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14. ABSTRACT Mexico has embarked on an ambitious plan to raise the living standards of all its citizens by improving the education system. A central element to this plan is upgrading the nation's information and communication technology (ICT) infrastructure in order to deliver telecommunication services to the country's most rural areas. By connecting these impoverished regions to more prosperous sectors, Mexico hopes to deliver education, training, healthcare, and social services to the country's poorest citizens. This paper examines the current state of Mexico's ICT infrastructure, defines the metrics for measuring ICT expansion, contrast Mexico's performance against Latin American and Caribbean (LAC) countries and Organization for Economic Cooperation and Development (OECD) nations. Finally, the paper draws conclusions concerning Mexico's lack of progress compared to OECD countries - also known as the digital divide. In addition to identifying Mexico's shortcomings, the paper will also offer recommendations for closing this capability gap.					
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**NAVAL WAR COLLEGE
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**Bridging the Digital Divide:
Developing Mexico's Information and Communication Technology Infrastructure**

by

Thomas C. Baldwin

CDR, U.S. Navy

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature: _____

28 October 2011

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Abstract

Mexico has embarked on an ambitious plan to raise the living standards of all its citizens by improving the education system. A central element to this plan is upgrading the nation's information and communication technology (ICT) infrastructure in order to deliver telecommunication services to the country's most rural areas. By connecting these impoverished regions to more prosperous sectors, Mexico hopes to deliver education, training, healthcare, and social services to the country's poorest citizens. This paper examines the current state of Mexico's ICT infrastructure, defines the metrics for measuring ICT expansion, contrast Mexico's performance against Latin American and Caribbean (LAC) countries and Organization for Economic Cooperation and Development (OECD) nations. Finally, the paper draws conclusions concerning Mexico's lack of progress compared to OECD countries – also known as the digital divide. In addition to identifying Mexico's shortcomings, the paper will also offer recommendations for closing this capability gap.

Introduction

Globalization has profoundly impacted the world community by lowering space and time barriers between nation-states and individuals. This phenomenon has created great prosperity for those able to develop and expand information and communication technology (ICT) infrastructure, but not all countries have realized the same benefits. The uneven distribution of capabilities may be described as the “digital divide” – an artificial barrier that imposes real limitations on a country’s ability to connect to the global commons. The lack of adequate ICT infrastructure required to support telecommunication platforms is a critical weakness that must be addressed in order to bridge the digital divide. National governments must be willing to commit and invest significant resources to developing these capabilities.

Mexico is a developing country with ambitions of joining the ranks of the most technologically advanced nations. The country has committed itself to improving the quality of life of its citizens through greater access to information systems and services in order to promote economic prosperity, education, and healthcare. Mexico is also hoping to connect its most impoverished and isolated villages with its more affluent and modern cities. Yet, despite a well-articulated development plan to transform Mexico into a technologically developed society, progress has been very uneven. The development of Mexico’s ICT infrastructure has not kept pace with Organization for Economic Co-operation Development (OECD) member nations. Consequently, the government of Mexico (GOM) must take definitive steps to encourage marketplace competition, implement government reform, and commit public and private investment to develop the nation’s ICT infrastructure in order to bridge the digital divide and increase the level of prosperity for all Mexicans.

This proposal will assess the current state of Mexico’s ICT infrastructure and briefly describe the government’s plans and goals for modernizing the nation’s ICT infrastructure. I will highlight and discuss three critical weaknesses that prevent Mexico from reaching a level of ICT development consistent with OECD performance levels. Finally, I will explore potential solutions that will allow Mexico to achieve its development goals.

Background

President Fox initiated a series of government reforms in order to transform Mexico into a vibrant, technologically advanced, and prosperous society. Described as a “revolution of hope”, the government focused its efforts on raising the country’s education standards by increasing ICT penetration rates in rural and economically depressed sections of the country and connecting them to more advanced and prosperous regions and cities.¹ Known as e-Mexico, “the overall objective of the plan was to build a national IT network that would connect over 90 percent of Mexico's population with electronic services for distance learning, internet access, government, health, and commerce.”² The GOM has established an ambitious goal of connecting 10,000 digital community centers to 98 percent of the population by 2025 – effectively driving the number of Internet users from 4.5 million to 60 million people.³ In 2010, the Economist Intelligence Unit released its annual “digital economy rankings” used to assess the world’s largest economies and their ability to exploit ICT for economic and social benefit.⁴ A component of the overall score, connectivity and

¹ Vicente Fox and Rob Allyn, *Revolution of Hope* (New York, NY: Viking, 2007), 244.

² ViaSat, “e-Mexico – A National Project to Bridge the Digital Divide in Mexico (LinkStar),” *ViaSat*, 01 March 2007, <http://www.viasat.com/news/e-mexico-national-project-bridge-digital-divide-mexico-linkstar/> (accessed 15 September 2011).

³ *Ibid.*

⁴ Economist Intelligence Unit, *Digital Economy Rankings 2010: Beyond E-Readiness*, A Report from the Economist Intelligence Unit (New York, NY: The Economist Group, June 2010), 1, <http://www.eiu.com/article887410673.html?pubtypeld=965257896/> (accessed 15 September 2011).

technology infrastructure was evaluated to gauge access to Internet and mobile networks, fixed and mobile-phone penetration rates, and broadband Internet subscribers as a percentage of the total population. Of the 70 countries examined, Mexico finished in 55th place with respect to connectivity and technology infrastructure – performance well behind Latin America and Caribbean (LAC) and OECD nations.⁵ Mexico has a long way to travel in order to close the digital divide. The downturn in the world economy has not helped Mexico’s plight, but the country’s problems go much deeper.

Mexico’s telecommunications industry is dominated by two companies, Telmex and Telcel, both owned by Carlos Slim. Telmex provides traditional fixed-line telephone service and cable internet access. Telcel is Mexico’s largest mobile phone carrier. Together, the two companies control 85 percent of the fixed-line market and 75 percent of the mobile phone market.⁶ According to the World Bank, “Telmex remains the dominant operator with 96 percent market share on local telephony, 78 percent in mobile telephony, 73 percent in domestic long distance, and 55 percent in the Internet market.”⁷ Telmex and Telcel control the telecommunications sector by maintaining relatively high tariffs and promoting anticompetitive practices.⁸ Prior to 1991, the telecommunications sector was a state-run industry, but its privatization has done little to shed its monopolistic behavior. As a result, lack of competition in the ICT sector has limited its development.

⁵ Ibid, 22.

⁶ Mary Cuddehe, “Market Door Creaks Open,” Financial Times Special Report, 10 November 2009, <http://www.ft.com/intl/reports/mexico-trade-investment-2009/> (accessed 15 September 2011).

⁷ The World Bank, *Private Solutions for Infrastructure in Mexico: Country Framework Report for Private Participation in Infrastructure*, A Country Framework Report (Washington, DC: The International Bank for Reconstruction and Development, February 2003), 3, <http://go.worldbank.org/OJX63BGB60/> (accessed 15 September 2011).

⁸ Business Monitor International, *Mexico Information Technology Report Q3 2011*, BMI Industry Report (London: Business Monitor International, July 2011), 9, <http://www.businessmonitor.com/cgi-bin/request.pl?view=publicationsearch&productCode=SSMX13&service=13&iso=MX&industryID=13&issue=2011-07-01&SessionID=31427F0E015C11E18112881FE862EE27/> (accessed 15 September 2011).

Marketplace Competition

Mexico has struggled to develop a free-market economy and transform itself into a developed nation. Until the 2000 election of President Fox, Mexico had been governed by the Institutional Revolutionary Party (PRI) for nearly 70 years.⁹ The PRI maintained near authoritarian control over the government and economy. The virtual absence of political plurality and free-market economic policies prevented competition and denied Mexico opportunities to becoming a developed nation.¹⁰ As a result, the GOM has struggled to recognize, embrace, and implement the reforms needed to spur competition and economic growth.

Similar to the PRI's control over the GOM for more than seven decades, Telmex has dominated the telecommunications industry and prevented any challenge to its monopolistic control. According to the 2011 Mexico Information Technology Report, "Internet penetration increased to 19.2% by 2006, making it the third highest in the region but still some way off market leaders Chile and Argentina."¹¹ The broadband market has been growing strongly, led by Telmex, and penetration rose to 2.9% in 2006, after doubling in 2005."¹² On the surface, the increase in market share for Telmex seems to indicate the presence of a healthy telecommunications sector. During the same period, leading cable operators Megacable and Cablemas experienced a decline in the number of dial-up

⁹ Adam Thomson, "Reform on Hold as All Eyes Turn to Elections," Financial Times Special Report, 10 November 2009, <http://www.ft.com/intl/reports/mexico-trade-investment-2009/> (accessed 15 September 2011).

¹⁰ Andrew Selee, Christopher Wilson and Katie Putnam, *The United States and Mexico: More than Neighbors*, special report (Washington, DC: Woodrow Wilson International Center for Scholars, May 2010), 7, <http://www.wilsoncenter.org/publication/more-neighbors/> (accessed 15 September 2011).

¹¹ Business Monitor International, *Mexico Information Technology Report Q3 2011*, BMI Industry Report (London: Business Monitor International, July 2011), 9, <http://www.businessmonitor.com/cgi-bin/request.pl?view=publicationsearch&productCode=SSMX13&service=13&iso=MX&industryID=13&issue=2011-07-01&SessionID=31427F0E015C11E18112881FE862EE27/> (accessed 15 September 2011).

¹² Ibid.

accounts.¹³ In reality, the gains enjoyed by Telmex are often made at the expense of potential competitors. While privatization of the telecommunications industry in Mexico has stimulated sector growth and lowered tariffs in real terms, compared to OECD countries, the lack of competition in the ICT sector tends to reinforce the digital divide.¹⁴

In April 2010, President Calderon announced “a ten-point plan to overhaul competition laws, seeking to strengthen competition among companies by levying stiffer fines on firms that act as monopolies and jail terms of up to ten years for their managers.”¹⁵ In 2006, the Mexican Congress passed a law to regulate the radio and television industry, but portions of the legislation were overturned by the Supreme Court the following year.¹⁶ According to the 2011-2012 Global Competitiveness Report (GCR), Mexico’s ability to boost competition through government reform remains a critical weakness — ranking a dismal 103 of 142 countries surveyed.¹⁷ The GOM has attempted to pass antitrust measures against Telmex in order to broaden the ICT market, but little progress has been made due to the ability of Telmex to keep the government tied up with endless appeals.¹⁸ In the meantime, Telmex continues to dictating terms of service and eliminate competition in the ICT sector.

¹³ Organization for Economic Co-operation and Development, *Economic Survey of Mexico, 2003*, Policy Brief (Washington, DC: OECD Observer, November 2003), 5-6, <http://www.oecd.org/dataoecd/49/20/19828156.pdf/> (accessed 15 September 2011).

¹⁴ Leonardo Martinez-Diaz, “The Global Economic Crisis and Mexico: Challenges for Recovery,” *Brookings*, 28 May 2009, http://www.brookings.edu/speeches/2009/0528_mexico_economics_martinez_diaz.aspx/ (accessed 15 September 2011).

¹⁵ Andrew Selee, Christopher Wilson and Katie Putnam, *The United States and Mexico: More than Neighbors*, special report (Washington, DC: Woodrow Wilson International Center for Scholars, May 2010), 17, <http://www.wilsoncenter.org/publication/more-neighbors/> (accessed 15 September 2011).

¹⁶ *Ibid.*

¹⁷ Klaus Schwab, *The Global Competitiveness Report 2011-2012*, (Geneva: World Economic Forum, 2011), 11, <http://reports.weforum.org/global-competitiveness-2011-2012/> (accessed 11 October 2011).

¹⁸ Mary Cuddehe, “Market Door Creaks Open,” *Financial Times Special Report*, 10 November 2009, <http://www.ft.com/intl/reports/mexico-trade-investment-2009/> (accessed 15 September 2011).

During the past decade, the Latin American economy grew at an average annual rate of 3.6 percent while Mexico grew at 2.35 percent.¹⁹ If Mexico hopes to reach its full potential, the government must allow the free market economy to flourish. The GOM must pass legislation prohibiting monopolistic business practices while supporting competition in the telecommunications sector, but these initiatives alone will not solve Mexico's dilemma.

Government Reform

The World Bank offers a pessimistic view of the GOM by describing it as being “hindered by an opaque, secretive, and cumbersome regulatory process, and by an inadequate system of oversight in the courts and the political branches of the government. Abuse of the Mexican instrument of judicial review has frequently caused paralysis in the implementation of many of COFETEL's [Federal Telecommunications Commission] decisions and findings.”²⁰ Rampant corruption in the executive, legislative, and judicial branches undermines government legitimacy, reform efforts, and transparency. According to the GCR rankings, the GOM has demonstrated lackluster performance in addressing flaws in the public institutional framework and adopting and implementing policies to boost domestic competition.²¹ The Inter-American Development Bank states, “Countries with lower institutional quality are more likely to have slower economic growth, higher economic inequality, more social conflicts, and fewer and lower-quality government services.”²² Based upon this assessment, Mexico appears to fit the mold. While institutional reform is critical to

¹⁹ Adam Thomson, “Reformist Zeal Hits Political Buffers,” *Financial Times Special Report*, 10 November 2009, <http://www.ft.com/intl/reports/mexico-trade-investment-2009/> (accessed 15 September 2011).

²⁰ *Ibid.*

²¹ Klaus Schwab, *The Global Competitiveness Report 2011-2012: Country Profile Highlights*, (Geneva: World Economic Forum, 2011), 11, <http://www.weforum.org/> (accessed 11 October 2011).

²² Alberto Chong, *Development Connections: Unveiling the Impact of New Information Technologies – Executive Summary*, (New York, NY: Palgrave Macmillan, 2011), 21-22, <http://www.iadb.org/en/research-and-data/dia-publication-details,3185.html?id=2011/> (accessed 15 September 2011).

restoring people's faith and confidence in its government, the GOM must also address the concerns of a growing population and the fiscal demands it will place upon Mexico's budget especially educational and innovation systems.²³

The population of Mexico ranks 11th in the world with 113,724,226 people, the growth rate is 1.102%, and the migration rate is -3.24%.²⁴ Based upon these figures, the median age of the population will increase as it grows in size. The negative migration statistic indicates more people are leaving the country compared to the amount crossing into Mexico's borders thus draining the country of viable manpower. As a result, the number of employed workers is gradually decreasing while the number of retirees is increasing. In other words, the tax base needed to support an aging population will continue to shrink. Mexico has one of the lowest tax takes of any country in the western hemisphere, with income from the non-oil sector equivalent to just 11 percent of the country's gross domestic product (GDP).²⁵ The inability to collect adequate tax revenue to fund essential government programs will place increasing strain on the budget. Mexico is habitually short of funds to cover basic infrastructure costs and struggles to provide social assistance programs for the 40 percent of the population living below the poverty line.²⁶ Unless the government takes immediate steps to reform its social security and health programs, the cost of Mexico's social safety net will outstrip most other funding priorities.

²³ Ibid.

²⁴ Central Intelligence Agency, The World Factbook, last modified October 24, 2011, <https://www.cia.gov/library/publications/the-world-factbook/geos/mx.html#top>.

²⁵ Leonardo Martinez-Diaz, "The Global Economic Crisis and Mexico: Challenges for Recovery," *Brookings*, 28 May 2009, http://www.brookings.edu/speeches/2009/0528_mexico_economics_martinez_diaz.aspx/ (accessed 15 September 2011).

²⁶ Adam Thomson, "Reformist Zeal Hits Political Buffers," *Financial Times Special Report*, 10 November 2009, <http://www.ft.com/intl/reports/mexico-trade-investment-2009/> (accessed 15 September 2011).

In 2007, President Calderon attempted to minimize the long-term tax burden by instituting a pension reform plan for government workers – an initiative the Congress approved. Two years later, the President attempted to raise the value added tax by two percent, but Congress only approved a one percent increase and decided to impose higher taxes on wealthy individuals and corporations.²⁷ By 2009, the president’s National Action Party (PAN) lost 63 seats during the mid-term elections, leaving only 143 of 500 seats available in the lower house of Congress.²⁸ As a result, any reforms contemplated by the Calderon administration will face stiffening opposition. Unless the government persuades the PRI to accept sweeping change now, the chances are President Calderon has shot his last round.²⁹ Mexico faces a number of mounting structural problems; including, a growing social security crisis, chronic under-investment in infrastructure projects, and an overwhelmed health care system.³⁰ Investments in future ICT infrastructure projects will become less palatable as it becomes more difficult to fund Mexico’s social safety net, unless sweeping reforms are made today.

Public and Private Investment

Despite assertions to the contrary, Mexico spends a paltry 1.2% of GNP on ICT systems and infrastructure – well below OECD levels.³¹ Ironically, since the liberalization of Mexico’s telecommunications industry in the early-1990s, public spending on infrastructure

²⁷ Ibid.

²⁸ Ibid.

²⁹ Ibid.

³⁰ Christian Stracke. “Mexico – The Sick Man of NAFTA,” *World Policy Journal* XX, no. 2 (Summer 2003): 32, <http://web.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=05ba87f6-26d6-4002-9a93-6b5328d384e0%40sessionmgr11&vid=5&hid=21/> (accessed 15 September 2011).

³¹ Business Monitor International, *Mexico Information Technology Report Q3 2011*, BMI Industry Report (London: Business Monitor International, July 2011), 9, <http://www.businessmonitor.com/cgi-bin/request.pl?view=publicationsearch&productCode=SSMX13&service=13&iso=MX&industryID=13&issue=2011-07-01&SessionID=31427F0E015C11E18112881FE862EE27/> (accessed 15 September 2011).

has steadily decreased from 12 percent of GDP to current levels.³² In addition, private investment in infrastructure projects collapsed from \$71 billion in 1998 to \$16 billion in 2003.³³ The launch of the e-Mexico initiative has helped focus the government's efforts on improving ICT infrastructure. "In 2011, the goal of the program remains to widen access to education and knowledge through utilization of IT and communications, with a substantial information and knowledge society budget administered through the Communications and Transport Ministry."³⁴ Among the barriers previously mentioned, restrictions on foreign investment have stifled growth in telecommunications sector.³⁵

The shared border and modern physical infrastructure that connect Mexico and the United States facilitates business-to-business and people-to-people interactions. Formalized under the NAFTA agreement, the trade barrier between Mexico and the United States was essentially eliminated and should have enabled Mexico to achieve economic prosperity, but reality tells a different story. According to the Woodrow Wilson Institute, 41 percent of Mexico's foreign direct investment (FDI) originates in the United States; in 2008, this equaled \$8.9 billion.³⁶ It would appear that financial assistance of this magnitude would fix many of Mexico's infrastructure problems, but the allocation of funds tends to benefit areas that need it the least. During this period, FDI to the rural and impoverished southern state of

³² Raul Rodriguez, *Parameters of Partnership in U.S. – Mexico Relations*, special report (Washington, DC: Woodrow Wilson Center Mexico institute, January 2005), 5,

<http://www.wilsoncenter.org/sites/default/files/Infrastructure.Rodriguez.doc/> (accessed 15 September 2011).

³³ Irene Mia, Julio Estrada and Thierry Geiger, *Benchmarking National Attractiveness for Private Investment in Latin American Infrastructure*, (Geneva: World Economic Forum, 2007), 28, <http://www.weforum.org/s?s=Benchmarking+National/> (accessed 11 October 2011).

³⁴ Business Monitor International, *Mexico Information Technology Report Q3 2011*, BMI Industry Report (London: Business Monitor International, July 2011), 9, <http://www.businessmonitor.com/cgi-bin/request.pl?view=publicationsearch&productCode=SSMX13&service=13&iso=MX&industryID=13&issue=2011-07-01&SessionID=31427F0E015C11E18112881FE862EE27/> (accessed 15 September 2011).

³⁵ *Ibid.*

³⁶ Andrew Selee, Christopher Wilson and Katie Putnam, *The United States and Mexico: More than Neighbors*, special report (Washington, DC: Woodrow Wilson International Center for Scholars, May 2010), 20, <http://www.wilsoncenter.org/publication/more-neighbors/> (accessed 15 September 2011).

Oaxaca increased from \$0.1 million to \$6.1 million while aid to the more prosperous northern state of Baja California Sur increased from \$227.1 million to \$883.8 million.³⁷ Mexico's inability to prioritize and disburse funds to the neediest parts of the country is making it incredibly difficult to improve the lives and prosperity of the people the government is trying to help.

According to the World Economic Forum, "Private infrastructure investment projects over the past decade represented only 0.8 percent of GDP, less than half the regional average (1.8 percent). Moreover, the World Bank reports that some 9 percent of projects in infrastructure were cancelled or distressed between 1990 and 2005."³⁸ As a consequence, privatization projects have not been very successful in most of Latin America. Private companies often experience backlash when the national government experiences political, social, or fiscal hardship, related to economic liberalization.³⁹ The tension between public and private ownership of assets has not been solved to the satisfaction of either side. The real issue should not be asset ownership, but the potential sources of funds that could be available and under what conditions.⁴⁰ Resolving this debate will offer a roadmap for future development.

Counterargument

Some critics might disagree with the proposed thesis and evidence I've presented by arguing that Mexico has taken the necessary steps to modernize its ICT infrastructure, made

³⁷ Ibid.

³⁸ Irene Mia, Julio Estrada and Thierry Geiger, *Benchmarking National Attractiveness for Private Investment in Latin American Infrastructure*, (Geneva: World Economic Forum, 2007), 28, <http://www.weforum.org/s?s=Benchmarking+National/> (accessed 11 October 2011).

³⁹ Raul Rodriguez, *Parameters of Partnership in U.S. – Mexico Relations*, special report (Washington, DC: Woodrow Wilson Center Mexico institute, January 2005), 6, <http://www.wilsoncenter.org/sites/default/files/Infrastructure.Rodriguez.doc/> (accessed 15 September 2011).

⁴⁰ Ibid.

significant progress expanding telecommunication platforms throughout the country, and narrowed the digital divide. For example the 2007-2012 National Infrastructure Program (NIP) establishes “the objectives, strategies, goals, and actions designed to increase the coverage, quality, and competitiveness of the country’s infrastructure.”⁴¹ A key component of this strategy focuses on developing and expanding the nation’s ICT infrastructure in order to “increase growth, generate more and better jobs, and attain sustainable human development.”⁴² To facilitate this overarching goal, the GOM has established three strategies to improve telecommunication sector performance. In addition, the government has established benchmarks to assess progress in each area at the six-year mark, 2012. The three strategies and associated benchmarks are listed below.

1. Increase private investment in telecommunications infrastructure to \$25 billion during 2007-2012. Achieve fixed and mobile phone line penetration rates of 24 and 78 lines per every 100 inhabitants, respectively.⁴³
2. Increase broadband coverage up to 22 users per every 100 inhabitants, especially in areas of scarce resources.⁴⁴
3. Increase the number of Internet users to 70 million.⁴⁵

Investments in telephone infrastructure have achieved modest results since the NIP was authored in 2007. By 2009, the number of fixed lines reached 19.4 million users and a

⁴¹ Gobierno de los Estados Unidos Mexicanos, Presidencia de la República, “National Infrastructure Program 2007-2012,” Powerpoint, July 2007, <http://www.infraestructura.gob.mx/index9ef4.html?page=english-version/> (accessed 11 October 2011).

⁴² Ibid.

⁴³ Ibid.

⁴⁴ Ibid.

⁴⁵ Ibid.

penetration rate of 18 lines per hundred inhabitants.⁴⁶ Mobile telephony experienced a comparatively higher rate of growth – mobile phone users reached 83.5 million and a sector density of 77 lines per hundred inhabitants.⁴⁷ Compared to the rest of the world, the cell phone industry within the LAC is very strong. The Inter-American Development Bank notes, “Barriers such as lack of infrastructure, cost, and income may be less constraining for low-income countries. Provided that network infrastructure exists and is affordable, access to mobile phone technologies requires very little initial investment (phone sets can be very cheap) and does not necessarily require a subscription, as pre-paid cards are widely available in the region.”⁴⁸ In Mexico, the telecommunications industry is considered an economic driver despite the current state of the global economy. In fact, Mexico is one of the leading countries within the LAC region for internet and broadband subscriptions, following only Argentina, Uruguay, and Chile.⁴⁹ Compared to the rest of the world, the cell phone industry within the LAC is very strong. At last count, Mexico had 34.9 mobile Internet mobile users and a broadband Internet penetration rate of 7 subscribers per 100 inhabitants.⁵⁰ While it will take a few years to collect and analyze data for 2012, trend analysis based upon current growth rates offers encouraging projections with respect to meeting the established benchmarks.

Mexico is taking steps to open up the telecommunications market by allowing foreign investors to purchase a greater than 49 percent stake in any fixed-line company. In addition,

⁴⁶ Central Intelligence Agency, *The World Factbook*, last modified October 24, 2011, <https://www.cia.gov/library/publications/the-world-factbook/geos/mx.html#top>.

⁴⁷ *Ibid.*

⁴⁸ Inter-American Development Bank, *Science, Technology, and Innovation in Latin America and the Caribbean*, special report (Washington, DC: Inter-American Development Bank, 2010), 69, <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=35384423/> (accessed 15 September 2011).

⁴⁹ *Ibid.*

⁵⁰ Central Intelligence Agency, *The World Factbook*, last modified October 24, 2011, <https://www.cia.gov/library/publications/the-world-factbook/geos/mx.html#top>.

the GOM is writing bidding rules for entities interested in purchasing segments of Mexico's radio spectrum and nearly 20,000 kilometers of fiber optic cable.⁵¹ By allowing competing companies access to the cables owned by Telmex, the government is hoping to open up the telecommunications market. In June 2010, Grupo Televisa, Megacable, and Spain's Telefonica were awarded licensing grants to access the Federal Electrical Commission's fiber optic network. Business Monitor International (BMI) anticipates that these companies will be able to "offer high speed services at a price that is affordable for the majority of the population. The new entrants should create considerable competition to Telmex as well as the cable operators that have been exhibiting particularly fast growth."⁵² In addition to opening the telecommunications market to competing service providers, the government is taking a harder stand against Telmex and its anti-competitive practices. In 2011, the Mexican Supreme Court lodged a decision against Telmex for manipulating the judicial system in order to stall competition. The government also blocked the company's long-standing request to enter the pay television market. Finally, COFETEL levied a massive \$1 billion fine against Telmex for its "monopolistic practices".⁵³

Improvements in the telecommunications sector feed into the government's plan to expand internet services and foster economic development. The 2011-2012 Global Competitiveness Index found the GOM making steady progress in liberalizing the ICT sector. The World Economic Forum observed, "The country's efforts to boost competition

⁵¹ Mary Cuddehe, "Market Door Creaks Open," Financial Times Special Report, 10 November 2009, <http://www.ft.com/intl/reports/mexico-trade-investment-2009/> (accessed 15 September 2011).

⁵² Business Monitor International, *Industry Forecast – Broadband – Q4 2011*, BMI Industry Report (London: Business Monitor International, 25 August 2011), 1, <http://www.businessmonitor.com/cgi-bin/request.pl?view=articleviewer&article=510080&service=1&SessionID=31427F0E015C11E18112881FE862EE27&iso=MX&metaid=311/> (accessed 15 September).

⁵³ Adam Thomson, "Media Wars Give Hope of More Choice," Financial Times Special Report, 24 June 2011, <http://www.ft.com/intl/reports/investing-mexico-2011/> (accessed 15 September 2011).

and its regulatory improvements that facilitate entrepreneurial dynamism by reducing the number of procedures and the time required to start a business seem to be paying off, contributing to an improvement of the overall business environment.”⁵⁴ These institutional reforms, coupled with a progressive vision and well-articulated development strategy, will give Mexico every reason to be hopeful for the future – provided it can stay the course.

Conclusion

Mexico has embarked on an ambitious plan to raise the living standards of all its citizens. In order to meet this objective, the GOM has launched an ICT infrastructure development plan designed to expand telecommunication services into the country’s most rural and impoverished areas. The ability to connect these areas to more prosperous regions will allow disadvantaged citizens to gain access to education, training, healthcare, and social services formerly out of reach. The NIP establishes specific strategies and benchmarks in order to achieve its development goals. Despite an impressive media campaign and rhetoric exhorting the virtues of Mexico’s capabilities, empirical evidence suggest Mexico’s ICT infrastructure development has not kept pace with LAC or OECD countries due to three structural weaknesses – lack of marketplace competition, inadequate government reform, and underinvestment in infrastructure programs. In order to close the digital divide that separates Mexico from a majority of the developed world, the government must enact a variety of changes to stimulate growth in the ICT sector. The GOM has the ability to facilitate social change through its stated economic and educational goals, but has yet to exercise the political will needed to make this vision a reality. Mexico has made some progress in transforming its society, but will not reach its full potential nor be able to compete with its OECD partners

⁵⁴ Klaus Schwab, *The Global Competitiveness Report 2011-2012: Country Profile Highlights*, (Geneva: World Economic Forum, 2011), 11, <http://www.weforum.org/> (accessed 11 October 2011).

until it commits to serious reform. Until that day, Mexico will remain separated by the digital divide.

Recommendations

First, the GOM must encourage competition in the telecommunications industry and continue to discourage Telmex from engaging in anti-competitive practices. The lack of competition in ICT markets allows Telmex to dictate the terms and prices for services at a rate 2-15 times higher than those paid by LAC and OECD country subscribers.⁵⁵ In addition, the absence of competition stifles innovation and places limits on the quality of customer service. Opening and expanding the ICT market to other service providers and companies will spur growth, expand ICT coverage, create innovation that will develop new technologies, and increase affordability and access to low-income customers. Recent government auctions of ICT infrastructure and the loosening of industry regulations are encouraging signs, but competition alone will not close the digital divide. The GOM must enact institutional reforms to build trust and confidence in the government and the economy.

Second, the government must enact institutional reforms designed to tackle corruption, increase the size of the national tax base, and establish funding priorities to balance the budget. Mexico has struggled to eliminate political and judicial corruption. The lack of government transparency and willingness of some officials to accept bribes undermines Mexico's ability to embrace political reform. The imposition of stiff fines, harsh jail terms, and adoption of a zero-tolerance policy with respect to corrupt practices will purge

⁵⁵ Yevgeny Kuznetsov and Carl J. Dahlman, *Mexico's Transition to a Knowledge-Based Economy: Challenges and Opportunities*, special report (Washington, DC: The World Bank, 2008), 95, http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187283&theSitePK=523679&entityID=000334955_20080530044932&searchMenuPK=64187283&theSitePK=523679/ (accessed 15 September 2011).

the government of individuals willing to compromise their integrity. Achieving this cultural change will be a long-term challenge, but the most important reforms the GOM can make. From a demographics perspective, the country's growing and aging population is placing a greater strain on the nation's budget. As Mexico's tax base continues to shrink, the portion of the budget dedicated to funding social programs will gradually expand at the expense of non-discretionary programs such as ICT infrastructure investment. The public-sector pension plan must be restructured by reducing pension benefits or increasing the minimum retirement age. Rolling back and reforming Mexico's entitlement programs will not be popular or easily achieved, but it must be addressed in order to prevent a future financial crisis. Difficult choices will need to be made with respect to identifying spending priorities and budget cuts.

Third, the GOM must earmark adequate public funding for ICT infrastructure projects. The delivery of telecommunication platforms and services to rural communities will not be accomplished overnight; it will require patience and a consistent effort to make this a reality, but the government cannot do it alone. FDI and private investment are essential to stimulating growth in the ICT sector and developing new technologies. Public-Private Partnerships (PPPs) offer a potential solution to Mexico's stagnant telecommunications industry. The private sector is able to direct funds to specific projects and regions where investments are most needed. In addition, it brings the necessary innovation, technical expertise, and leadership needed to generate growth. Mexico needs more ICT investments from its businesses in order to close the digital divide with its more technologically advanced LAC and OECD peer nations. Public sector investment and government backing provide the necessary commitment and legitimacy needed to see these projects through to completion. It

also demonstrates national will and a commitment to the Mexican people, not just another infrastructure project designed to enrich private company shareholders. The PPP model is a win-win for investors and the people of Mexico.

Collectively, these recommended changes will give Mexico the best possible chance for accomplishing its development goals. None of the choices will be easy to make, nor will they have an immediate effect on altering the country's economic and social environment. Building a bridge to cross the digital divide will require patience and dedication from all parties and institutions.

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