events such as Mobile World Congress, Mobile World Congress Shanghai and the Mobile 360 Series conferences.

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

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Contents

Executive Summary

69% of the Mexican population subscribe to mobile services

Mexico is the second largest mobile market in Latin America with 89 million unique mobile subscribers[1], equivalent to 69% of the population. In recent years, unique subscriber growth in Mexico has been relatively slow, resulting in a unique subscriber penetration rate equal to that of Brazil but lower than that of many other markets across Latin America, such as Chile (93%), Uruguay (92%) and Argentina (91%).

1. Unique users who have subscribed to mobile services at the end of the period, excluding M2M. Subscribers differ from connections such that a unique user can have multiple connections (see Appendix for more information)

The mobile sector contributes 3.5% to Mexico's total GDP

In 2015 the mobile sector made a total contribution of more than $40 billion in value-added terms, equivalent to nearly 3.5% of Mexico's total GDP. This includes both direct and indirect contributions, as well as productivity and efficiency gains through the use of mobile technology. Approximately 335,000 jobs were also supported by the mobile ecosystem.

Reforms stimulating price declines, competition and investment

In 2014, market reforms were implemented to kick-start the market and address major challenges that had hindered the adoption of mobile services. These challenges included a concentrated market stifling investment and innovation in the country, and high prices making mobile affordability an issue, particularly for over half of the population that lives in poverty.

The impact of the reforms, not just on the telco sector but also the wider economy (thanks to reforms in the transport and energy sectors too), has been significant:

- AT&T entered the market in 2015 with an aggressive pricing strategy and plans for a major expansion of its 4G network. Meanwhile, Telcel continued to expand and upgrade its 4G network across the country, and Movistar took steps to expand coverage into areas where it was not yet present.
- Seven MVNOs have launched since 2014, and over 15 more are expected over the next few years.
- Mobile prices fallen by 17% between December 2014 and December 2015, and are now among the cheapest in the region.[2]
- Inflation reached a record low of 2.13% in 2015.[3]
- Foreign direct investment in telecoms in 2015 reached $2.7 billion, 10% of total FDI in Mexico.[4]
- Venture-capital (VC) funding in Mexico-based start-ups surpassed $1 billion in 2014, an almost six-fold increase on the previous five years combined.[5]

2. Source: IFT
3. Source: INEGI
4. Source: Cuarto informe trimestral estadístico 2015, IFT, May 2016
5. Source: CB Insights

Increasing affordability leading to growing adoption of advanced mobile services

The combination of a steadily growing economy, record-low inflation and declining mobile prices is contributing to accelerating subscriber penetration, migration to mobile broadband (3G and above) services and rising smartphone adoption. By the end of 2015, 36% of the population in Mexico subscribed to mobile broadband services, up from less than a quarter in 2013. In parallel, smartphones accounted for half of total connections, almost double the adoption rate of 2014 (27%).

The challenge is to close the coverage gap, and satisfy latent demand for advanced services by developing local content and improving digital skills. Technology migration is leading to growing usage of advanced mobile services, particularly IP messaging and social media: four out of five mobile phone users in Mexico use IP messaging and access social networks, higher than regional average. However, affordability is affected by high taxes and fees applied to mobile services in Mexico, which generate significant costs for consumers and mobile operators.

Favourable environment leading to increased investment and innovation

Aided by a favourable regulatory environment, proximity to the US, a youthful tech-savvy population, the accelerating migration to advanced mobile services, growing risk capital and plentiful on-the-ground accelerators, the mobile ecosystem in Mexico is expanding rapidly.

Hailed as one of the most dynamic start-up scenes in Latin America, Mexico is attracting a high share of risk capital relative to regional peers. In the last two years, Mexico accounted for more than a third of regional VC funding (70% of which came from the Internet and mobile sectors), an over-performance considering it accounts for 20% of regional unique subscribers.[6]

Mobile is the key technology to help Mexico realise its innovation potential, and it is crucial for the entire mobile value chain to support entrepreneurs and start-ups to aid their development. For example, mobile operators are increasingly becoming involved in emerging areas such as IoT/M2M, digital commerce, mobile security and all-IP communications; the government is helping support start-ups and small and medium-sized businesses with funding via the Instituto Nacional del Emprendedor (INADEM); and various accelerators/incubators such as Startup Mexico, 500 Mexico City and Naranya*LABS are helping entrepreneurs to thrive and take advantage of huge scale potential in Mexico.

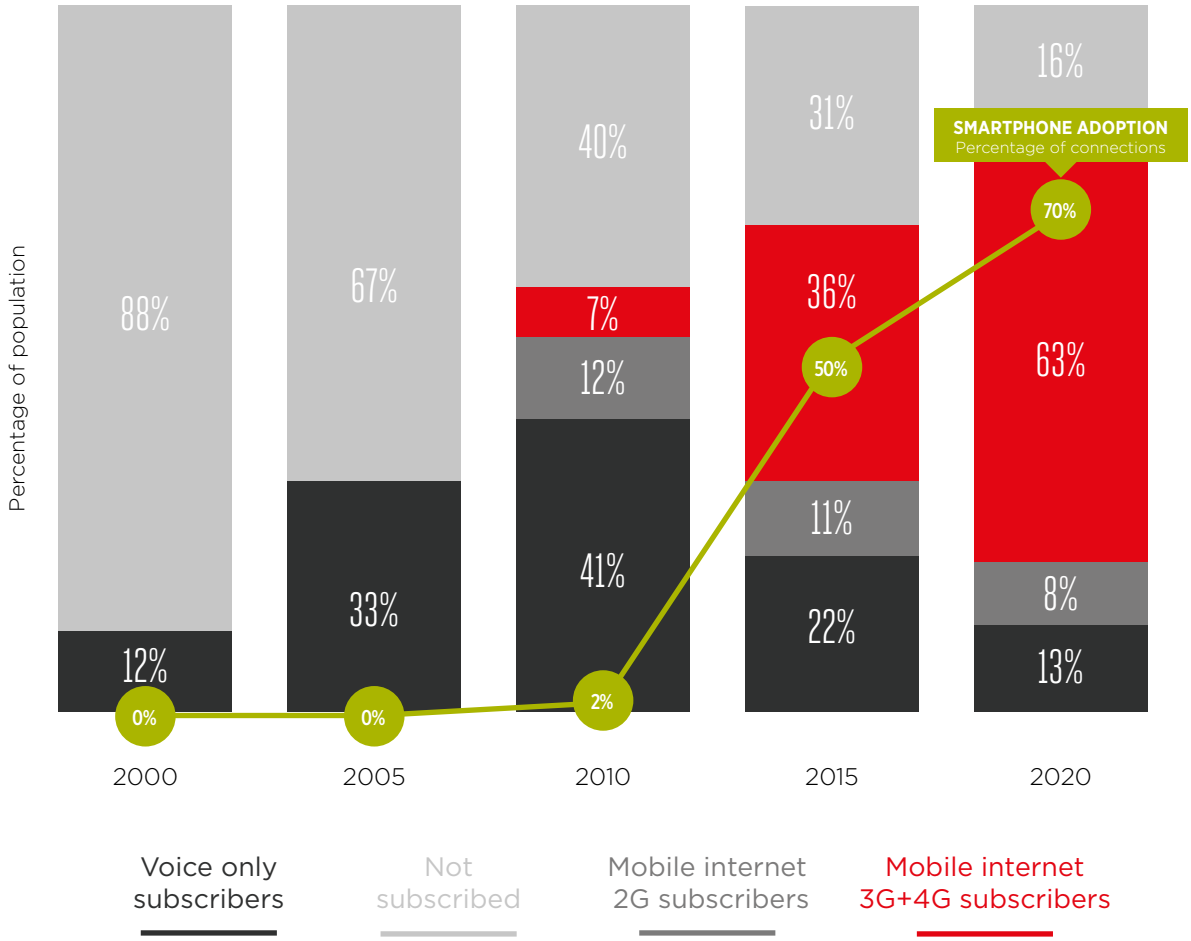
6. Source: CB Insights

Mobile driving productivity and economic growth – a positive outlook for 2020

Mobile operators in Mexico are expected to invest more than $11 billion in the next four years as they develop and enhance their networks, particularly in the rollout of 4G services to cover 85% of the population by 2020. Based on this foundation and supported by an improved economic outlook, mobile broadband penetration will rise from 36% of the population in 2015 to around 63% by 2020, and a similar shift is expected in device ownership; smartphone adoption is expected to increase to 70% of connections over the next five years. As the value chain grows, the total economic contribution of the mobile sector could reach $52 billion by 2020, representing 3.8% of Mexico's GDP, up from 3.5% in 2015.

Figure 1

Mexico technology evolution



Source: GSMA Intelligence
Note: smartphone adoption is percentage of connections

MEXICO

Unique subscribers and SIM connections

2015
88m
69% PENETRATION RATE

2020
114m
84% PENETRATION RATE

CONNECTIONS*
*Excluding M2M

2015 **104m**
81% PENETRATION RATE

2020 **129m**
95% PENETRATION RATE

Smartphones

2015 **52m**
50% ADOPTION

2020 **91m**
70% ADOPTION

4G

% of connections

2015 **7m**
7% PENETRATION

2020 **42m**
32% PENETRATION

Population coverage

52%

85%

Mobile broadband subscribers

2015
46m
52% of total subscribers

2020
86m
75% of total subscribers

Mobile broadband connections

(excluding M2M)

2015 **60m**
58% of total connections

2020 **100m**
77% of total connections

Employment

2015

335,000 Jobs

Cellular M2M connections

2015

4 million

2020

13 million

Capital expenditure

2015

$2bn

2016-2020

$11bn

Mobile industry contribution to GDP

2015 **3.5%**

2020 **3.8%**

Mobile operator and GSMA activities to support the developing mobile ecosystem

Accelerating the delivery of new connected devices and services in the M2M market through industry collaboration, appropriate regulation and optimising networks

Helping mobile network operators deliver global interconnected all-IP communications services to consumers such as voice over LTE (VoLTE), video over LTE (ViLTE), voice over Wi-Fi (VoWiFi) and Rich Communications Services (RCS)

Delivering a universal identity system that securely authenticates the user and provides safe access to mobile and digital services via the mobile phone through GSMA's Mobile Connect programme

Supporting digital inclusion through the creation and promotion of local content, contributing to the elimination of barriers to infrastructure deployment and supporting digital literacy initiatives. Also promoting mobile financial services, stimulating interoperability and enabling banking for the unbanked.

1 Context

1.1 Mexico in numbers

Mexico is the 14th largest country in the world by land area, and third behind Brazil and Argentina in Latin America. It has the second largest population in the region (behind Brazil), with 122 million people.[7] Mexico is a federation comprising 31 states and Mexico City, its capital and largest city.

The global financial crisis in late 2008 caused a massive economic downturn in Mexico, although growth returned quickly in 2010. Ongoing economic and social concerns include low real wages, high income inequality and few advancement opportunities for the population in the impoverished southern states.

7. Source: Consejo Nacional de Población (CONAPO) mid-year 2016 projection

Figure 2

Mexico key facts

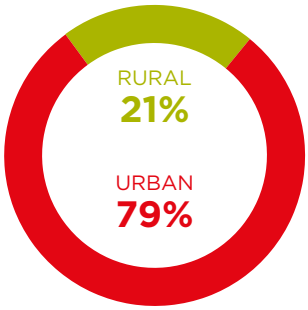
Total population
122 million

Capital city
Mexico City

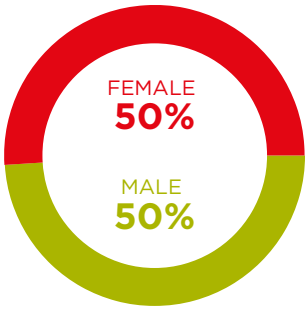
Official language
Spanish

Second largest country in Latin America by land area
1,943,950 sq km

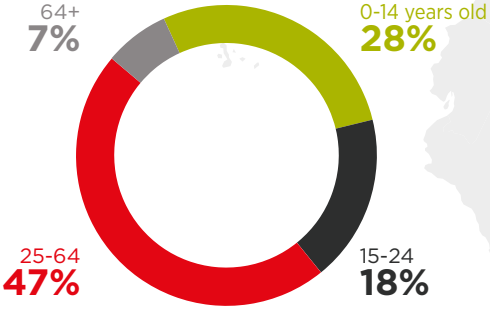
MOSTLY URBAN

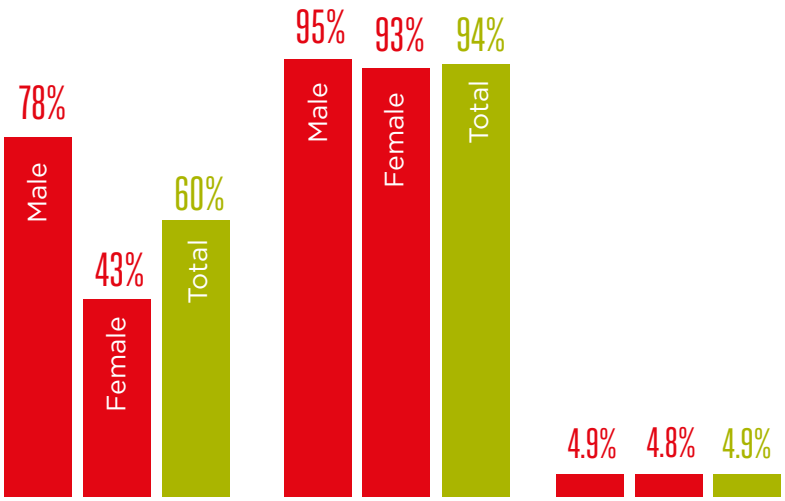


EVEN GENDER SPLIT

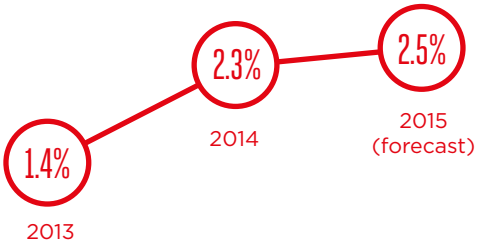


YOUTHFUL POPULATION





GDP growth



GDP per capita (nominal)

$9,009

Upper middle income

Source: World Bank, CONAPO, IMF

1.2 Snapshot of the Mexican mobile market

Unique subscriber penetration in Mexico stands at 69% as of Q1 2016, below the regional average of 71%.[8] This follows a few years of relatively low growth, with an average annual growth rate of 1.3% between 2012 and 2015 (the fourth lowest in the region). Despite this low penetration rate, the market is relatively mature: as of Q1 2016, mobile broadband (3G and above) accounts for more than 53% of total unique subscriptions (the fourth highest in Latin America and above the regional average of 49%), and smartphones account for 54% of total connections (above the regional average of 51%).

Three licensed MNOs operate in Mexico: América Móvil's Telcel has 67% of connections (as of Q1 2016), Telefónica-owned Movistar has 24%, and AT&T, which recently acquired Iusacell and Nextel, has 9% of connections.

Table 1

Key mobile indicators for Mexico

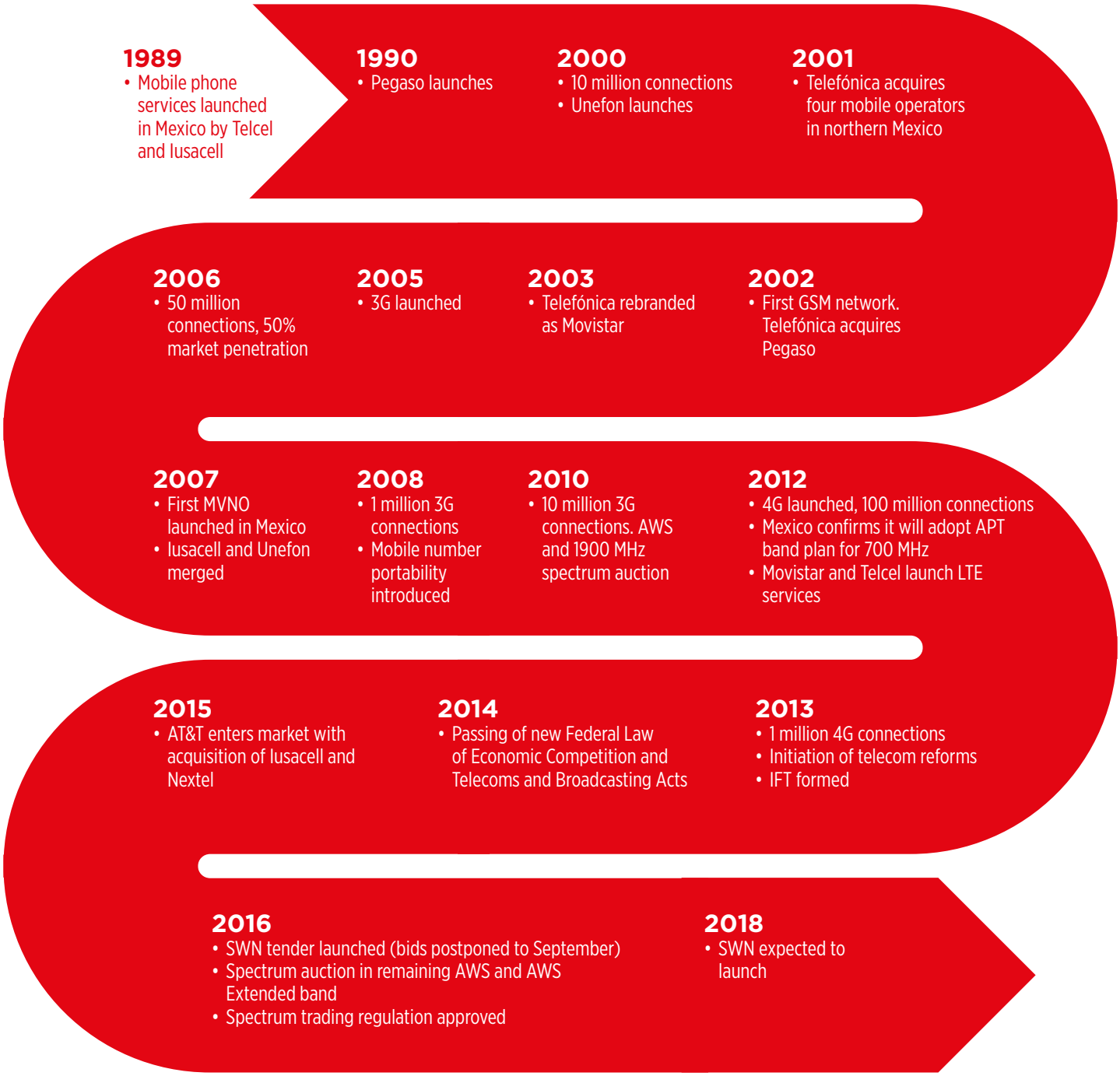
METRIC	2012	2013	2014	2015	Q1 2016
Unique subscribers (million)	80	82	85	88	89
Mobile broadband subscribers (million)	20	28	39	46	47
Connections (excluding cellular M2M, million)	100	104	103	104	105
4G connections (million)	0	1	4	7	9
Cellular M2M connections (million)	1	2	3	4	4
Penetration, unique subscribers	65%	66%	67%	69%	69%
Penetration, connections	81%	83%	82%	81%	82%
Unique subscriber growth (annual)	8%	2%	3%	4%	
Connections growth (annual)	6%	4%	-1%	1%	
% prepaid connections	85%	86%	86%	85%	86%
% smartphones connections	6%	13%	27%	50%	54%
% 3G connections	25%	33%	44%	44%	44%
% 4G connections	0%	1%	3%	7%	8%
% cellular M2M connections	1%	2%	3%	4%	4%
ARPU, by connection ($)	$11.01	$10.47	$9.27	$8.90	$8.33
Recurring revenue ($ million)	$12,820	$12,800	$11,509	$11,044	
Recurring revenue growth	8.3%	-0.2%	-10.1%	-4.0%	

Source: GSMA Intelligence
Note: revenue figures adjusted for Q1 2016 US dollar exchange rate

8. Unique users who have subscribed to mobile services at the end of the period, excluding M2M. Subscribers differ from connections such that a unique user can have multiple connections (see Appendix for more information).

Figure 3

Major milestones of Mexican mobile market



Source: Operator websites, news reports, GSMA Intelligence

1.3 Contribution of the mobile sector to the economy of Mexico

Direct contribution: Our definition of the mobile ecosystem in Mexico includes a set of closely interlinked industries (see Figure 21) that jointly made a contribution of nearly 1% to national GDP in 2015, directly generating an economic value added of $11 billion. Mobile operators account for the majority of this figure with nearly $6 billion[9], representing more than half of the total contribution of the mobile ecosystem in Mexico. The contribution of the rest of the mobile ecosystem put together directly accounts for approximately the other half, with more than $5 billion in value added. This latter figure includes the contribution from mobile content, application and service companies, distributors and retailers of mobile technology[10], manufacturers of mobile devices, and mobile infrastructure companies.

The mobile ecosystem is a central part of a broader digital ecosystem that also includes fixed-line communications and the internet and software sectors. In an increasingly converged sector, where products and services are offered and consumed simultaneously on mobile and fixed devices and networks, the distinction between mobile and fixed digital services is becoming increasingly blurred. Note that our figures are different to estimates from the IFT on the telecoms sector's contribution to GDP in Mexico due to differences in scope and methodology.[11]

Indirect contribution: Firms in the mobile ecosystem purchase inputs from their providers in the supply chain in other sectors and industries across Mexico. This produces additional economic activity that would have not been generated otherwise. For example, the ongoing rollout and upgrade of 4G networks requires services from the transport, manufacturing and construction sectors, indirectly generating jobs in the broader 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 2015 this additional economic activity generated a further $3.6 billion in value add (or 0.3% of GDP) in Mexico.[12]

Productivity contribution: The use of mobile technology also drives significant improvements in productivity and efficiency by workers and firms. For example, it provides faster and easier access to information, saving money and time. It has also started to facilitate the increased digitisation of businesses in many sectors of the Mexican economy. The productivity effect of mobile technology and services represented a boost to Mexican GDP of more than $25 billion, or just over 2.2% of GDP in 2015.

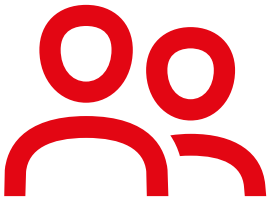
Overall, taking into account the direct, indirect and productivity impacts, in 2015 the mobile sector made a total contribution of more than $40 billion in value-added terms, equivalent to nearly 3.5% of Mexico's total GDP in 2015.

9. The economic value added directly generated by mobile operators in Mexico 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 Mexico. GSMA Intelligence estimates total turnover of over $15 billion in 2015 for mobile operators, equivalent to 1.3% of GDP. Turnover is an important measure to understand the size of the sector, but also accounts for value added that is generated in other parts of the economy or imported from abroad. Our measure of economic value added excludes those elements that do not represent a direct contribution to GDP.
10. The contribution through mobile distribution excludes any sales by mobile operators through their direct retail channels, which is included in the mobile operators figure.
11. The IFT estimates a contribution from the telecoms and broadcasting sector of 3.6% to GDP in Q4 2015. This figure is higher than our figure for two main reasons. Firstly, the IFT uses 2008 prices for this calculation, so the contribution is approximately twice the amount it would be if calculated in nominal 2015 prices. Secondly, it includes fixed line operators as well as broadcasters, which are not within the scope of our estimate of the mobile ecosystem.
12. The indirect impact is calculated using multiplier estimates for the Mexico economy that are derived from the input output tables of INEGI.

Figure 4

Total contribution of mobile ecosystem to GDP in Mexico in 2015

Source: GSMA Intelligence



1.4 Contribution of the mobile sector to employment in Mexico

In 2015 the mobile ecosystem provided direct employment to approximately 170,000 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 60,000 people, and mobile content, applications and services, with employment of nearly 75,000. However, many of those employed in the mobile content and apps sector are self-employed or employed on a part-time basis. Direct employment in mobile device manufacturing is also significant, with more than 20,000 people employed in the sector. However, employment in device manufacturing, which is very much geographically concentrated in the north of the country, has significantly reduced in the last few years, as a number of production and assembly plants have relocated to other regions with lower unit costs. Finally, the mobile retail and distribution sector and the mobile infrastructure sector also directly generated jobs in Mexico, with 10,000 and nearly 2,000 jobs respectively.

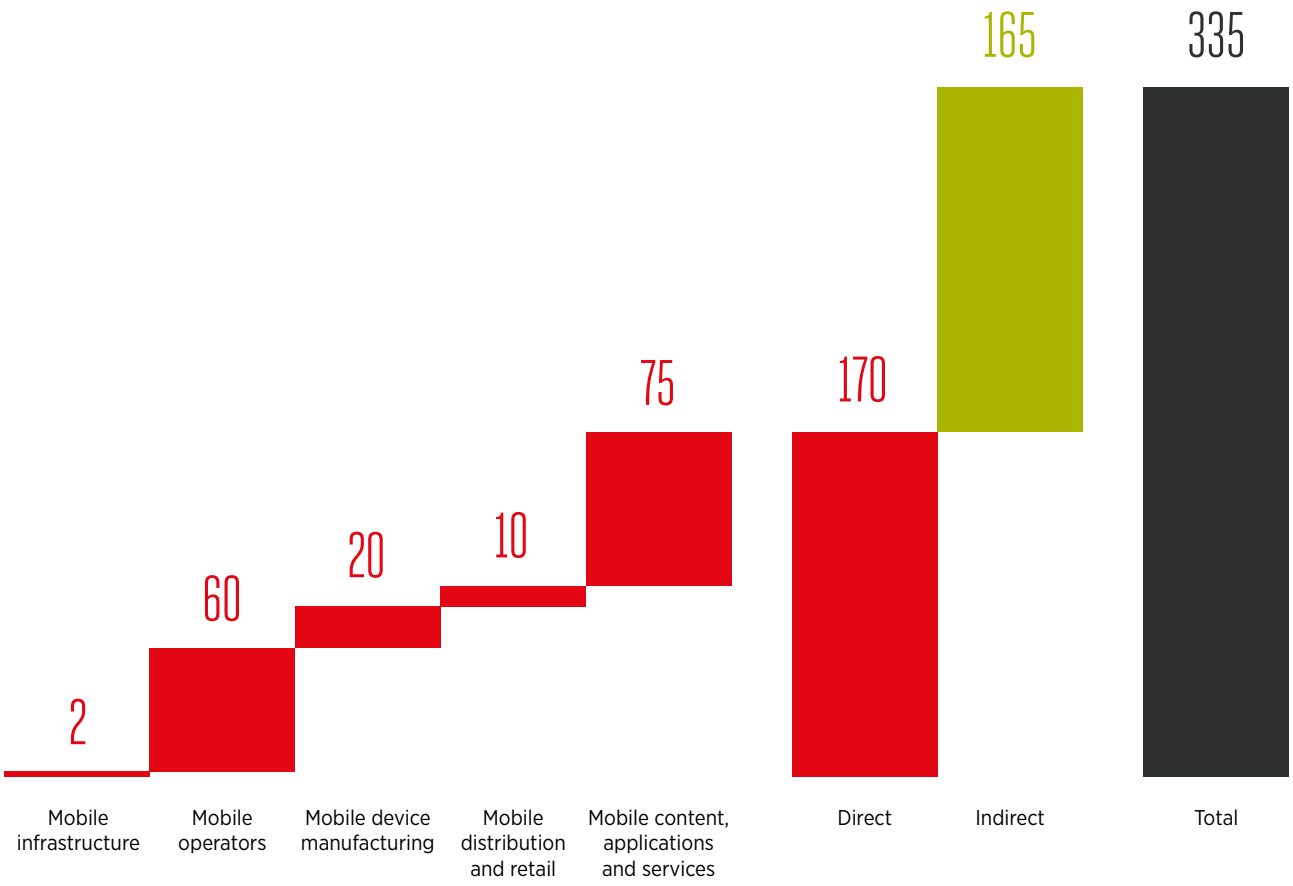
The mobile ecosystem is a central part of a broader digital ecosystem that also includes fixed-line communications and the internet and software sector. The number of jobs directly supported by this broader digital ecosystem in Mexico is obviously higher than for just the mobile ecosystem. For example, across all its operations, América Móvil alone directly employs nearly 90,000 people in Mexico.

The economic activity of companies in the mobile ecosystem generates jobs in other sectors of the economy, 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 2015 approximately 165,000 jobs were indirectly supported in this way, bringing the total impact (both direct and indirect) of the mobile industry to approximately 335,000 jobs.

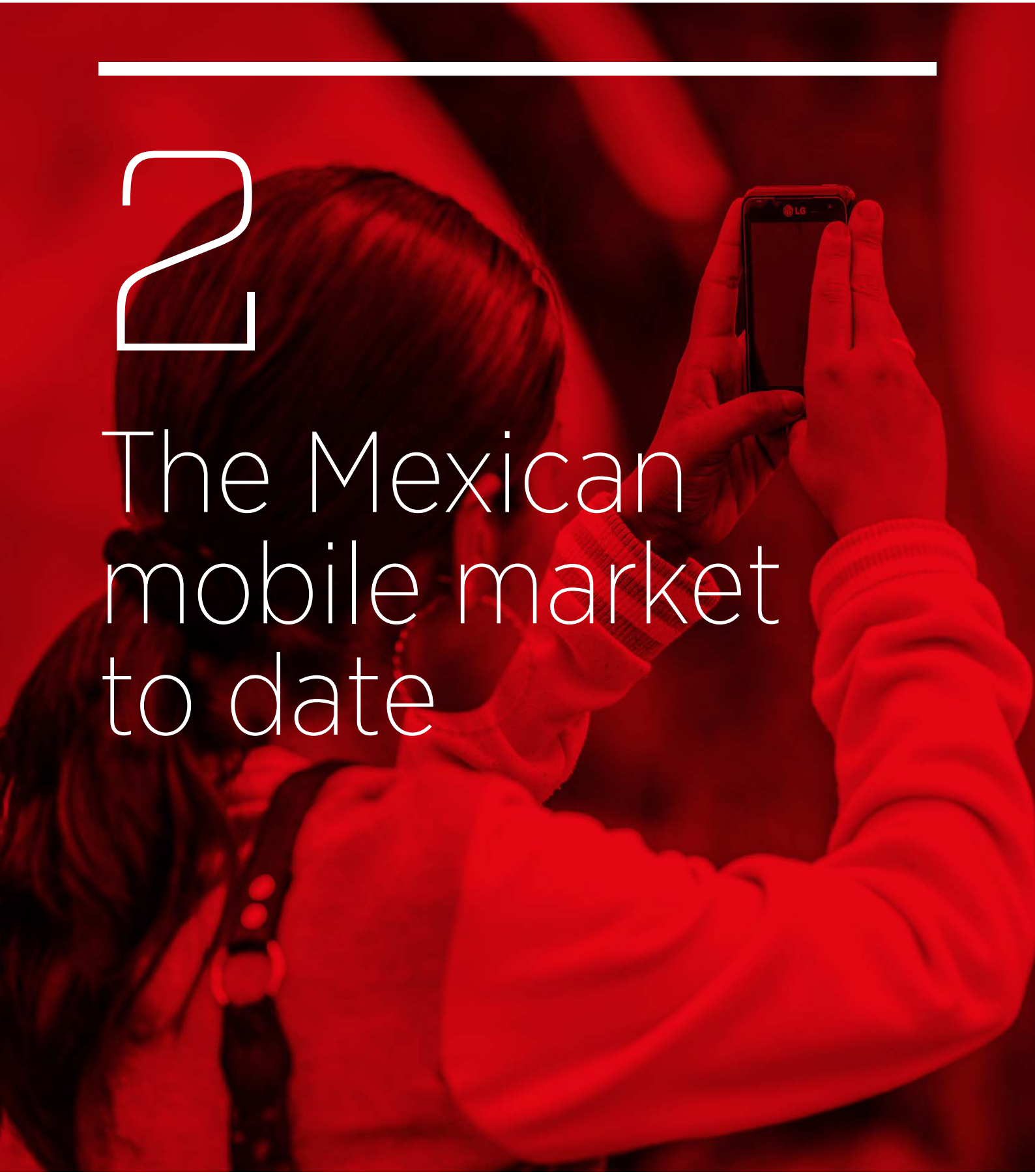
Figure 5

Total jobs (direct and indirect) created by the mobile ecosystem in Mexico

Jobs (thousands)



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



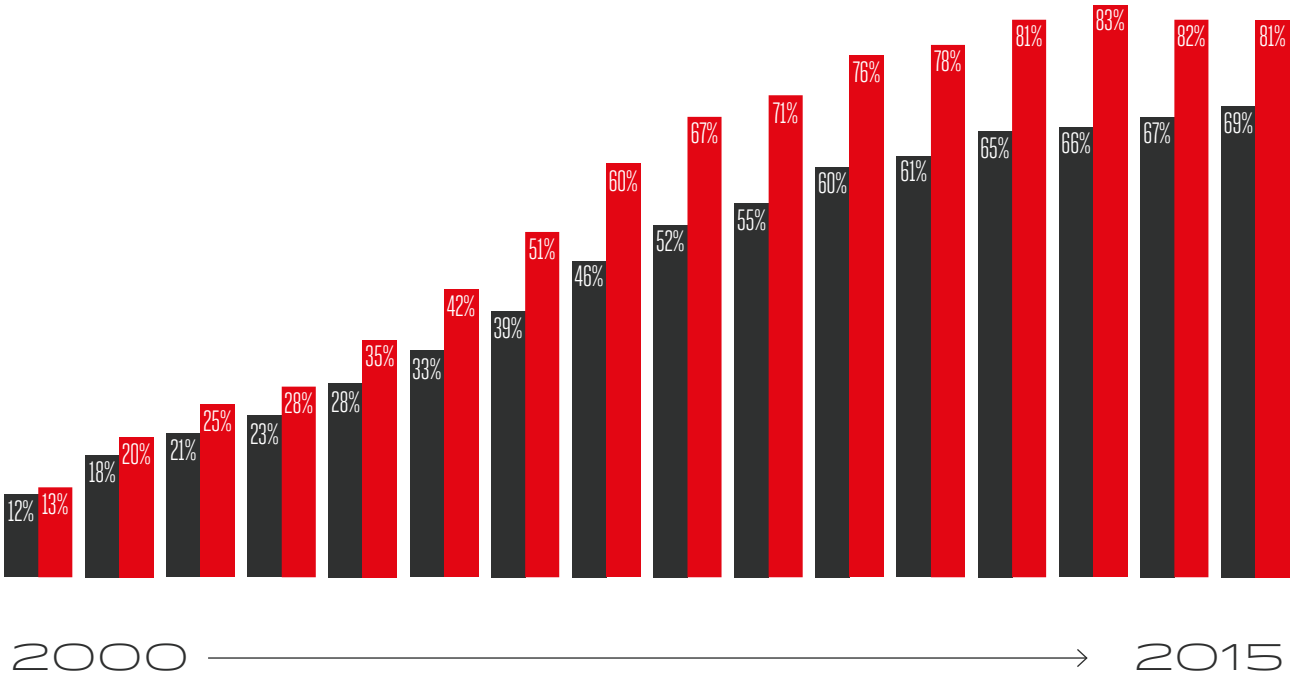
2 The Mexican mobile market to date

2.1 Relatively low mobile adoption in Mexico

Mexico is the second largest mobile market in Latin America (after Brazil), with 89 million unique subscribers[13] accounting for 105 million connections (excluding cellular M2M)[14] as of Q1 2016. However, in recent years – particularly since the global economic crisis of 2008 – growth has been relatively slow. The number of unique subscribers grew at an average annual rate of 4.3% between 2010 and 2015 (below the regional average of 5.4%). Mexico consequently has a penetration rate lower than that of many other markets across Latin America.

Figure 6

Mexico mobile market stagnating in recent years



Source: GSMA Intelligence

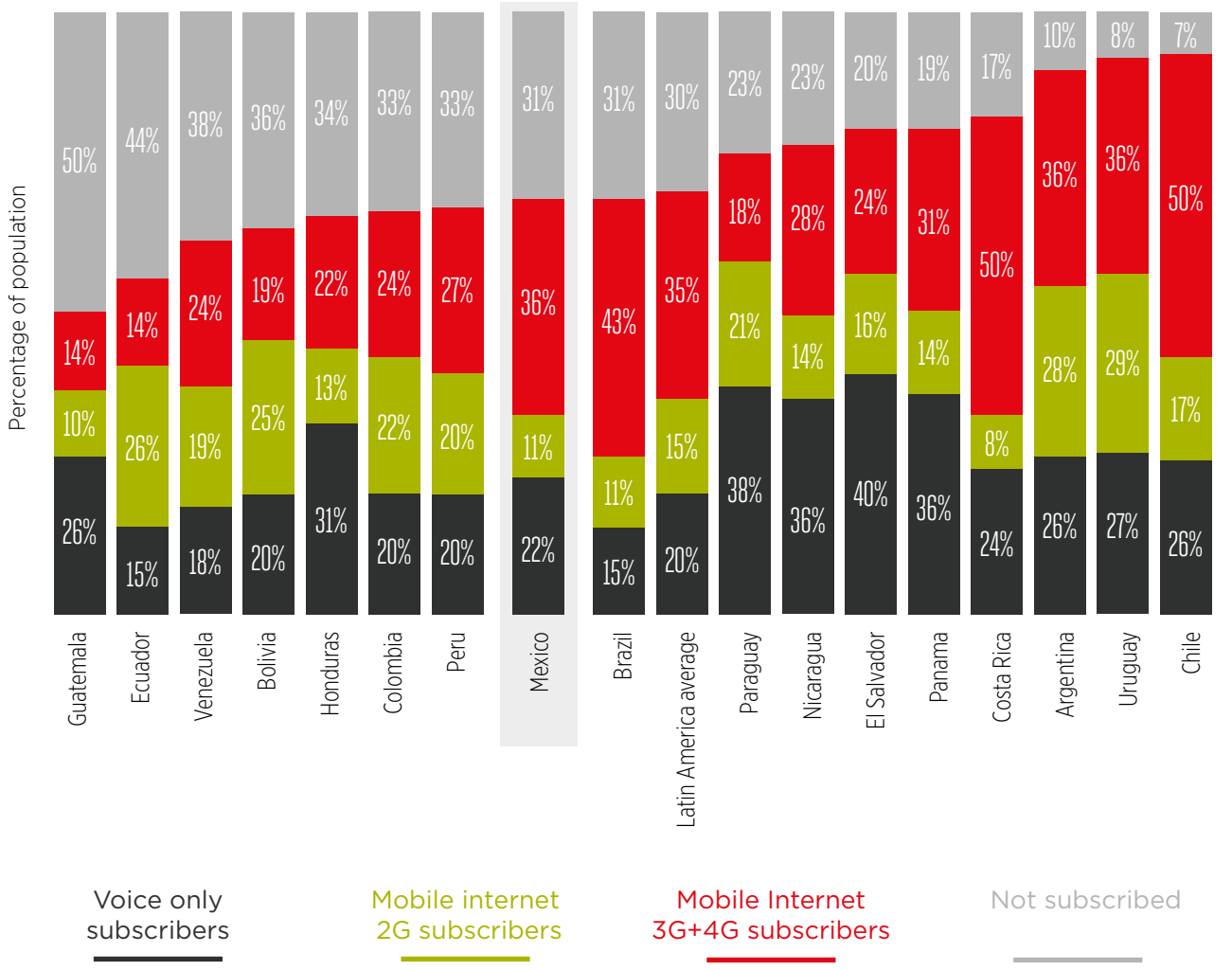
13. Unique users who have subscribed to mobile services at the end of the period, excluding M2M. Subscribers differ from connections such that a unique user can have multiple connections
14. Unique SIM cards (or phone numbers, where SIM cards are not used) that have been registered on the mobile network at the end of the period. Connections differ from subscribers such that a unique subscriber can have multiple connections.

As shown in Figure 6, over the last two years penetration actually declined in Mexico. One of the main reasons for this was AT&T undertaking a phase of "cleaning" its base in early 2015 following the acquisitions of Iusacell and Nextel, resulting in a net loss of 3.6 million connections (almost 40% of the combined bases of Iusacell and Nextel).

At the end of 2015, unique subscriber penetration stood at 69%, below the regional average of 70%. This is behind other major markets such as Chile, Uruguay and Argentina but equal to Brazil (see Figure 7). Mexico is one of only a few major markets with a connections penetration rate below 100%, largely due to the fact that multi-SIM ownership is a lot less common in the country compared to other Latin American markets. A Mexican subscriber has on average 1.2 SIMs, which is the lowest ratio in the region, behind other markets such as Brazil and Guatemala with ratios of 1.6 and 2.0 SIMs per subscriber respectively.

Figure 7

Subscriber penetration comparison, 2015



Source: GSMA Intelligence

Among the main reasons why mobile in Mexico has not grown as quickly as some of its regional counterparts is Mexico's socio-economic conditions: a large, widely dispersed youth population (more than a quarter of the population are under 15 years of age), a wide income disparity and poverty levels that are among the highest in Latin America.

Additionally, the regulatory landscape prior to the 2014 Telecommunication Reform had a negative impact on network infrastructure deployment and service adoption, particularly due to artificial spectrum scarcity, a lack of a long-term vision on spectrum licensing and a heavy tax burden for mobile operators that put a strain on competition. Section 2.2 discusses the reforms that sought to address these challenges and modernise the mobile sector.

Affordability issues

Despite its position as the second largest economy in Latin America, Mexico is a country with high levels of social inequality. GDP per capita is just over $9,000[15], which makes Mexico an upper-middle income country as defined by the World Bank. But income is very unevenly distributed (see Figure 8); Mexico's GINI coefficient[16] in 2013 was 0.48 (the second highest in the OECD behind Chile), 53% of the population live below the national poverty line[17] (the second highest proportion in Latin America after Honduras) and the top 10% of earners (accounting for almost 40% of the nation's wealth) make on average 30 times more than the bottom 10%. Adjusting for inequality, Mexico's human development index (HDI) in 2014 was 0.59, which places it in the "medium-low human development" category (Mexico's unadjusted HDI was 0.76, or "high human development").

Figure 8

High levels of social inequality in Mexico

GINI COEFFICIENT	PERCENTAGE OF POPULATION BELOW POVERTY LINE	INCOME SHARE HELD BY TOP 10%	INEQUALITY-ADJUSTED HDI
0.48	53%	39%	0.59
Second highest of OECD countries	Second highest in Latin America	Top 10% earn 30× bottom 10%	Medium-low

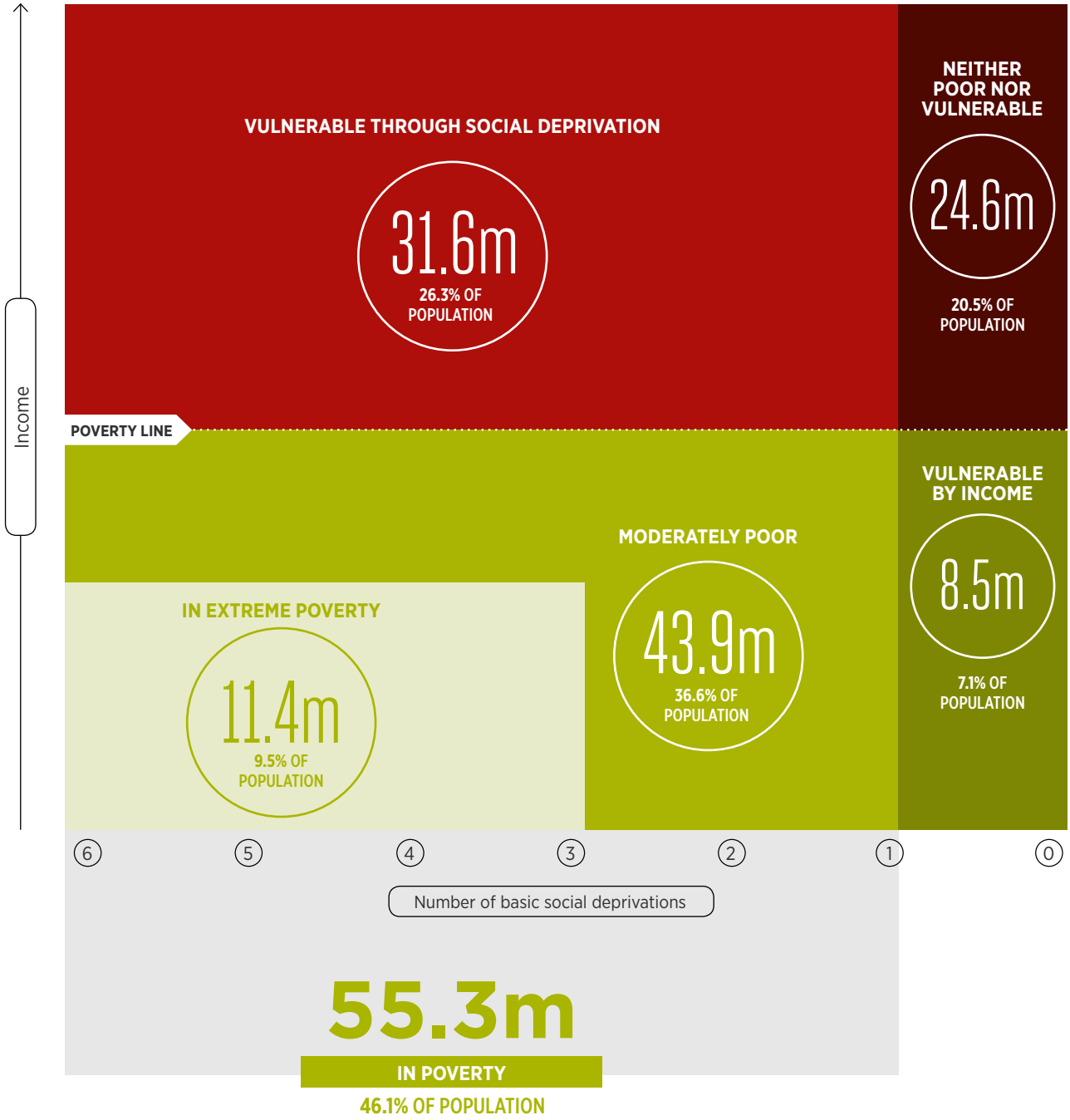
Source: World Bank, OECD, UNDP

15. Source: IMF
16. GINI is a representation of income distribution on a scale of 0 (perfect equality) to 1 (maximal inequality)
17. Defined by The National Council for the Evaluation of Social Development Policy (CONEVAL) in 2014 as MXN2,542 ($146) per month in cities and MXN1,615 ($93) in rural areas. The benchmark for extreme poverty was MXN1,243 ($72) per month in cities and MXN868 ($50) in the countryside.

Besides the 68 million people living in poverty, an additional 34 million are vulnerable through deprivation of one or more basic social needs (education, access to healthcare, access to social security, quality of housing, basic services in the home or access to food). Overall, only one in five Mexicans is deemed to be neither poor nor vulnerable (Figure 9).

Figure 9

Poverty in Mexico

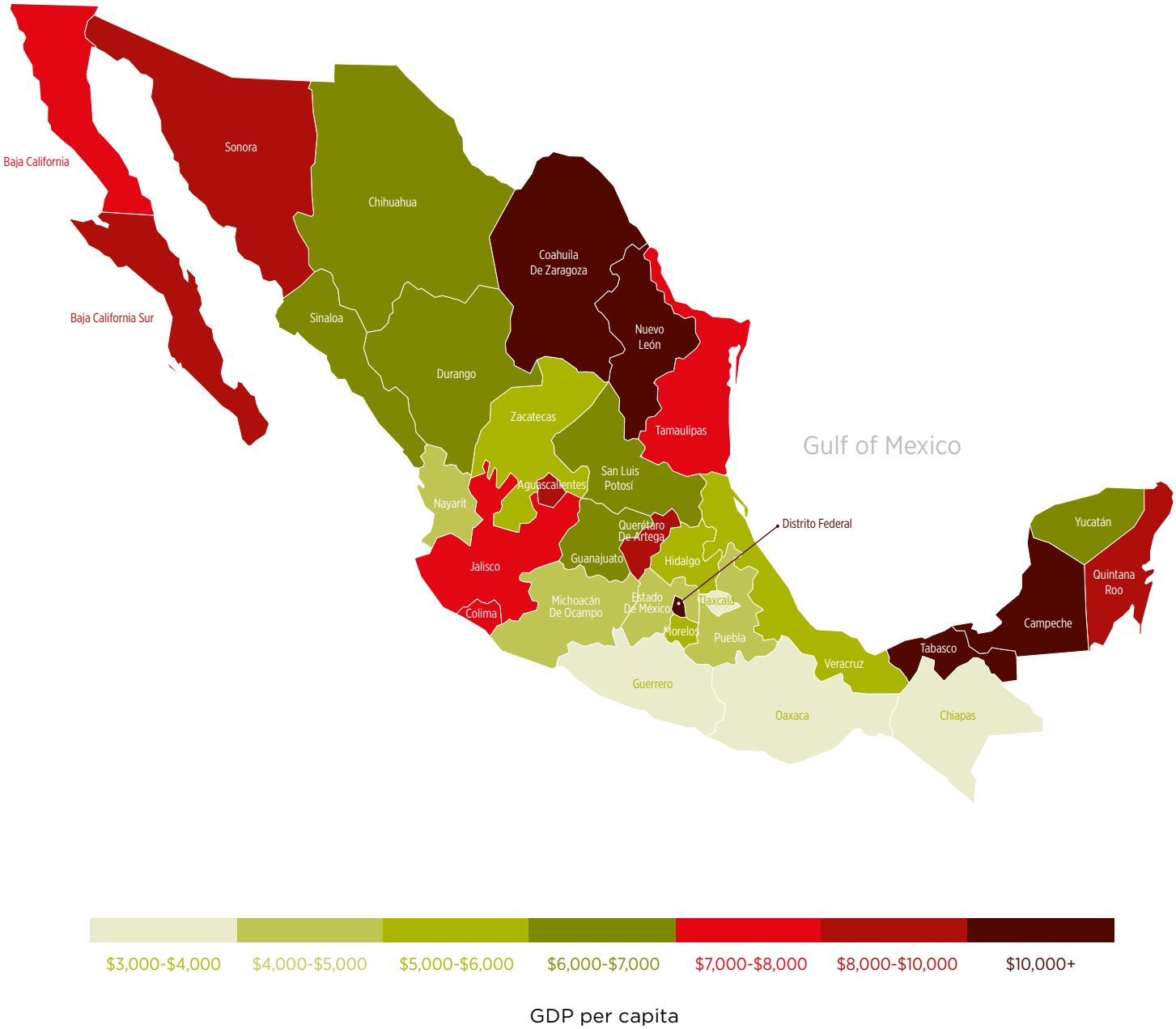


Source: CONEVAL, GSMA Intelligence
Note: 2014 CONEVAL analysis updated with 2015 population figures

There is also wide regional diversity when it comes to wealth. Compared to wealthy states, such as the Distrito Federal and Nuevo León with GDPs per capita of around $16,000 and $13,000 respectively, southern states such as Chiapas, Guerrero and Oaxaca have GDPs per capita of less than $4,000 (Figure 10).

Figure 10

Uneven wealth distribution in Mexico



Source: INEGI, CANAPO, GSMA Intelligence

By the end of 2015, 36% of the Mexican population subscribed to mobile broadband services, up from 7% in 2010 (see Figure 11). Some 6 million people were not covered by a mobile broadband network, most of whom live in remote or poor areas where extending mobile coverage is often uneconomical (for more information see Closing the coverage gap: Digital inclusion in Latin America). Most importantly however, 59% of the population, or over 70 million people, were covered by a mobile broadband network but did not subscribe. These people are most likely to be in lower income groups for whom affordability is a key barrier. While much progress has been made in recent years (see Section 2.3), there is still a long way to go in bringing these people into the digital age.

Figure 11

Mobile broadband adoption in Mexico

Source: GSMA Intelligence

Total cost of mobile ownership (TCMO) as a share of income for the poorest 40% of the Mexican population is 11%, more than double the 5% that is generally considered to be the threshold for affordability. Although this is an improvement on markets such as Guatemala and Bolivia, where TCMO for the bottom 40% is over 35% of income, it is more of an issue than in Uruguay, Argentina or Brazil, where TCMO for the bottom 40% is 5%, 8% and 10% respectively (for more detail, see *Digital inclusion in Latin America and the Caribbean*).

Exacerbating these issues are the high taxes and fees levied on mobile services in Mexico, which create significant costs for consumers and mobile operators. These include the following:

- **consumer taxes:** consumption tax, mobile-specific tax, SIM activation tax and customs duty on devices
- **operator taxes:** corporate tax, mobile-specific tax, regulatory and spectrum fees, universal service obligation (for América Móvil only), customs duty and other, miscellaneous taxes.

Mobile consumers pay the Impuesto Especial sobre Produccion y Servicios (IEPS) tax on mobile airtime and SMS, which adds to the cost of service consumption and the overall cost of owning and using a mobile phone. When all taxes on devices and services are taken into consideration, taxes accounted for nearly 19% of the total cost of mobile ownership in Mexico in 2014.

Mobile operators are also subject to a number of taxes and regulatory fees, including general taxes such as corporation tax, customs duties and customs processing fees, and fees paid to the regulator. Mobile operators' contribution to the Mexican government through annual regulatory fees is among the highest globally – more than 10% of revenues.

A Deloitte report commissioned by the GSMA estimates that:

- a reduction of IEPS from 3.0% to 1.5% could lead to an increase of 1.1 million connections, $2.3 billion in GDP and 15,000 jobs by 2020
- elimination of IEPS altogether could result in a gain of 2.2 million connections, $4.5 billion in GDP and 23,000 jobs in the same period
- a 10% reduction in regulatory fees could lead to around 290,000 new connections, $590 million in GDP and 3,000 jobs in the next five years.[18]

As a result of these taxes and fees (in particular annual spectrum fees), total recurring payments made by consumers and mobile operators represent 27% of market revenues.[19] These financial burdens increase the final price of mobile services, creating a barrier to affordability and leading to reduced consumer demand. These taxes also lead to higher costs of operation, pressure on margins and reduced investment incentives for mobile operators. However, there are more positive signs ahead, with adoption and investment increasing (as discussed in Sections 2.3 and 3.2).

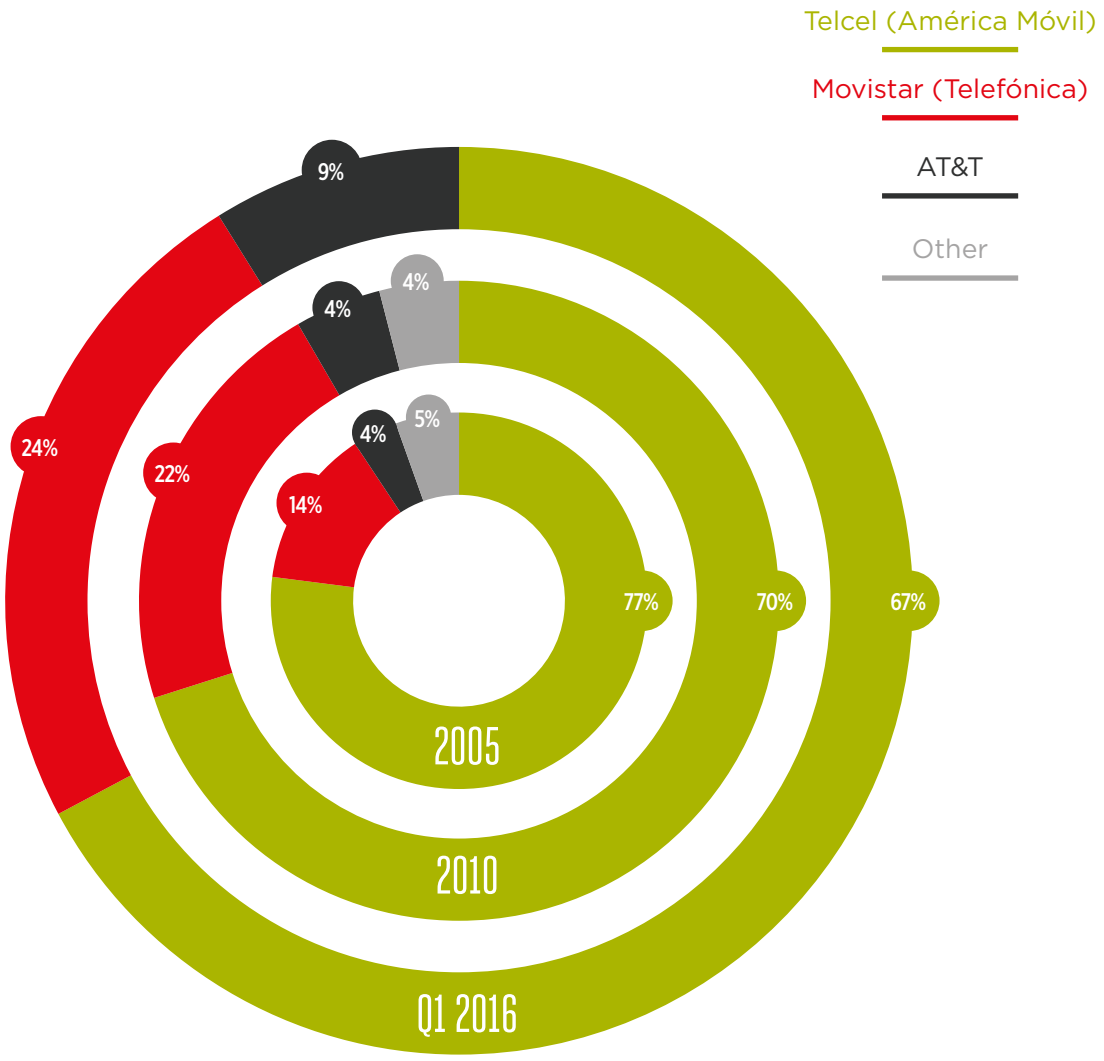
18. Source: Tax reform in Mexico, GSMA/Deloitte, August 2015
19. Source: Digital inclusion and mobile sector taxation in Mexico, GSMA/Deloitte, August 2015

A market in transition

The mobile market in Mexico is unusual in that it is home to three mobile operators with very uneven market shares: América Móvil's Telcel has 67% of connections (as of Q1 2016), Telefónica-owned Movistar has 24%, and AT&T, having acquired Iusacell and Nextel in early 2015, has 9%. Market share has changed very little over the last few years: the only major movement being a gain of six percentage points by Movistar in the second half of the last decade (see Figure 12). Since 2010, mobile operator market shares have remained largely unchanged.

Figure 12

Mexico operator market share evolution



Source: GSMA Intelligence
Note: AT&T data includes historic market share of Iusacell and Unefon

2.2 Market reforms target mobile sector modernisation

In June 2013, a constitutional reform act was passed (and by-laws approved in July 2014) with the goal to modernise the telecoms sector, increase competition and stimulate mobile adoption.

The reforms are based on three pillars – competitive prices, quality of service and national coverage – and included the formation of a new regulator (the IFT) with the power to impose sanctions on any player it deems to have a dominant position (more than 50% market share, revenues or network traffic). América Móvil-owned Telcel was deemed such a player, and is subject to specific regulations (such as asymmetric mobile termination rates and forced infrastructure sharing) to create a more conducive environment for competitors. Other initiatives included opening up of incumbent networks to MVNOs, elimination of national roaming rates and the potential creation of a national single wholesale network (SWN) for mobile broadband services, to be operational by 2018.

It is still early days in the reform process and market share has yet to see any major change. However, the reforms have helped create a climate more conducive to competition and market growth (one example being Telcel having to pay mobile termination rates to competitors but not being able to charge them in return). AT&T's acquisition of Iusacell and Nextel in early 2015 (at a combined cost of $4.4 billion[20,21]), followed by a planned investment of approximately $3 billion in its 4G network by the end of 2018[22], is a significant step in bringing increased competition to the Mexican mobile market. AT&T is aiming to cover 75 million people with its 4G network by the end of 2016 (which will put its coverage roughly equal to Movistar and about 10 percentage points behind Telcel) and extend this to 100 million by 2018.

AT&T entered the Mexican market with an aggressive pricing strategy, focussing mostly on the contract segment, and targeted at the growing middle class combined with the expanding Latin American population in the US (where AT&T is a market leader). It launched a seamless cross-border service allowing customers to use their individual plans for voice, SMS and data while in the US at no added charge (i.e. with no international roaming charges), and to call those in the US who are on AT&T's network for free.

Telcel launched its "Sin Fronteras" ("No Borders") plan (more such plans followed), which allows customers to make local-rate calls to the US and Canada and use voice, SMS and data allowances in the US and Canada with no roaming charges, all for an additional MXN50 (around $2.90), including taxes. Telcel also announced plans to invest $6 billion in mobile in Mexico.[23]

Encouraged by the more competition-friendly environment, a number of MVNOs entered the market in 2014/2015: currently there are seven MVNOs with commercial offerings in Mexico (including sub-brand MVNOs).[24] The IFT published new guidelines designed to protect MVNOs, such as allowing them to have their own phone numbers (assigned by the IFT) and provide their own SIM cards, as well as allowing them access to incumbent mobile operator networks and the future potential SWN. The aim is to attract more MVNOs to the Mexican market; 10–15 more could potentially launch in the next few years. However, while this can introduce some interesting commercial innovation through alternative business models, it is unlikely to affect market share and does not guarantee longevity. Differentiation is needed to compete with incumbent network investment. This could be through a focus on, for example, mobile broadband connectivity and access; social sharing; gaming and OTT apps; digital commerce and money services; specific communities; or emerging Internet of Things solutions (for more detail, see *Setting the scene for future MVNO growth*).

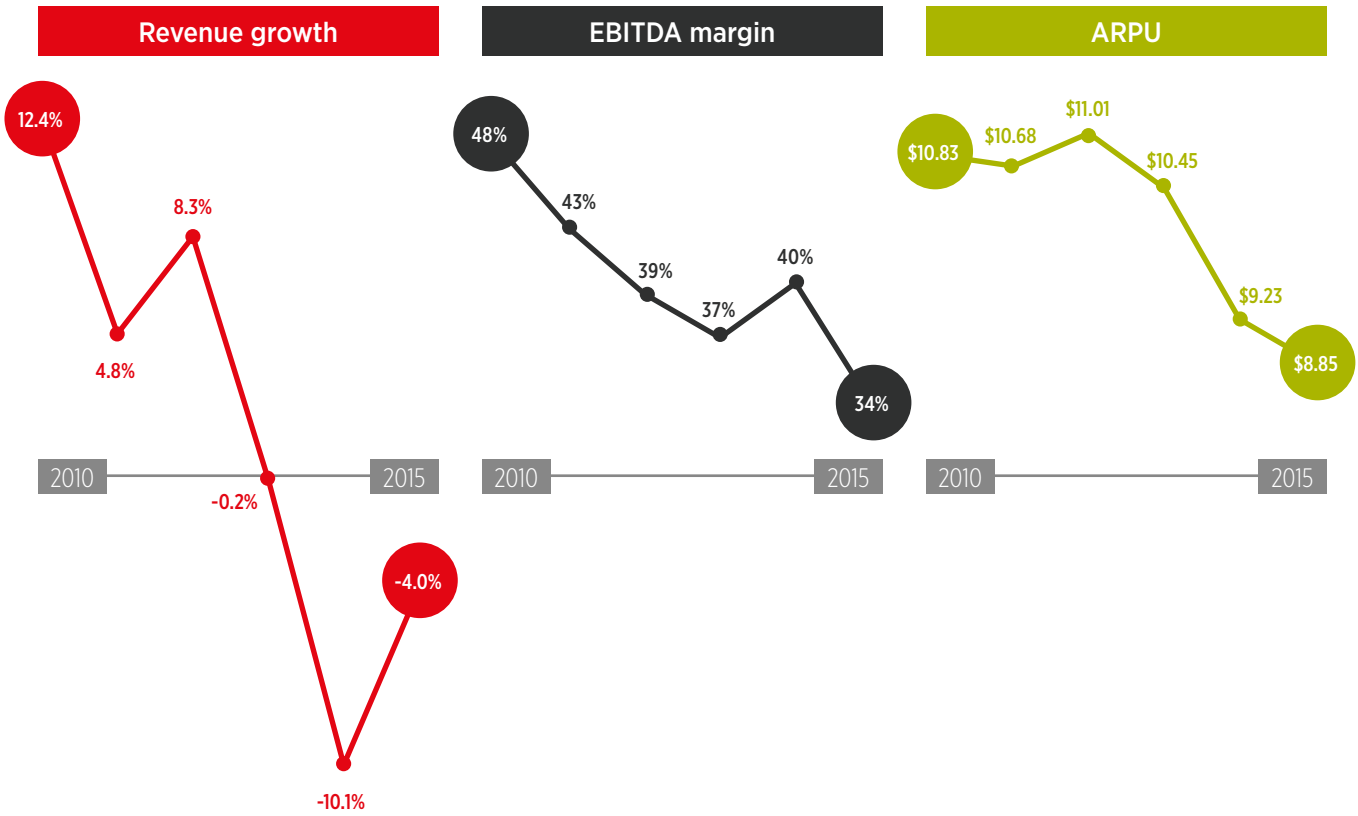
20. Source: "AT&T Closes Acquisition of Mexico Wireless Provider Iusacell", AT&T, January 2015
21. Source: "AT&T Completes Acquisition of Nextel Mexico", AT&T, April 2015
22. Source: "AT&T to Invest Approximately US$3 Billion in Mexico", AT&T, June 2015
23. Source: "América Móvil to invest US$6bn in Mexico", BNamericas, March 2016
24. Weex, Maz Tiempo, QBOCel, Tuenti and Virgin Mobile on Telefónica's network, Bueno Cell on Telcel's network, and Unefon on AT&T's

> Through the creation of a more competitive environment and the opening of the telecommunications sector, more companies, both national and foreign, are investing in Mexico.
>
> **President Enrique Peña Nieto**

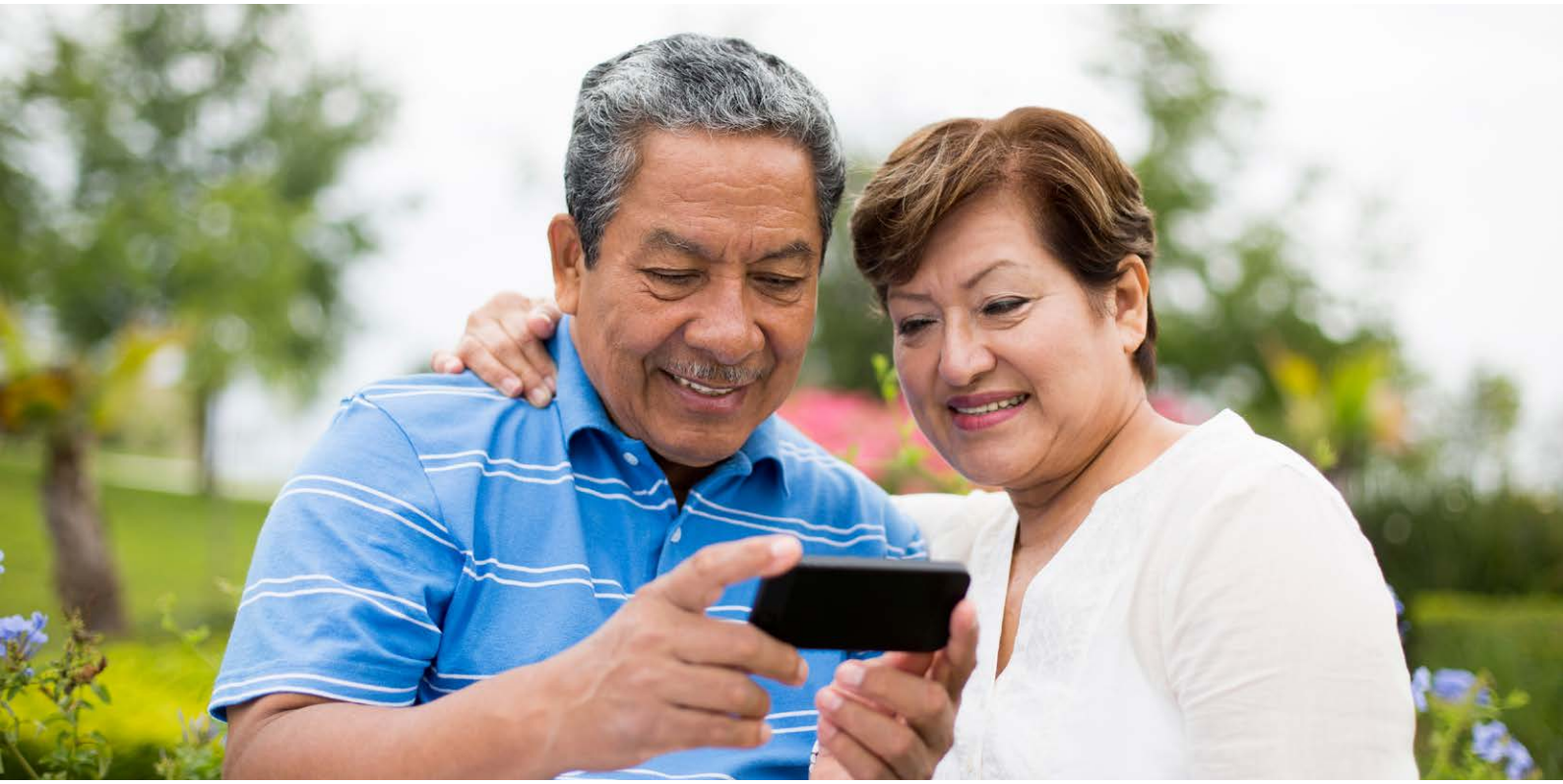
Increasing competition has had a significant impact on prices in Mexico: in parallel with record-low inflation of 2.13% in 2015, mobile prices decreased by 16.8% (discussed further in Section 2.3). This is a significant step to addressing the affordability issue outlined earlier. Mobile operators, however, are feeling the effects. As the new regulations came in and prices started to drop, revenues declined by 10% in 2014. ARPU decreased from $11.01 in 2012 to $8.85 in 2015 (reaching a low of $7.53 in Q1 2016). This also resulted in squeezed profit margins, with EBITDA falling from 48% of total revenues in 2010 to 34% in 2015 (see Figure 13).

Figure 13

Mobile operator financials under pressure due to market reforms



Source: GSMA Intelligence



Revenues have started to show signs of stabilisation, with smaller declines in 2015 than in 2014. Most mobile operators are reporting an acceleration in mobile data revenues as a leading cause of this reversal, driven by growing migration to mobile broadband services and smartphone usage (discussed further in Section 2.3). For example:

- Telcel announced that smartphone penetration in Mexico had reached 45% in Q1 2016 (up from 30% in Q1 2015), driving mobile data traffic growth of 144% in the same period
- Movistar reported smartphone penetration in Mexico of 44% in Q1 2016 (up ten percentage points on the same period in 2015) and a doubling of its LTE connections base (driven by strong coverage expansion), leading to a twofold increase in data traffic.

In early 2016, the IFT will review the reforms put in place, thoroughly evaluating existing measures in order to ensure whether the policies are still relevant to achieve the initial objectives. This will include assessing whether to maintain or eliminate the asymmetric measures under current conditions of competition. While the reforms have yet to affect Telcel's market share, the process is likely to take time.

The single wholesale network proposal

In addition to the regulations imposed directly on América Móvil, the constitutional reforms of 2013 included the potential creation of a national single wholesale network (SWN) in Mexico, for which the full digital dividend band (90 MHz in the 700 MHz spectrum band) was reserved. This band is particularly valued by mobile operators for its coverage characteristics; the low frequency provides extended coverage at lower cost as fewer base stations are required to achieve greater geographic coverage. It also helps to improve indoor coverage in urban areas.

Mexico's transport and communications ministry, SCT, released the tender for the SWN early in 2016 with the aim of launching the network in 2018. The winning bidder will be expected to invest around $7 billion over 10 years to build a network that reaches a minimum of 85% of the population with 4G mobile broadband within five years, 12.75% of which should include towns with fewer than 10,000 inhabitants.

The fundamental question is whether this approach is preferable over a process to tender the 700 MHz spectrum among competing mobile operators with conditions that incentivise them to achieve the SWN coverage targets. This issue was analysed by Frontier Economics in a report sponsored by the GSMA that found that moving away from traditional mobile operator competition models towards SWNs can lead to economic inefficiencies (in terms of forgone tax revenues and capital investments), stifle innovation, restrict take-up of mobile broadband services, and ultimately work against consumer interests. Several arguments support this:

- An SWN may co-exist for a period with existing networks. As the SWN will be supported by the government, this will likely lead to a distortion of competition. Co-existence is also likely to increase uncertainty, which will have a dampening effect on investment in mobile broadband services.
- The success of the SWN would depend on whether the wholesale prices, which will be regulated in addition to quality and coverage conditions, are low enough to attract investors. MVNOs operating over the SWN would likely focus on price competition, as their ability to differentiate their retail offerings would be limited by the availability (and pricing) of suitable wholesale products. This could impede the ability of MVNOs to compete with existing operators at the retail level, and may therefore reduce demand for access to the SWN. Additionally, without the assurance that current mobile operators will be clients of this network, traffic may not be sufficient to keep it self-sustainable.
- Although an SWN could deliver coverage in areas into which it would be uneconomical for competing networks to expand, final coverage may end up being less than that of incumbent mobile operators. For example, despite the stipulation that total coverage of 85% should include 12.75% in towns with fewer than 10,000 inhabitants, this is less than half of the current population that lives in these areas.[25] The correct approach is to consider how public subsidies could be used to extend the benefits of network competition to those areas.
- The benefits of network competition go beyond coverage. Innovation is a key driver of consumer value at the national level, and this occurs in networks as well as services and devices. In practice, single networks have been slow-moving in terms of expanding coverage, performing upgrades and embracing new technologies such as 3G. An SWN can be expected to prompt less innovation than network competition.

The SWN proposal is controversial as no such comparable arrangement exists in Latin America (Rwanda has the only currently live wholesale network globally). It also may not do anything to change the competitive dynamics of the market, as traditional network competition could actually be more successful in meeting the government's objective for improved coverage and reduced prices. As a case in point, 3G coverage has reached 95% of the population in Mexico through traditional competition (despite anti-competitive arguments), and 4G population coverage stood at around 60% as of Q1 2016. Further, a recent report commissioned by the GSMA[26] found that 3G coverage is 36% higher, and overall coverage has increased three times faster, in countries with competing networks compared to those served by a single network.

25. Source: "Cobertura y despliegue de la red compartida", Mediatelecom, February 2016
26. Source: Assessing the case for Single Wholesale Networks in mobile communications, Frontier Economics, 2014

2.3 Positive outlook for affordability and adoption

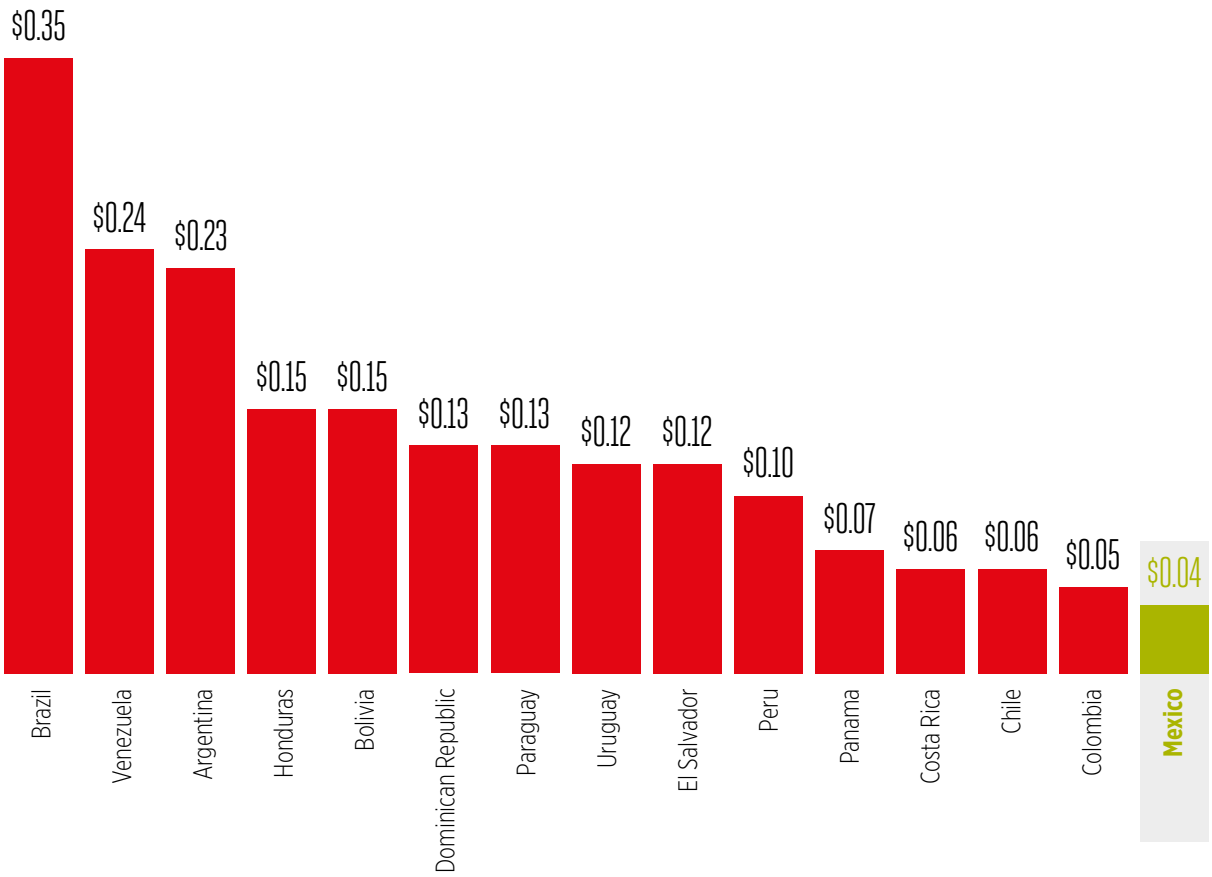
Reforms stimulating price declines in mobile

The new regulations outlined in Section 2.2, along with increased competition and aggressive pricing strategies by new entrants (particularly AT&T and certain MVNOs), has resulted in steady price declines in Mexico. Figures from the Ministry of Communications and Transport and the IFT show that, between December 2014 and December 2015, prices for mobile services declined by 16.8%. And in October 2015, data from Peruvian regulator Osiptel showed that, in Q3 2015, Mexico had the lowest prepaid mobile prices in Latin America[27] (see Figure 14). Further, mobile operators in Mexico offer zero-rated data for Facebook, WhatsApp and Twitter usage, making mobile services even more affordable.

Figure 14

Mexico now has some of the cheapest tariffs in Latin America

Average price per minute, prepaid (excl VAT)



Source: Osiptel

27. Source: "México tiene precios de móvil más baratos", Mediatelecom, April 2016

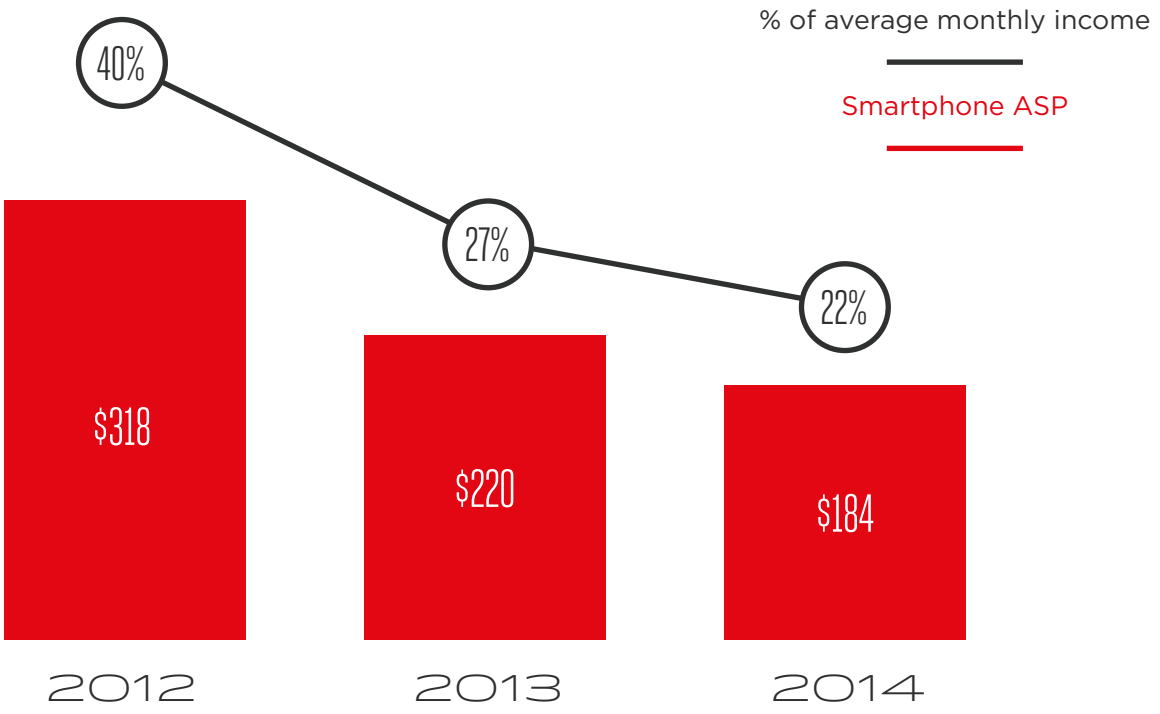
Mobile operators in Mexico are also increasingly bundling data and/or other services into their tariffs. For example, Movistar's contract and prepaid subscribers have unlimited WhatsApp usage, and Telcel prepaid top-ups of MXN100 ($6) per month or more offer Facebook, Twitter and WhatsApp for free, as well as unlimited voice, SMS and 300 MB of data. This is in addition to free roaming in the US and Canada, making such tariffs as much as ten times cheaper than in other markets.

Consequently, Mexico has enjoyed a much improved position in the Global Information Technology Report 2015 published by the World Economic Forum (WEF). Despite being placed 69th in the overall "Networked Readiness Index" (a jump of 10 places on 2014), Mexico ranked fourth in the "Affordability" pillar, a rise of 89 places compared to the 2014 report.[28]

Mexico has also recently shown improvements in terms of device affordability. In 2012, the average retail price of a smartphone of $318 represented 40% of average monthly income, putting smartphones well beyond the reach of the majority of the population (particularly the 53% living below the national poverty line). By 2014, the smartphone ASP had dropped to $184 or just over 20% of average monthly income (see Figure 15). Entry-level smartphones are available in Mexico for less than $100, and mobile operators (such as Telcel) and other players (such as Micel) offer finance deals to help people with no credit history to buy smartphones. This is all a step in the right direction to getting more Mexicans online.

Figure 15

Smartphones becoming more affordable in Mexico



Source: Strategy Analytics, World Bank

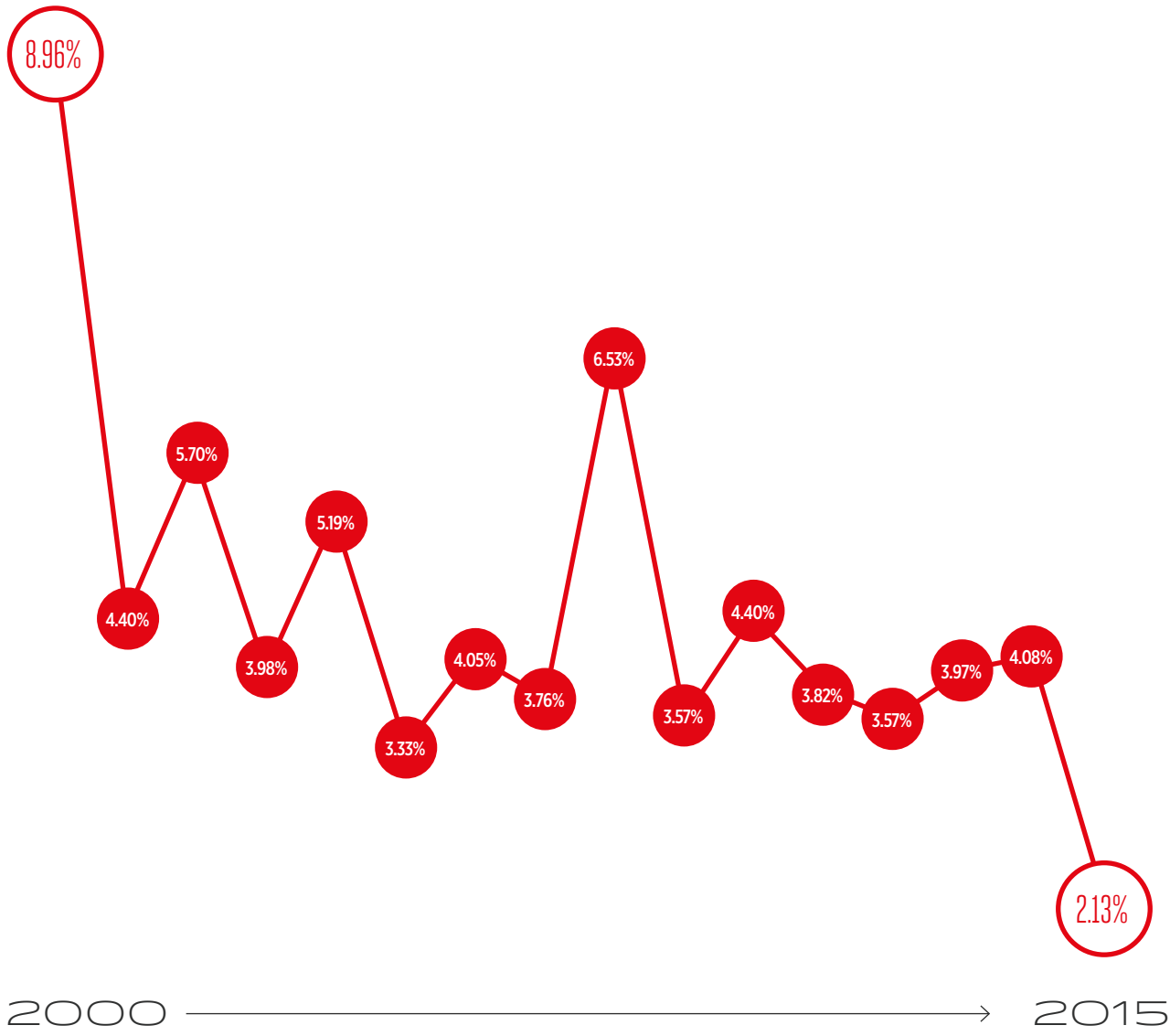
28. Source: The Global Information Technology Report 2015, WEF

Increasing affordability leading to growing adoption of advanced mobile services

Greater competition and lower prices as a result of the structural reforms have had wider economic consequences: in 2015, Mexico reported its lowest inflation rate on record of 2.13% (see Figure 16). Inflation directly affects families' well-being, as it measures the change in prices of a basket of goods and services representative of household consumption: low inflation means that prices for major products and services purchased by Mexicans are only slightly rising.

Figure 16

Record low levels of inflation in Mexico



Source: INEGI

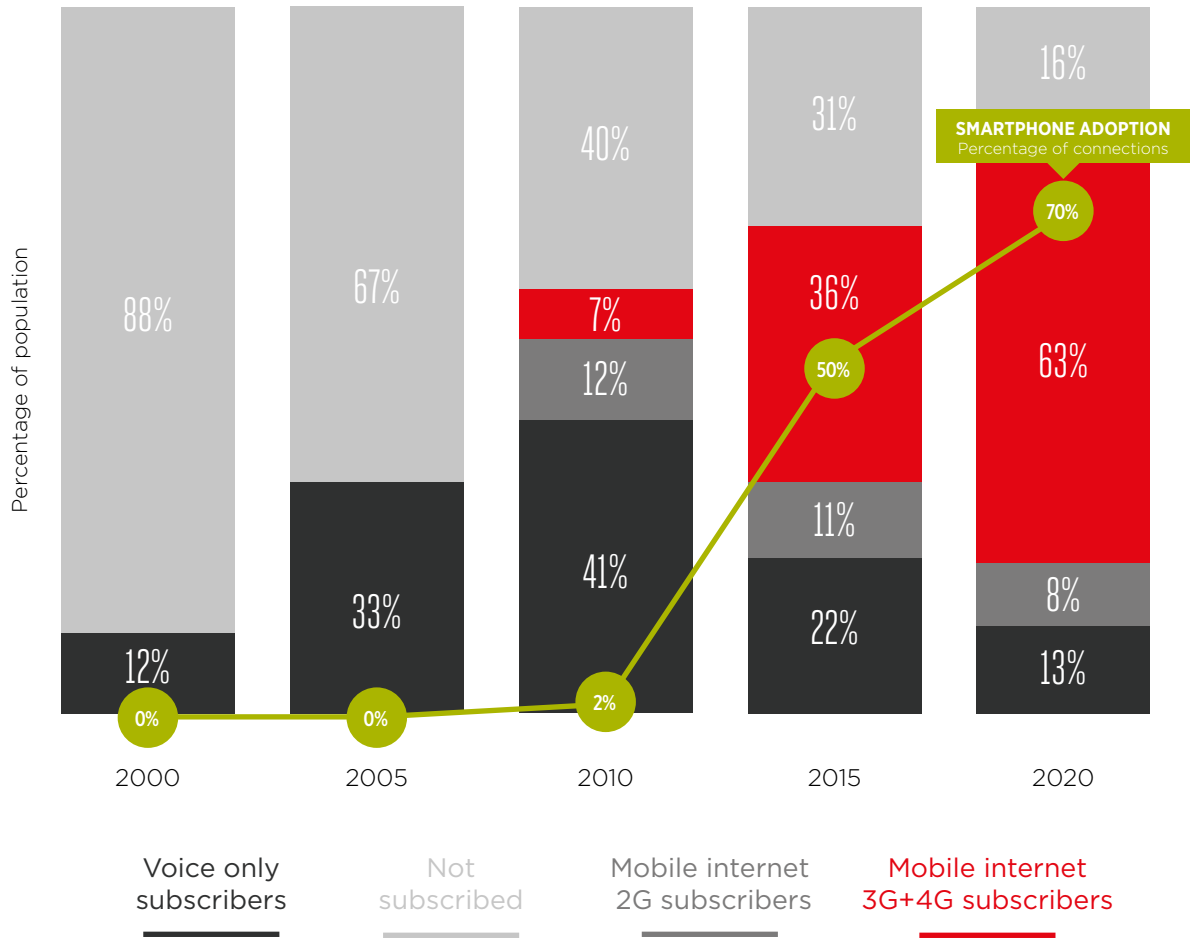
The combination of a steadily growing economy, record-low inflation and declining mobile prices is contributing to the accelerating migration to mobile broadband services and growing smartphone adoption (see Figure 17).

By the end of 2015, mobile broadband (3G and 4G) accounted for 52% of total unique subscribers (the fourth highest in the region and above the regional average). This translates to 35% of the total population subscribing to mobile broadband services, up from 22% in 2013 and only 7% in 2010. In parallel, at the end of 2015, smartphones accounted for half of total connections in Mexico (above the Latin American average of 48% and again the fourth highest in the region). This is almost double the adoption rate of 2014 (27%). Smartphone adoption is particularly strong among the large youth population in Mexico: according to a survey by Amdocs, nearly 80% of 15–18 year-olds in Mexico own a smartphone, three quarters of whom subscribe to mobile broadband services.[29]

By 2020, subscriber penetration in Mexico will have grown to 84% of the population, a 15 percentage-point increase on 2015. By this time, mobile broadband will account for three quarters of all subscribers, (equivalent to 63% of the population), and smartphones will account for 70% of total connections.

Figure 17

Mexico technology evolution



Source: GSMA Intelligence
Note: smartphone adoption is percentage of connections

29. Source: "More than half of young Mexicans see internet as basic right", BNamericas, April 2016

As more people migrate to smartphones and mobile broadband, use of data services is growing, particularly IP messaging, social media (both driven by the zero-rating of WhatsApp and Facebook data by mobile operators) and video. Four in every five mobile phone owners (both featurephone and smartphone owners) in Mexico use IP messaging, more than any other Latin American country, and the same proportion access social networking sites, compared to an average of around two thirds across the region.[30] Some 71% of Mexicans regularly download apps to their phones, and social media apps are the most popular (see Table 2).

Table 2

Social media apps are the most popular in Mexico

	Android Google Play	iOS App Store
1	WhatsApp	WhatsApp
2	Messenger	Messenger
3	Facebook	Facebook
4	Instagram	Snapchat
5	Facebook Lite	YouTube

Source: App Annie
Note: Top free apps on 18 May 2016

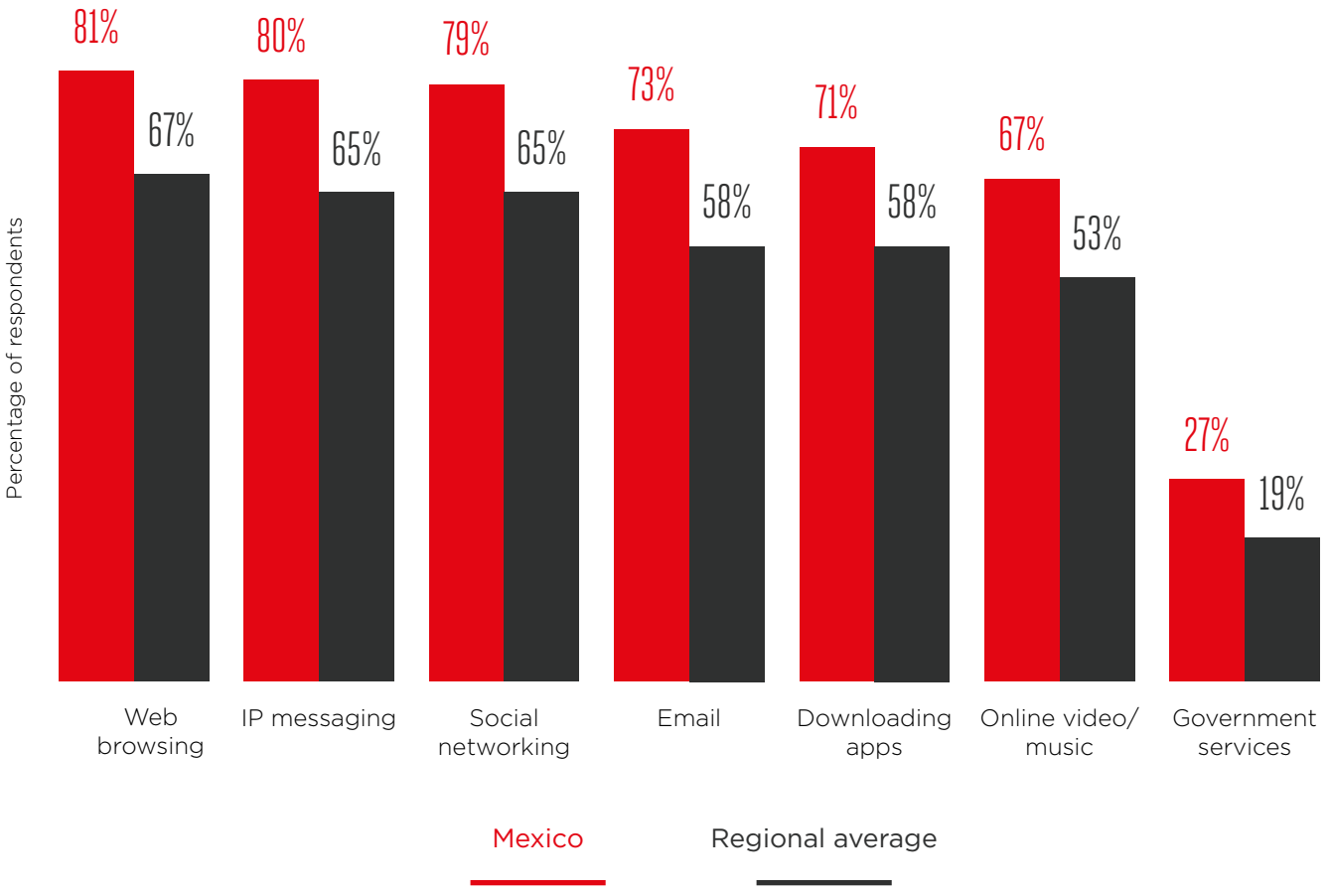
30. Source: GSMA Intelligence Consumer Survey 2015. Average is of eight markets (Argentina, Brazil, Chile, Colombia, Guatemala, Mexico, Nicaragua and Puerto Rico)

Use of other services is also consistently higher than the regional average (see Figure 18). Outside of Brazil, people in Mexico consume the most online video in Latin America, with each subscriber watching on average 162 videos online per month (compared with 143 in Chile, 139 in Colombia and 112 in Argentina[31]). Given that fixed broadband penetration is relatively low in Mexico (around 10% of the population[32]), mobile is likely to be the primary access channel for video: according to a poll by Google and TNS, towards the end of 2014, 78% of smartphone users in Mexico watched mobile video on their device at least once a month, a higher proportion than Brazil (73%) and Argentina (58%).

The Mexican government is promoting m-government services and apps to drive mobile usage and connect citizens with public institutions, making content more relevant for Mexicans. More than a quarter of mobile phone owners in the country use such services (compared to around one in five at the regional level).

Figure 18

High usage of mobile services in Mexico



Source: GSMA Intelligence Consumer Survey 2015

31. Source: 2015 Mexico Digital Future in Focus, ComScore
32. Source: ITU

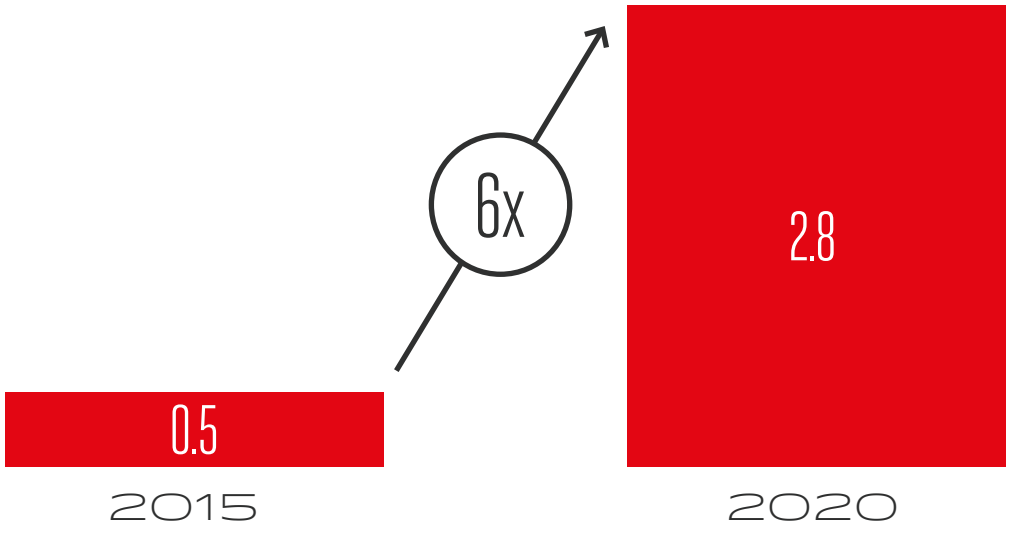
Meeting the data demand

The migration to smartphone and mobile broadband services is driving an explosion of data traffic. Mobile data traffic in Mexico will grow eightfold between 2015 and 2020 (an annual growth rate of 51%), reaching over 320 PB per month in 2020, up from 40 PB per month in 2015. This growth will be twice as fast as fixed IP traffic. By 2020, the average subscriber in Mexico will be consuming just under 3 GB of mobile data per month, up from around 0.5 GB per month in 2015 (see Figure 19).

Figure 19

Mobile data in Mexico to grow rapidly over the next five years

Mobile data traffic (GB per subscriber per month)



Source: Cisco, GSMA Intelligence

To help meet this growing demand for mobile data, the Mexican government auctioned the remaining parts of the AWS spectrum in February 2016[33], increasing the total amount of spectrum available for mobile broadband services by almost 30%, and raising MXN43.7 billion ($2.4 billion) in the process.[34] América Móvil bought the largest share of frequencies, paying MXN2.1 billion ($117 million), while AT&T spent MXN1.03 billion ($57 million).[35] Both operators will now have access to more contiguous spectrum to provide better mobile services and faster data speeds. Telefónica decided to not take part in the auction. In 2016, the IFT will auction 120 MHz of the 2.6 GHz spectrum band, which will be important for mobile operators looking to increase their capacity in highly populated areas.

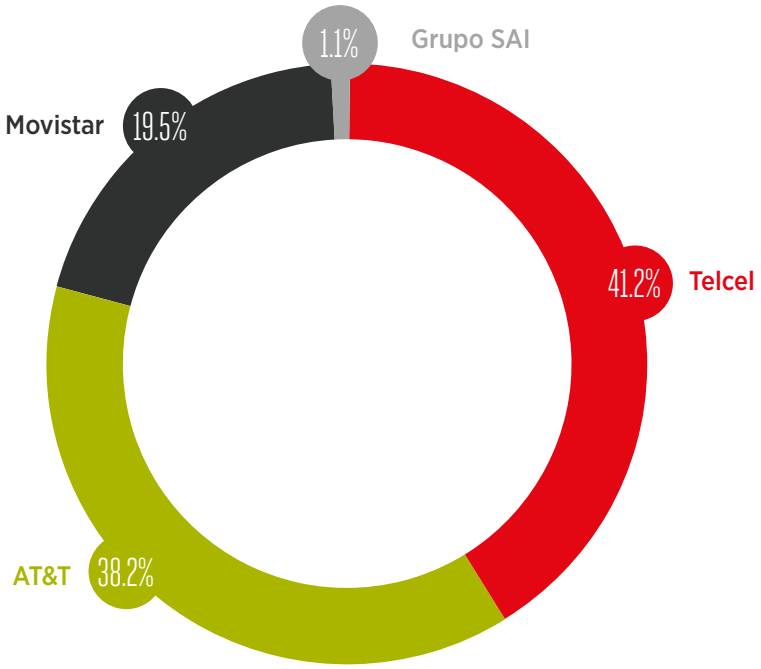
33. A total of 80 MHz of spectrum in the AWS-1 (1710–1725 MHz/2110–2125 MHz) and AWS-3 (1755–1780 MHz/2155–2180 MHz) bands was sold
34. Includes initial bids and annual payments over the next 15 years
35. Source: "Mexico's América Móvil top buyer in wireless spectrum auction", Reuters, March 2016

Mexico also introduced spectrum trading regulations, which allow operators to freely trade spectrum assets. This is in line with ITU recommendations on spectrum efficiency use and gives mobile operators the opportunity to acquire spectrum at any time in accordance with their strategy. Spectrum trading agreements are subject to IFT approval in order to safeguard competition, avoid service interruption and prevent spectrum hoarding.

Following the auction, Telcel holds the largest share (41.2%) of the available International Mobile Telecommunications (IMT) spectrum in Mexico, ahead of AT&T and Movistar with 38.2% and 19.5% respectively. The remaining 1.1% of spectrum is held by Grupo SAI, a subsidiary of construction firm Grupo Hermes (see Figure 20).

Figure 20

Mexico IMT spectrum holding



Source: IFT

The digital dividend band (700 MHz) is being reserved for the single wholesale network, but the IFT has announced plans to auction the 600 MHz spectrum (the second digital dividend) in 2018. The band is currently being used for TV broadcasts, but will be cleared for the use of mobile services within the next three years. This will be key to bringing mobile broadband services to currently underserved rural populations.

3 Ecosystem expansion and innovation

With recent deregulation of the mobile market, accelerating mobile broadband migration and rising smartphone penetration, Mexico is seeing growth in innovative value-added services (such as those associated with carrier billing), significant expansion of the mobile value chain and the creation of one of the most dynamic mobile ecosystems in Latin America (see Figure 21).

The wider context in Mexico is also contributing to the flourishing digital ecosystem:

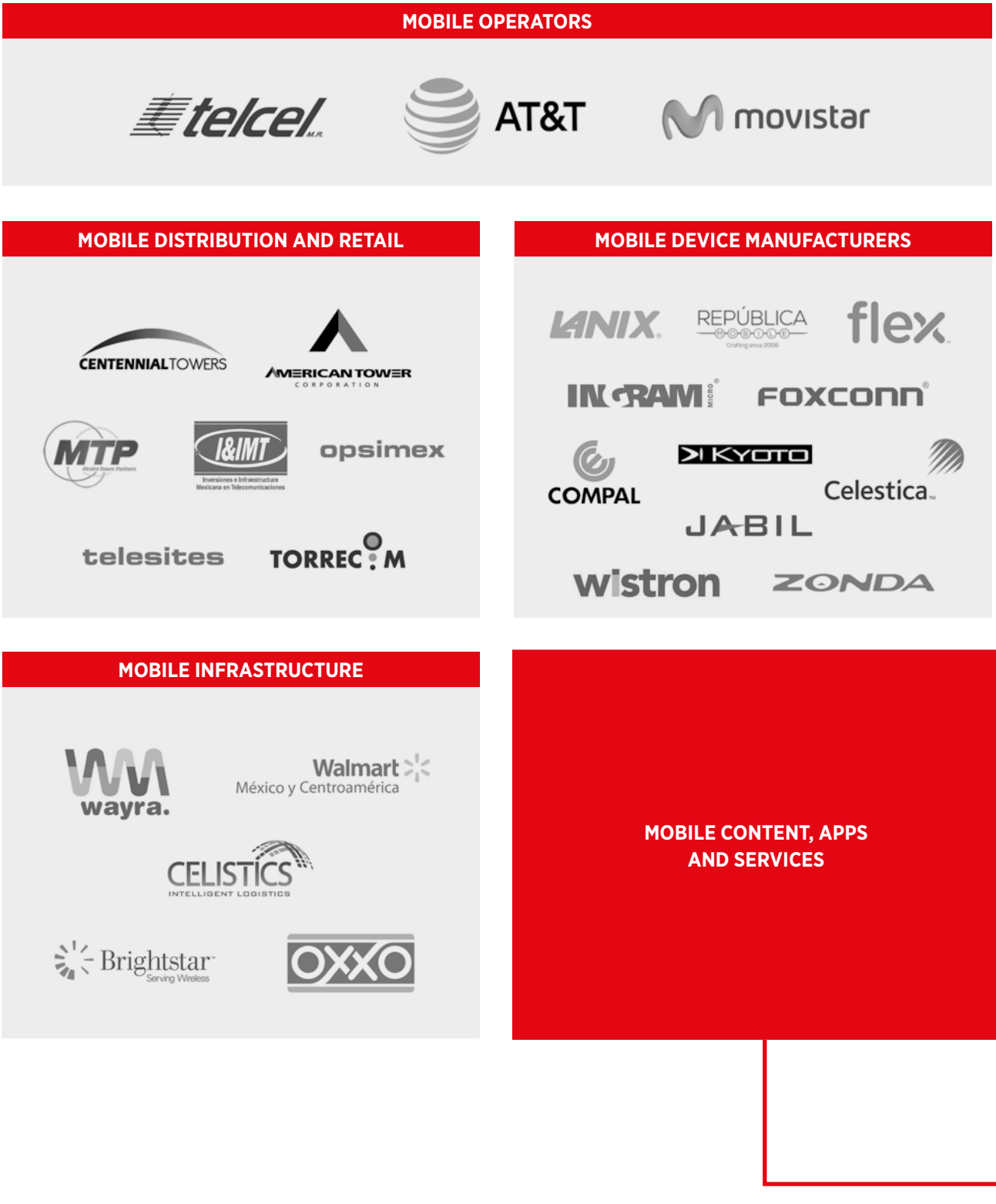
- an improving economy (growing GDP and low inflation)
- a large young population (over half are under 30 years old)
- convenient proximity to the US (including close business ties to Silicon Valley and access to the growing US Latino population and their $1.5 trillion in buying power[36])
- a large and solid private sector (Mexico is a global manufacturing leader[37])
- an increasingly positive attitude to innovation and investment.

Players across the entire value chain, from mobile operators to content providers and start-ups, are developing innovative new services to meet the growing consumer demand.

36. Source: The Hispanic Market Imperative, Nielsen, 2012
37. For example, Mexico's Alfa Group, headquartered in Monterrey, is the global leader in the production of engine blocks and cylinder heads for the car industry, is one of the largest producers of petrochemical products in North America, and is a leader in the distribution of refrigerated foods in Mexico

Figure 21

The mobile ecosystem in Mexico



MOBILE CONTENT, APPS AND SERVICES

Accelerators & enablers

Mobile content, services and software

Commerce/payments

Entertainment & infotainment

Mobile advertising

Content producers

Gaming

Health

Education

Source: GSMA Intelligence

3.1 Mobile operators: supporting the development of the mobile ecosystem

Mobile operators are well positioned to aid the development and delivery of innovative digital services, and in turn benefit from an increased number of connections on their network and the potential for additional revenue through value-added services. This is particularly important as their financials come under increasing pressure, and their business models face disruption from new Internet players and services. It is crucial for mobile operators to focus on innovative services and promotions to drive customer 'stickiness', and they are increasingly looking beyond traditional services (e.g. voice and messaging): non-voice revenues accounted for 46% of Telcel's recurring revenues in Q2 2015, a ten percentage-point increase in two years, and Movistar's data revenues grew at an average annual rate of 27% between 2011 and 2015.

The GSMA has identified four key growth areas where mobile operators can collaborate and in doing so play an active role in delivering future opportunities and benefits for consumers.

Connected Living

The initial focus of the GSMA's Connected Living programme is to accelerate the delivery of new connected devices and services in the machine-to-machine (M2M) market through industry collaboration, appropriate regulation, optimising networks and developing key enablers to support the growth of M2M in the immediate future. The ultimate aim is to enable the Internet of Things – a world in which consumers and businesses enjoy rich new services connected by an intelligent and secure mobile network.

Though still at its early stages of development, M2M technology is beginning to generate interest from mobile operators, governments and M2M hardware and solutions companies in Mexico, mainly in the areas of smart meters, digital signage, telecare, remote monitoring, mobile payments and connected cars. Various projects have been announced aimed at developing the M2M ecosystem in Mexico:

- In 2009, Telcel and Jasper, a cloud-based IoT and M2M software platform, announced a multi-year, strategic agreement to connect and support a variety of emerging consumer electronics and business devices
- In December 2015, América Móvil launched services using the GSMA Embedded SIM Specification for remote over-the-air provisioning of M2M devices
- In 2014, Telefónica announced the launch of its Smart M2M Solution in Mexico, providing clients in sectors such as fleet management, asset tracking and smart cities the power to connect, manage and control M2M communications with local SIM cards in a flexible and secure way.

Digital Commerce

Working with mobile operators, regulators, banks, retailers, transport operators and other service providers across the globe, the GSMA's Digital Commerce programme is helping drive the mass adoption of mobile-enabled digital commerce services. The GSMA engages regularly with key government and regulatory bodies, providing advice and guidance on how to harness the potential benefits of mobile services in transport, retail and other sectors of the economy, and developing industry positions on aspects of policy, highlighting the impact of regulation and informing regulators' decision-making.

Mobile banking and payments are becoming increasingly common in Mexico, and about half of all Mexican retail firms (especially newer companies) sell online.[38] Mobile accounts for 18% of total e-commerce sales[39] (which are expected to grow at an annual rate of almost 25% over the next four years[40]). This is a greater proportion than that in the US (12%). Mobile is the preferred method of banking and shopping for a greater proportion of people in Mexico (55%) than in any other country in Latin America.[41] According to IE Market Research, mobile payment transaction volumes in Mexico reached $10.3 billion by the end of 2015.

Additionally, mobile payments present a huge opportunity for the four-fifths of Mexicans who do not have a bank account. Through the payment relationships they already have with customers, mobile operators can help enable a vast market and allow the unbanked to fully participate in the digital economy.

- Transfer, a joint venture between Telcel and the Banamex/Citibank and Inbursa banks launched in Mexico in 2011, offers deposits, cardless withdrawals from ATMs, person-to-person (P2P) transfers, prepaid top-ups and an optional companion card. By early 2016, there were around 5 million active Transfer accounts in Mexico, representing around 5% of the adult population.[42]
- In February 2016, PayPal announced a partnership with América Móvil, which will see PayPal's capabilities integrated into Telcel's mobile wallet services.
- In April 2016, Telcel partnered with Naranya Pay to launch a micro-payment platform that enables app developers and content providers to monetise their user bases, and allows consumers without bank accounts to pay for services via their mobile bill.

"Mobile operators in Mexico and in other emerging markets have a huge opportunity to become an enabler of innovation by offering their payment assets to the digital ecosystem. Contrary to developed markets, much of the population in emerging markets is unbanked. Thus, mobile operators in these markets can use the huge assets they have in payments and carrier billing to become a key player in the digital economy"

Arturo Galván, Founder & CEO, Naranya

38. Source: World Development Report 2016: Digital Dividends, World Bank, May 2016
39. Source: Estudio Dispositivo Móviles 2014, AMIPCI
40. Source: "Retail ecommerce sales near $50 billion in Latin America", eMarketer, July 2015
41. Source: Views of Latin American consumers on electronic fraud 2015, Easy Solutions
42. Source: América Móvil

Personal Data

Through Mobile Connect services, the GSMA's Personal Data programme is working with mobile operators that have launched identity services across the globe. Mobile Connect is a GSMA service launched in a growing number of countries, designed to deliver a universal identity that securely authenticates the user and provides safe access to mobile and digital services via mobile. It uses the mobile phone to simplify a number of day-to-day transactions in the digital world such as logins, authorisation and authentication, allowing a better user experience and security. This brings convenience to users and can help increase conversion rates in e-commerce/m-commerce. It can also help reduce losses associated with fraud. Extended to government services, Mobile Connect can be an important part of digital inclusion.

- In December 2015, América Móvil launched its Mobile Connect enabled service, integrating dozens of digital service providers.
- Also in December 2015, Telefónica launched its Mobile Connect service, initially for the self-service Mi Movistar portal.

Network 2020

The GSMA's Network 2020 programme is designed to help mobile network operators in the move to an all-IP world and deliver global interconnected all-IP communications services to consumers such as voice over LTE (VoLTE), video over LTE (ViLTE), voice over Wi-Fi (VoWiFi) and Rich Communications Services (RCS). Operators are in a unique position to offer secure, ubiquitous all-IP solutions with reach, reliability and richness. The programme is already helping operators from around the world migrate from circuit-switched technology to an all-IP infrastructure, while helping them to maintain service continuity.

- Telcel launched RCS in December 2013, then in February 2014 committed to re-launch RCS with Google/Jive.[43]
- Telcel launched VoLTE in Mexico City in December 2015, and plans a nationwide rollout (including the implementation of HD voice) in Q2 2016.
- Mobile operators in Mexico are developing VoWiFi, targeting launch in the next few months.

43. Source: Global operators, Google and the GSMA align behind adoption of RCS, GSMA, February 2016

3.2 Start-ups: favourable environment driving investment and success

Mexico once had a reputation as a difficult place in which to start a new business, due in part to the complexity of the process, but that perception has gradually changed. Mexico now ranks 38th in the world for ease of starting a business[44], a gain of 15 places since 2012. This follows major improvements in areas such as paying taxes (abolishing the business flat tax), obtaining credit (allowing a general description of assets granted as collateral) and access to electricity (reduced costs). According to the rankings, Mexico is now the most "business-friendly" country in Latin America (see Table 3).

Table 3

Mexico is the most business-friendly country in Latin America

	EASE OF DOING BUSINESS RANK 2016
Mexico	38
Chile	48
Peru	50
Colombia	54
Costa Rica	58
Panama	69
Guatemala	81
El Salvador	86
Uruguay	92
Paraguay	100
Honduras	110
Brazil	116
Ecuador	117
Argentina	121
Nicaragua	125
Bolivia	157
Venezuela	186

Source: World Bank Group
Note: The rankings of economies with populations over 100 million as of 2013 (i.e. Brazil and Mexico) are based on data for two cities.

44. Source: Doing Business 2016, World Bank Group

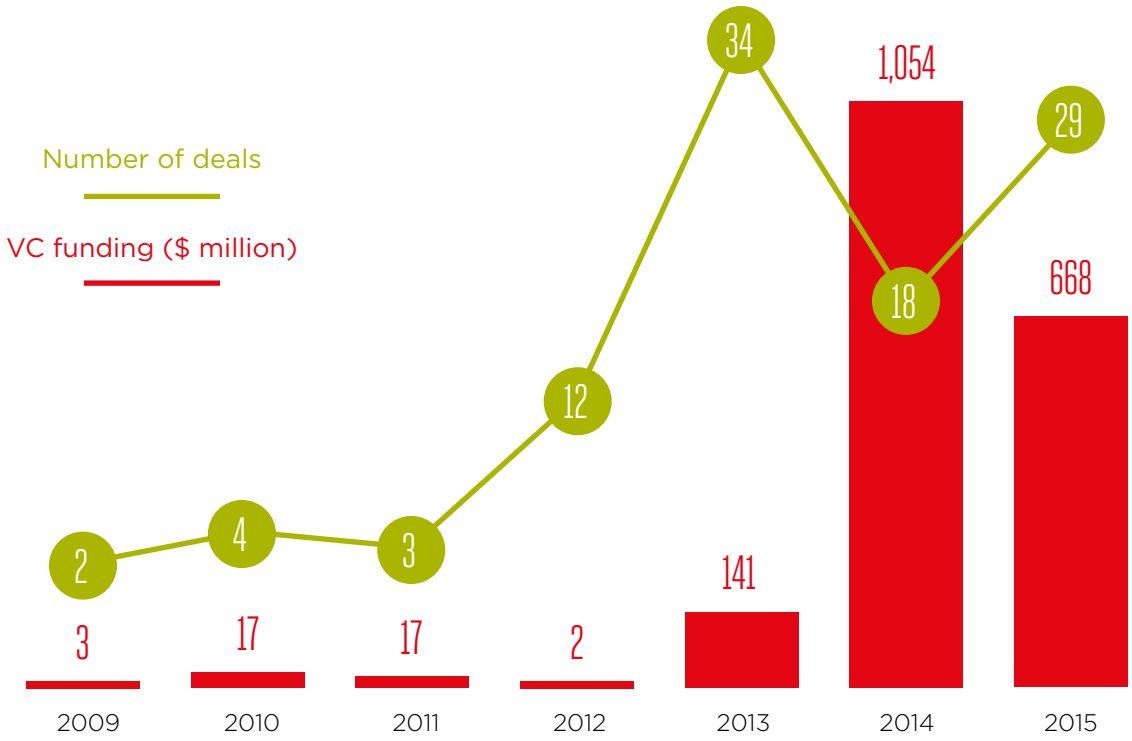
Mexico has a large internal market offering huge scale potential, but also has an extensive network of free-trade agreements (FTAs) encompassing more than 40 countries. Most notably, Mexico's close relationship with the US, both in terms of geographical proximity and integration of supply chains and business practices since the North American Free Trade Agreement (NAFTA) of 1994, has been a major driver of foreign direct investment (FDI) inflows into Mexico.

Encouraged by a stable economy (including growing GDP and record-low inflation) and a number of improvements in recent years simplifying foreign investment procedures (including less red tape, higher ceilings for foreign capital, fewer local-content requirements and better intellectual property legislation), FDI inflows reached a peak of $45 billion in 2013, up from $19 billion in 2012.[45] Following a decline in 2014, FDI increased again to $28 billion in 2015.[46] In 2015, FDI in telecommunications and broadcasting totalled $2.7 billion, the third largest contribution behind manufacturing and financial services. In total, private investment in mobile in 2015 reached MXN18.1 billion ($1 billion), an 8% increase on 2014.[47] This figure is set to increase in 2016 with AT&T's commitment to spend $ billion expanding its LTE network to 100 million users by the end of 2018, and América Móvil's plans to invest $6 billion in mobile in Mexico.

The favourable environment is also driving increasing levels of risk capital in Mexico. In 2014, VC funding in Mexico surpassed $1 billion, the highest on record and an almost six-fold increase on the previous five years combined (Figure 22). There was a decline in funding in 2015, but the number of deals increased as more and more VC firms see the benefits of investing in Mexico.

Figure 22

Risk capital flooding to Mexico



Source: CB Insights

45. Source: World Bank
46. Source: "Captación de IED crece 25% a 28,382 millones de dólares", El Economista, February 2016
47. Source: Cuarto informe trimestral estadistico 2015, IFT, May 2016

While much of VC funding in Mexico goes to the US, examples of companies that have received significant domestic funding injections in recent years include the following:

- **Linio**, a multi-product e-commerce retailer targeting Latin and South American markets including Mexico, Colombia, Peru and Venezuela, raised $79 million in July 2014
- **Kueski**, an online short-term micro-loan service for Latin America based in Guadalajara, attracted VC funding of more than $35 million in 2016, the largest capital funding for a fintech start-up in Mexico to date
- **Cornershop**, a grocery delivery service operating in Mexico City and Santiago de Chile, launched in July 2015, raised $6.7 million in VC funding in April 2016
- **Aliada**, a housekeeping booking service based in Mexico City enabling better communication and negotiation, while improving service for customers and job conditions for workers, raised $800,000 in May 2015
- **Micel**, which provides mobile services to the large unbanked population in Mexico, received $9 million in funding in 2010. Micel's contract service plans, in which customers only pay for the minutes they use, are sold to customers who lack a bank account, credit card, or credit history. It resells plans offered by other service providers rather than owning a radio spectrum or wireless infrastructure itself, assuming customers' repayment risk
- **Clip**, a mobile payments solution that uses phone numbers and text authentication to verify customer ID, has raised a total of $18 million in funding since launch in 2013. Most recently it raised a round of $8 million in December 2015.

Given the size of its mobile market, Mexico attracts a high share of funding relative to regional peers (see Table 4). In the last two years, Mexico saw more than $1.7 billion in VC funding, the second highest in Latin America behind Brazil, and just under 70% of these deals came from the Internet and mobile sectors (47% and 21% respectively). This equates to 34% of regional VC funding, which means that Mexico over-performs in terms of investment as it only accounts for 21% of regional mobile subscribers. Although Brazil leads the way in terms of number of deals (156 in the last two years), Mexico has the highest average deal size in Latin America, with an average funding round in excess of $35 million.

Table 4

Mexico in relation to its regional peers, 2014–2015

	VC funding ($m)	Deal volume	Average deal size ($m)	Share of regional VC investment	Share of regional mobile subscribers
Brazil	2,231	156	14	45%	35%
Mexico	1,722	47	37	34%	21%
Colombia	457	16	29	9%	8%
Chile	128	15	9	3%	4%
Argentina	380	31	12	8%	9%

Source: CB Insights, GSMA Intelligence

Mexico is hailed as one of the most dynamic start-up scenes in Latin America, with hundreds of successful entrepreneurs and prestigious universities producing around 114,000 engineers per year, the eighth highest in the world.[48] For example, the Tecnológico de Monterrey is a highly successful private multi-campus, university with more than 33 locations across Mexico, and is one of the most prestigious universities in Latin America. It has formed a deeply rooted entrepreneurial culture, developing technology parks (some of them have become clusters) in 12 cities in Mexico that host more than 80 companies employing a total of 1,700 people. The university hosted the first research programme financed by Google in Latin America and, in association with the Mainz Institute of Microtechnology in Germany, set up the first centre of micro process engineering in the region. Since 2006, it has been the leading patents applicant among Mexican universities.[49]

To further support the start-up ecosystem, the Mexican government created the Instituto Nacional del Emprendedor (INADEM) in 2013 with the goal of organising all the public funding for start-ups and small and medium-sized businesses. In 2014, around $658 million was distributed to an estimated 620,000 entrepreneurs, micro, small, and medium-sized businesses, leading to the creation of 6,000 new companies and 73,000 new jobs

INADEM supports various accelerators and incubators throughout Mexico, primarily in three locations: Mexico City (the capital and largest city), Guadalajara (the second largest city and a major tech hub home to offices of major global companies such as General Electric, IBM, Intel and Oracle) and Monterrey (an important commercial centre given its proximity to the US border). Examples include the following:

- **500 Mexico City** is a leading accelerator and seed investor in Mexico City, supporting selected start-ups with office space, money and know-how to get their products to scale. It recently acquired Mexican.vc – the first Silicon Valley funded incubator in Mexico – in order to bolster its position and capability in terms of attracting the best talent and the most promising local start-ups.
- **Alta Ventures Mexico** is focused on helping small entrepreneurs as part of an overarching aim to foster an entrepreneurial culture in Mexico, particularly in high-growth markets such as technology and mobile. A major initiative, for instance, is E|100, designed to support entrepreneurs that are likely to succeed in the next two or three years.
- **Naranya*LABS** is a mobile media and commerce accelerator helping provide funding, support and resources for technology start-ups aiming at high-growth economies, especially those in the mobile ecosystem. It is part of Naranya, a mobile internet company in Latin America, connecting people, products and services through innovation within the emergent markets.
- **Startup Mexico**, while not an incubator per se, is a super hub that includes recently established high-impact businesses, seed funds, corporate implants and services for entrepreneurs, all under one roof. It is the first campus especially designed to drive collaboration and innovation, helping to establish new high-impact businesses in Mexico.
- **Wayra Mexico**, Telefónica's start-up accelerator, provides funding of up to $50,000, workspaces, access to a global network of business partners, mentors and experts plus the opportunity to work with Telefónica businesses around the world. For example, Wayra Mexico was responsible for bringing in the global seed stage investment fund, Startup Labs to Mexico, where it was able to infuse Silicon Valley context into its accelerator bootcamps. Wayra is particularly keen to help cultivate an innovation-based economy in Mexico City.

48. Source: Which country has the most engineering graduates? WEF, September 2015
49. Source: Building globally competitive cities: The key to Latin American growth, McKinsey, August 2011

"Mobile is being used more and more by society across the entire economic spectrum, particularly by the young generation who are very comfortable using their mobile devices and cannot live without them. We are seeing a lot of entrepreneurship associated with creating apps that help deliver services via this medium, and there will be a lot of growth in the usage of this technology "

Genaro Fernandez, Founder, President & CEO, Jaguar Labs[50]

Given the huge scale potential in Mexico, along with the easy access to the US and the rest of Latin America, the start-up ecosystem has significant opportunity for growth. Mobile is the key technology to help realise this potential, and it is crucial for the entire mobile value chain to support entrepreneurs and start-ups to aid their development. For example, Mexico thrives on its informal and SME economy (the former contributed just under a quarter of Mexico's GDP in 2014[51]). The World Bank estimates that more than half of Mexico's SMEs are unbanked or financially underserved, and services such as mobile payments and banking are playing a large part in their development.

Looking forward, greater hand-holding from accelerators, a general sense of trust in entrepreneurs and involvement of the entire mobile value chain is key to making Mexico a regional leader in tech innovation and expanding beyond Latin America.

50. Jaguar Labs is a Guadalajara-based software and mobile application development company, named a Top 20 Most Promising Enterprise Web Application Solution Provider by CIOReview magazine in 2016
51. Source: INEGI

4

The role of the mobile sector in future economic growth

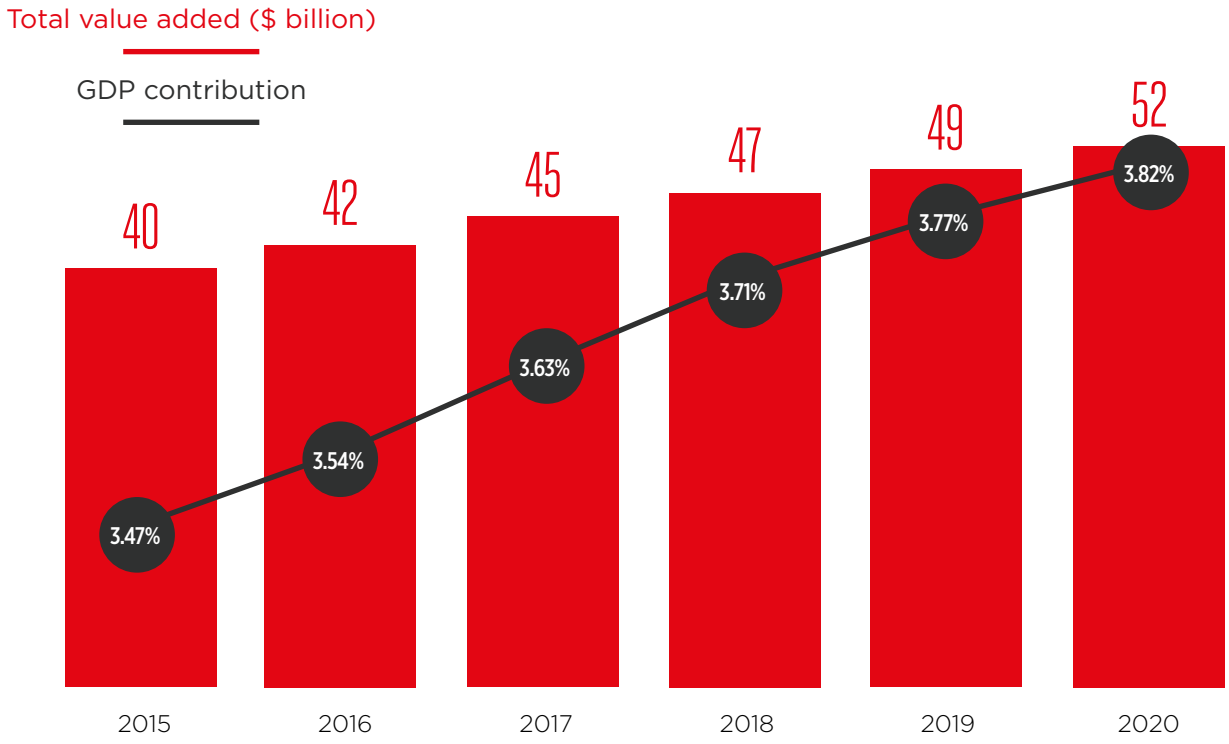
The conversion of the major trends outlined in this report (increasing competition, price reductions, migration to smartphones and mobile broadband services, rising investment levels and a flourishing start-up ecosystem) is resulting in the mobile sector having a growing impact on the overall economy in Mexico.

4.1 Impact of mobile sector on economy continues to grow

The total economic contribution of the mobile industry in Mexico will continue to increase in the period to 2020. In value-added terms, the total economic contribution of the sector will reach $52 billion in 2020, representing more than 3.8% of Mexico's GDP, up from a contribution of $40 billion in 2015, or just under 3.5% of GDP.

Figure 23

Contribution of mobile sector to the economy: outlook to 2020



Source: GSMA Intelligence

The majority of this growth (approximately $8 billion) is driven by the positive effects of mobile technology on productivity growth. As Figures 24–26 show, we expect three main effects to drive this growth in labour productivity in Mexico. Firstly, the largest effect will result from additional consumers and workers that do not currently have access to an internet connection (not even fixed) obtaining one through mobile technology. Secondly, the transition to more advanced mobile networks (from 2G to 3G, and increasingly, 4G) will lead to workers and firms increasingly relying on mobile services. Finally, and although of limited scope for most of this period, the increased penetration of M2M connections and the Internet of Things will result in an increased digitisation of the Mexican economy – for example, allowing firms to improve equipment maintenance and operations, optimise inventory and realise efficiency and cost savings through the full application of mobile solutions to improve information flows in the areas of logistics, transport and commerce.

Figure 24

Outlook to 2020: Increased value add driven mostly by productivity impacts

$ billion

Source: GSMA Intelligence

Figure 25

Mobile operators and content sector driving ecosystem sector growth between now and 2020

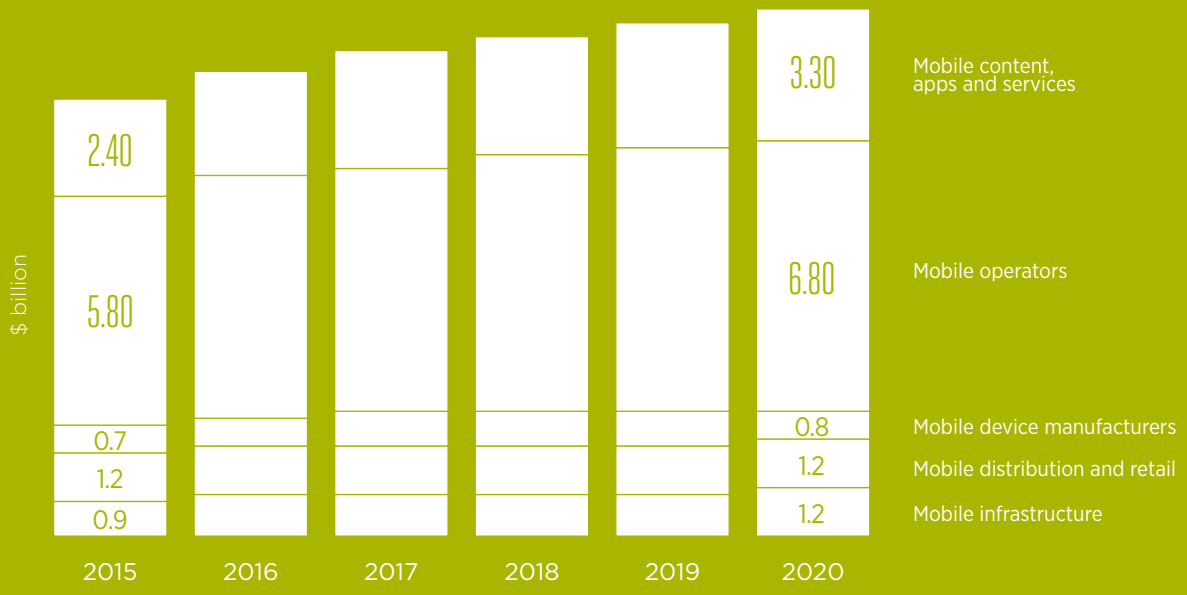
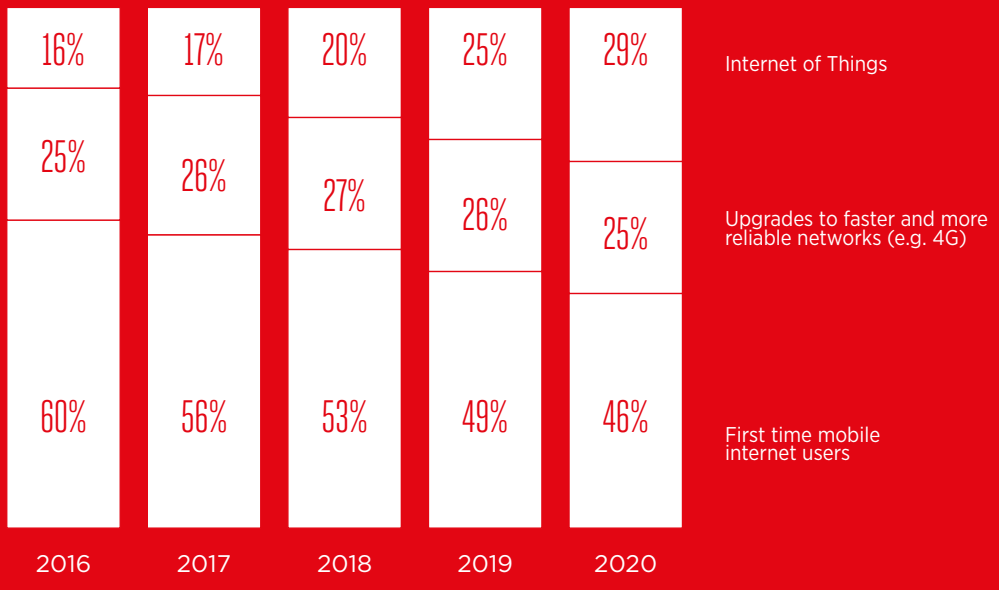


Figure 26

Key sources of productivity growth from mobile technology



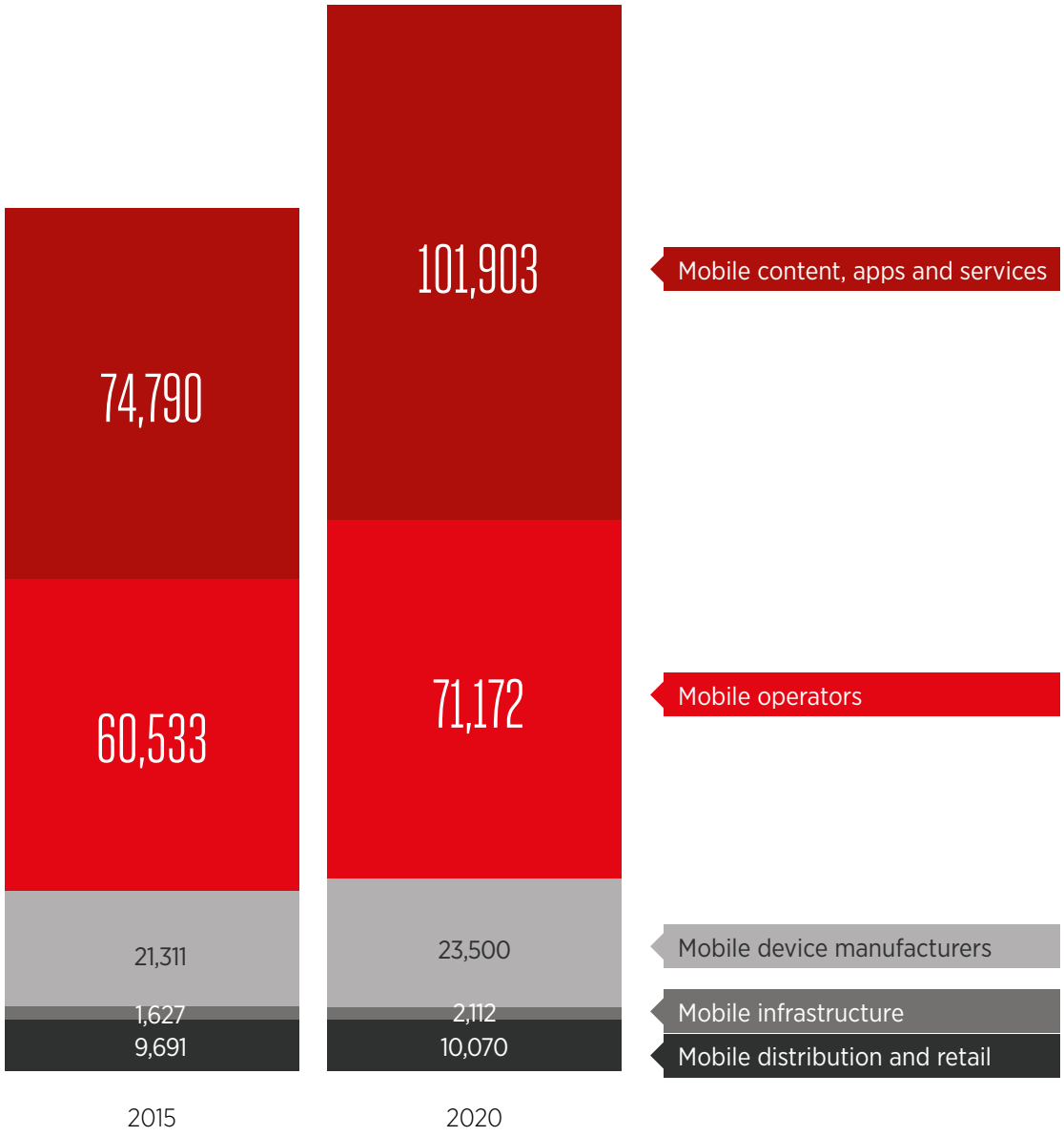
Source: GSMA Intelligence

The mobile ecosystem will also experience significant growth in terms of its economic value added over the period. In particular, the contribution by mobile operators and the mobile content, apps and service segment will continue to increase, with a combined additional value added generated for the Mexican economy of more than $2 billion over the period. In contrast, the other three segments of the mobile ecosystem will contribute similar levels in 2020 as in 2015.

The growth in both mobile operators and the mobile content and apps sector will also materialise in employment growth for these two sectors. By 2020, total employment in the mobile ecosystem is expected to reach nearly 210,000, up from 170,000 in 2015, with virtually all of this growth coming from mobile operators and the content and apps services segment.

Figure 27

Employment in the mobile ecosystem, 2015 and 2020



Source: GSMA Intelligence

4.2 Mobile well placed to help meet policy goals

Mobile technology is strongly positioned to help meet the public policy goals set by the current administration to expand Internet services to all of the population, promote knowledge, enhance productivity across industries, improve healthcare and boost access to basic services, particularly to those in remote locations. Ways to meet these objectives include:

- reducing telecoms-specific taxes

- removing barriers to network infrastructure deployment

- leveling the playing field for all digital ecosystem stakeholders.

Mobile operators in Mexico are increasingly looking to launch advanced mobile services to supplement their existing portfolios. These include Mobile Connect solutions, providing users with a simple, single login for services, apps and content; voice over LTE (VoLTE), enabling users to communicate in a more efficient way and with high-definition audio; and IoT services enabling a more efficient way to connect various aspects of their lives. Meanwhile, mobile money can help bring financial services to the unbanked.

The main challenges for the next five years are connecting the unconnected and bridging the digital divide, thus enabling investment conditions to keep pace with innovation. Mobile operators have helped bring more than 35 million Mexicans into the digital age since 2010, reaching almost 54 million internet connections, representing just over 40% of the country's population. But many Mexicans still remain unconnected. According to PwC, achieving 100% internet penetration in Mexico would add $125 billion to Mexico's GDP between 2015 and 2020[52], and mobile has a key role to play given it is the primary means of accessing the Internet for the majority of the population.

The telecoms reforms have put Mexico on the right path in connecting the unconnected, but further collaboration between mobile operators, the government, regulators and other stakeholders is crucial to continuing the progress made, growing mobile adoption and delivering high-value services across the country.

"The time has come for the world to realise innovation doesn't come from the US alone. I think you'll be surprised what Mexico and Latin America in general will be offering the world in the next few years"

Marcus Dantus, Co-founder and CEO, Startup Mexico

52. Source: Connecting the World: Ten Mechanisms for Global Inclusion, PwC, May 2016

Appendix

Methodology for unique subscriber estimates

Unique subscribers are calculated from two inputs: active connections and the SIM ratio. The number of unique subscribers in a market is equal to the number of active connections divided by the SIM ratio.

Here we elaborate on how both of these inputs are generated and explain some of the other aspects of the methodology underpinning the unique subscribers dataset.

Active connections

Most operators report a figure for connections (which are sometimes referred to as customers or subscribers – though this is distinct from unique subscribers as defined in this report), but precise definitions of this metric can vary considerably. Many operators include inactive SIMs in their reported total – SIMs that are no longer in use by the subscriber who originally acquired them.

If these unused SIM cards were included in the calculation for unique subscribers, they would artificially inflate the end figure, as the SIM ratio derived from GSMA Intelligence's consumer survey results reflects only SIM cards actively in use by consumers.

To arrive at the figure for active connections, an estimated inactive share is stripped out of the total. This share is modelled by estimating the share of inactive SIMs for each operator known to include an inactive share in their reported connections.

The assumed inactive share is calculated based on those operators that report both total and active connections, from which the inactive share can be derived.

For some operators – particularly those in developed markets – this process is not necessary, as only active connections are reported. In cases where operators do report active connections, they typically use a 90-day activity period. The active share of connections we estimate is therefore also intended to approximate a 90-day activity period.

By our estimates there are approximately 530 million inactive SIMs included in the global total connections figure in Q4 2015. This figure is declining, as operators increasingly switch to reporting only active connections, in part to arrive at a higher figure for average revenue per user, which is otherwise dragged down by non-revenue-generating inactive SIMs.

SIM ratio

The SIM ratio is one of the key inputs of unique subscriber penetration. The ratio represents the number of SIM cards owned by each unique subscriber, on average, per market. The SIM ratio therefore cannot be below one, given that anybody must own at least one SIM to be a unique subscriber.

The SIM ratio for each market has been estimated based on the results of extensive survey data, which was collected by GSMA Intelligence from 1,000 respondents in each of 54 countries worldwide in 2015. In developed markets with a high level of internet penetration, the survey was conducted online. However, in markets where this would not be expected to give a representative cross-section of the population due to low internet penetration, the survey was conducted entirely face-to-face, with surveyors going to a number of different regions in every country.

Respondents were asked whether they personally owned a SIM card, and if so, how many, as well as whether child dependents within their household owned their own devices. These results were carefully balanced to provide a representative sample from each surveyed market, and to ensure they reflected both adult and child SIM ownership. Non-surveyed markets were benchmarked against a number of comparable markets, with the benchmarks decided on the basis of factors such as geographic proximity, economic and socioeconomic similarity and the broader level of maturity and penetration of the telecoms market, among other considerations. SIM ratios in surveyed and non-surveyed markets were also checked against other sources of data from international organisations and national statistics offices.

The SIM ratio is expected to vary as the market penetration changes. The expected relationship between SIM ratio and penetration was extrapolated for each market, underpinning the forecast change in SIM ratio out to 2020. In all markets, once it has reached the demographic ceiling, any further connections growth will be the result either of an increase in population or, primarily, a proportional increase in the SIM ratio.

Demographic ceiling

A fundamental assumption underpinning unique subscriber analysis is that in no case will the entire population of a country become a subscriber to mobile services. This is because, for certain portions of the population, it would not be realistic to ever consider them 'subscribers'. For example, while an infant might occasionally use a mobile phone, it would be highly unusual for them to ever be the sole or primary owner of a mobile contract, or the sole user of a prepaid SIM card.

There are also other portions of the population that could reasonably be considered non-addressable; the prison population would, for the most part at least, be expected not to regularly subscribe to mobile services. Equally, in some regions of the world it seems highly implausible that some of the most geographically remote portions of the population will realistically be connected to mobile services, at least without a huge amount of additional infrastructure investment. In such low income and sparsely populated areas the commercial incentive to operators of rolling out infrastructure is likely to remain extremely limited throughout the forecast period.

There are, therefore, many potential considerations in assuming the maximum addressable market. However, for the most part the assumptions used in this report have focused on a minimum addressable

age, with an additional economic modifier – GNP per capita. This is based on the assumption that in less developed markets it will be far less common for every member of a family to own a phone – children are therefore likely to become potential subscribers only at an older age. However, this variable is also intended to represent other purely economic factors – i.e. the portion of the population that will remain unaddressable throughout the forecast period due to low levels of income.

The minimum addressable age has been estimated as between five and 10 years old, with a lower age threshold for more economically developed countries. It should also be noted that in developing countries children account for a larger proportion of the population, so the addressable population will always be a lower share of the total, further amplified by the assumption of a higher age threshold for addressability.

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 featurephones, smartphones, tablets and wearables, and mobile content, application and service providers. Any economic value generated through mobile commerce in Mexico 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 INEGI, the Mexican national statistics office. 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.

Acknowledgements

We would like to thank the following individuals for their contributions to this report:

Miguel Calderon, VP of Regulation, Telefónica Mexico
Genaro Fernandez, Founder, President, & CEO, Jaguar Labs
Arturo Galván, Founder & CEO, Naranya
Efrén Páez, Economist, Mediatelecom
Marco Quatorze, EVP of Value Added Services, América Móvil Group
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