

A glowing lightbulb with a map of Mexico inside it, set against a warm orange and yellow background. The lightbulb is the central focus, with its filament visible. The map of Mexico is outlined in a bright, glowing yellow light, making it stand out against the darker interior of the bulb. The background is a gradient of warm colors, from deep orange at the bottom to bright yellow at the top.

Fostering Innovation in Mexico

Ideas from the High-Level
Innovation Forum for Policymakers

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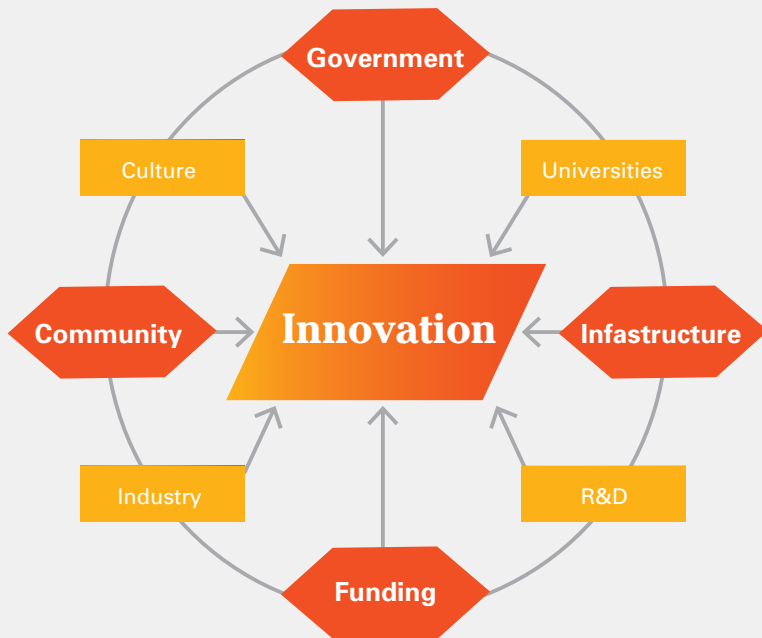
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FOSTERING INNOVATION IN MEXICO

Ideas from the High-Level Innovation Forum for Policymakers



By Duncan Wood, Christopher Wilson and Alejandro Garcia.
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Introduction and Key Findings

Mexicans are creative and entrepreneurial. Some of the world's most notable and widely-used technologies have their roots in Mexico. Mexican chemist, Luis Miramontes, for instance, co-invented the progesterin used in the first contraceptive pills. Mexican engineer, Guillermo González Camarena received the world's first patent for the color television. And Mexican writer, Victor Celorio invented InstaBook, the technology that produces a perfect-bound book in one step and just two minutes. Mexico has a fine tradition of science and innovation, and President Enrique Peña Nieto is right to say, "Mexico should recognize, value, and take advantage of the great value of our human resources."¹ It is the Mexican entrepreneur that has been and will continue to be the strength of the nation's economy and the driver of innovation.

During his trip to Mexico City in May 2013, President Obama observed, a "new Mexico is emerging," referring to the country's evolving and growing economy.² Traditionally, Mexico's economy was closed, heavily regulated, and based on protecting its national industries from competition through import substitution and a major focus on the exploitation of its natural resources. However, by the 1990s, the country



transitioned into a more open economy, setting the foundation for greater investment opportunities in science and technology. Over the past decade, the country has launched important structural reforms and signed free trade agreements to open the economy further. A manufacturing and services economy has emerged, replacing the old commodity and agricultural-based economy, and the country has enjoyed significant macroeconomic stability and a growing middle class. Despite these advances, Mexico continues to face significant challenges to achieving greater productivity and competitiveness, and lags significantly behind other Organization for Economic Co-operation and Development (OECD) countries in many science and innovation performance indicators.³ As a recent Wilson Center publication states, “Mexico is poor no more, but developed not yet.”⁴ Achieving a higher Gross Domestic Product (GDP) per capita and reducing the country’s high poverty rates remain a policy priority for Mexican legislators. Innovation can help meet that challenge.

As economies mature, there are diminishing returns for increasing the supply of resources devoted to production. Manufacturing remains important for Mexico, but the country will have to find new ways to use resources more efficiently and to develop new products to keep up

with an increasingly competitive global economy. Mexico recognizes that the ability to innovate will be a determinant of future economic growth, and it is looking to create an environment prime for knowledge creation.

the Government of Mexico established a seed fund through the state run development bank, National Financial (NAFIN) for investment in high-tech startups.

Mexico has recently shown a commitment to fostering entrepreneurship and accelerating innovation. Beginning in the 1990s, the country launched several programs and initiatives through its National Science and Technology Council (CONACYT) to advance the role of science and technology.⁵ In 2012, the Government of Mexico established a seed fund through the state run development bank, National Financial (NAFIN) for investment in high-tech startups.⁶ In January 2013, the country created the National Entrepreneur Institute (INADEM), an administrative body within the Ministry of Economy to support small and medium size businesses.⁷ Also in that year, Mexico and the United States launched a joint Entrepreneurship and Innovation Council (MUSEIC) to “enhance regional competitiveness by strengthening the North American high-impact entrepreneur ecosystem.”⁸ Most recently, the Mexican government increased funding for research through CONACYT this year to US\$230 million, up from US\$130 million last year.⁹ Even so, greater institutional, legal, and fiscal support is needed to create a solid foundation for innovation to thrive. Innovation development is new to Mexico, so policy makers have many opportunities to promote and expand the country’s knowledge-based economy.

To increase understanding of the benefits and challenges of innovation and to aid in the development of policy recommendations that encourage innovation in Mexico, the Mexico Institute of the Woodrow Wilson International Center for Scholars held a High-Level Innovation Forum for Policymakers in November 2013. The forum covered several topics related to innovation, including: entrepreneurship, financing innovative

businesses, regulation, spillovers between universities and companies and the role of small and medium enterprises (SMEs). Questions examined at the forum included: How has the global economy changed, and what does it mean for innovation? How should we be thinking about innovation? What conditions are necessary for innovation to thrive? How can we attract greater investment for innovation activities? What types of government policies and regulations can strengthen innovation? How can we better integrate science and technology into practical applications? What are the barriers to innovation, and how can we overcome them? This paper summarizes the main themes of the conference and highlights some lessons learned. The purpose of this paper is to aid in ongoing dialogue, the next stage of which will take place in Washington, DC in October 2014.



KEY FINDINGS

- Innovation is the key driver of economic growth and productivity in today's global economy, but Mexico is behind other emerging economies with regards to productivity.
- Continuing dialogue with regional partners is important to increase understanding of policy reforms that strengthen regional innovation and productivity outcomes.
- Innovation operates within an ecosystem of four main components: government, infrastructure, funding, and community. The overarching role of government should be uniting and enhancing all the aspects of the innovation ecosystem.
- There is a difference between small businesses and gazelles—the types of small firms that want to grow, that are actually innovating, and that are creating new jobs—so the policy focus should be less on small companies and more on high potential start-ups.
- Innovation occurs in environments that encourage experimentation and accept failure as a necessary part of the process.

- There are a variety of funding opportunities outside of venture capital or bank lending that can help spur greater entrepreneurship.
- Sustaining the growth of innovation clusters and enhancing integration between universities and businesses can help turn research initiatives into market realities.
- Business incubators are important programs that help facilitate mentoring relationships vital for smaller businesses.
- Governments with weak tax, legal, and fiscal policies tend to stymie productive innovation outcomes.
- Non-traditional policy efforts outside of the regulatory framework such as promoting the use of crowdfunding and incubator programs, building and expanding innovation clusters, tapping into the Mexican diaspora, and implementing programs that celebrate entrepreneurship at the local level can help drive innovation in the short-term.
- Mexico can benefit from a government-sponsored program such as the United States' Small Business Innovation Research (SBIR) grants program, which minimizes risks for venture capitalists and stimulates venture capital fund development.



1

Section

understanding innovation

Chapter 1. Innovation in a Rapidly Changing Global Economy

Innovation—the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations—is a fundamental catalyst for growth and development in the 21st century.¹⁰ Innovation is about creating and adapting to change. In this new economy characterized by globalization, free trade, and technological advancements in communication, countries have become increasingly interconnected, competitive, and specialized in innovation and production. The speed and scale of data transfer has changed the way businesses operate and interact and the way individuals perceive economic opportunities. The internet has altered the way consumers buy products and services, and the way businesses and individuals think about success. The global economy is changing rapidly, and countries are racing to achieve an economic advantage by generating new technologies and products, establishing high technology industries, and seeking broader investment partnerships.

Rodrigo Canales, Associate Professor of Organizational Behavior at the Yale School of Management, suggests there were three structural changes that have made the global economy much more complex:

- A blurred line between organizations and sectors;
- A growth in the level of interdependence and international connection; and
- Advancements in technology, which have amplified the effects of the first two changes and have reduced the cost of experimenting ideas.

He insists countries have become obsessed with innovation because organizations and businesses are not keeping up with pace of change in the 21st century. Traditional business models “do not have the processes in place to thrive in a 21st century environment,” he states. This has put innovation policy at the top of the agenda for decision makers in business and government all over the world.

As Ambassador Eduardo Medina Mora observes, “Although we could celebrate what has happened in the last 20 years,” referring to the United States’ and Mexico’s innovative advances, “it is even more important to look ahead and make a prospective analysis rather than a retrospective one.” His view aligns with what major international organizations and multi-lateral forums such as the United Nations, the World Bank, the Inter-American Development Bank (IDB), and the Organization for Economic Co-operation and Development (OECD) have stated – that Mexico (and Latin America more broadly) has shown signs of growth, but productivity remains low and much more needs to be done to ensure broader socio-economic benefits to society. Mexico has tremendous potential to strengthen its economy through well-designed policies that encourage innovation.

The Importance of Innovation

There are three basic ways to drive economic growth: growing the population, adopting higher productivity industries, or initiating broader productivity improvements.¹¹ Productivity—the quantity of output that can be produced per unit of input—is considered the most critical measurement of economic performance. Because innovation can

The U.S. Department of Labor has estimated that innovation has produced about half of all U.S. economic growth in the last 50 years.

increase the amount of output per unit of input, it can be a key driver of productivity and greater economic growth. The U.S. Department of Labor has estimated that innovation has produced about half of all U.S.

economic growth in the last 50 years.¹² The OECD has also stated that 50 percent of GDP in the major OECD economies is knowledge-based.¹³ Innovation and productivity are linked.

Carlo Pietrobelli from the Competitiveness and Innovation Division at the Inter-American Development Bank cited a number of recent studies by the IDB on the innovation activities of Mexican companies to demonstrate a positive correlation between technological innovation and productivity.¹⁴ He explained that Mexico is behind other emerging economies with regards to productivity. The chart below shows that Mexico's productivity has withered since the 1980s and that Mexico currently has the lowest productivity score compared to Brazil, India, China, and South Korea.

PRODUCTIVITY INDEX RELATIVE TO U.S., 1960=1

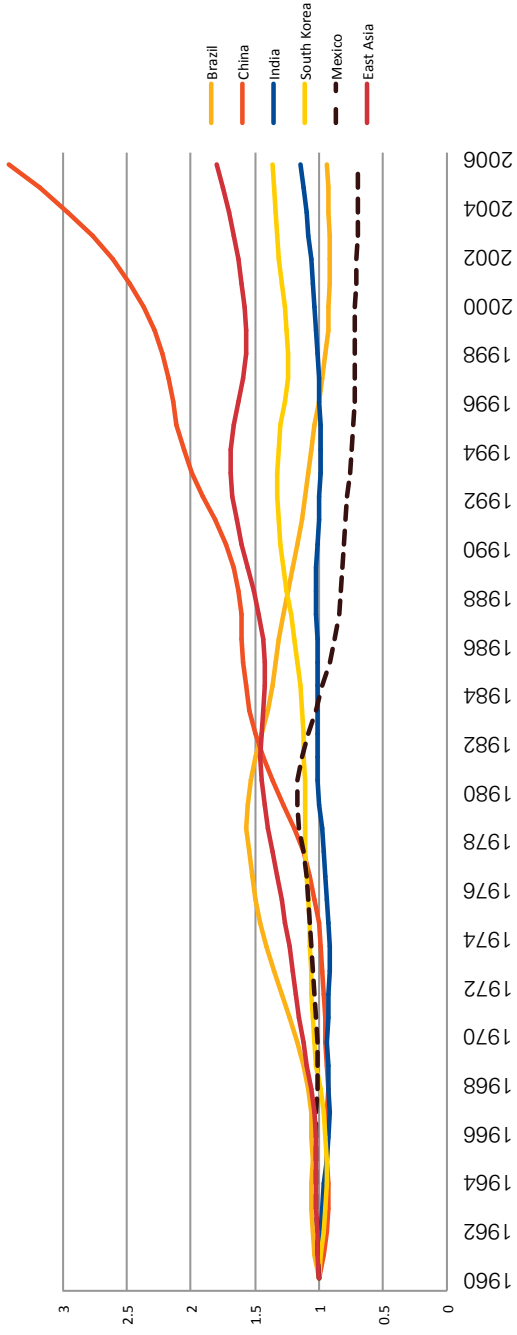


Figure 1: Source: IDB, 2010. Data are from Daude and Fernandez Arias (2010) based on Heston, Summers and Aten (2006), World Bank (2008), Barro and Lee (2000).

He provided three reasons to explain Mexico's poor productivity, all of which are tied to the country's innovation climate:

- The low propensity of Mexican companies to invest in Research, Development, and Innovation
- The great heterogeneity of federal entities, and the fact that public policies have failed to reduce this heterogeneity
- The weak system of institutional governance for competitiveness and innovation.

His analysis suggests there is a weak structure in place linking the country's public policies, education system, and private sector. Even with its most skilled labor force ever, Mexico is experiencing limited job creation and low labor force productivity.¹⁵

Mexico's lack of innovation has slowed its productivity and eroded its international competitiveness, especially in relation to other emerging economies such as China, which recently supplanted Mexico as the United States' second largest trading partner and has boosted its investment in science, technology, innovation and human capital.¹⁶ Mexico has made progress in boosting GDP per capita, but not enough to remain competitive with other emerging economies.¹⁷ Despite Mexico's recent reforms, it is still very difficult for small businesses to obtain the resources and support they need to grow. There have been some advances in its entrepreneurial base, but Mexico still lags behind many countries in innovation performance indicators, including public and private investment in research and development, science and technology journal publications, number of patents filed, tertiary education levels, and internet accessibility.¹⁸

With President Enrique Peña Nieto's commitment to reforms in labor market regulation, education, telecommunication and competition policy, financial sector regulation, energy, and fiscal policy, Mexico has a unique opportunity to make innovation policy an integral aspect of broader economic and development goals. The country's future productivity will grow increasingly dependent on the government's ability to promote and foster a healthy entrepreneurial climate.

Mexico's Current Innovation Climate

Mexico has shown signs of growing entrepreneurship. The country has evolved into an important information technology center in recent years. Guadalajara and Monterrey, for instance, have been referenced as “Mexico’s Silicon Valleys,” based on their expanding business sectors.¹⁹ The cities exemplify a growing entrepreneurial spirit, where collaboration between government, private businesses, and universities continues to grow. According to National Public Radio (NPR), Mexico’s technology industry has grown three times faster than the global average in the past decade.²⁰ There are 111,400 new professionals graduating from technical and engineering schools annually.²¹ More than 65 percent of the population are younger than 35 years old, 50 percent are younger than 26, and the population is expected to double over the next 30 years.²² Mexico is developing a critical mass of young people ready to innovate and solve problems. Nonetheless, experts suggest the structural conditions needed to support this momentum are weak.

Forum participant Rob Atkinson, President and Founder of the Information Technology and Innovation Foundation (ITIF), highlighted Mexico’s innovation rankings in a study conducted by ITIF and the Kauffman Foundation. The report classifies 50 countries as Upper Tier, Upper-Mid Tier, Lower-Mid Tier, or Lower Tier based on their strength in the following seven policy areas:

1. Open and non-discriminatory market access and foreign direct investment policies;
2. Science and R&D policies that spur innovation;
3. Openness to domestic competition and new firm entry;
4. Effective intellectual property rights protection policies;
5. Digital policies enabling the robust deployment of ICT platforms;
6. Open and transparent government procurement policies; and
7. Openness to high-skill immigration.²³

The study classified Mexico as a Lower Tier country, with poor scores in almost every policy area except trade. The elimination of research and development tax incentives and limited access to reliable capital or government assistance as barriers to growth are central themes throughout the study.

Rank of Countries on Innovation Policy Capacity (in alphabetical order)

Upper Tier	Upper-Mid Tier	Lower-Mid Tier	Lower Tier
Australia	Belgium	Brazil	Argentina
Austria	Cyprus	Bulgaria	India
Canada	Czech Republic	Chile	Indonesia
Chinese Taipei	Estonia	China	Mexico
Denmark	Hungary	Greece	Peru
Finland	Iceland	Italy	Philippines
France	Israel	Latvia	Russia
Germany	Lithuania	Malaysia	Thailand
Hong Kong	Luxemburg	Poland	Vietnam
Japan	Malta	Romania	
Netherlands	Portugal	Slovak Republic	
New Zealand	Slovenia	South Africa	
Norway	South Korea	Turkey	
Singapore	Spain		
Sweden			
Switzerland			
United Kingdom			
United States			

Table 1: Source: Global Innovation Policy Index, 2012

Country Rank by Core Innovation Policy Area

Country	Aggregate	Trade	Science/ R&D	Domestic Competition	Intellectual Property	ICT	Government Procurement	High-Skill Immigration
Mexico	Lower	Upper- Mid	Lower	Lower	Lower-Mid	Lower	Lower	Lower

Table 2: Source: *Global Innovation Policy Index, 2012*

In another study, the 2014 Global Innovation Index, Mexico ranks 66th out of 143 countries—this is worse than its 63rd place ranking in the 2013 index.²⁴ The study averages innovative inputs (institutions, human capital and research, infrastructure, market sophistication, and business sophistication) vs. innovative outputs (knowledge and technology outputs and creative outputs) to measure countries’ overall innovation climate. Mexico moved up 18 positions from 2011 to 2013, making it one of the fastest improving nations in the study; but the decline in this year’s rankings suggests there is much opportunity to strengthen Mexico’s innovation climate.

The Regional Potential for Innovation

In today’s global economy, what happens in one country can quickly affect another; so national interests are increasingly becoming regional and global interests. This is especially true for North America, where the size and complexity of trade has expanded, where products, ideas, and skills are transferred at an enormous pace and scale, and where the development of products has become a shared phenomenon. Forum participants emphasized the importance of regional integration and progress, and shared the view that the economic outlook of both Mexico and the United States is predicated on a healthy North-American innovation system where bilateral trade, investment, and supply chains can continue to grow. Because the United States is the world’s greatest export market, Mexico is well-placed to exploit its export sector and gain from further trade and investment liberalization.

Both governments acknowledge that the strength of our countries will come from creating and sustaining an environment in which entrepreneurs can arise and remain competitive in the future. The establishment of the Mexico-US Entrepreneurship and Innovation Council (MUSEIC) is testimony to the strong bilateral emphasis on innovation.

P*olicy* idea

Continuing regional dialogue can help engender policy reforms that strengthen regional innovation and productivity outcomes.

Our Future Competitiveness: Energy and Technology

Ambassador Medina-Mora stated that North America's future competitiveness will not be contingent on cheap labor but on two factors: energy and technology. The increasing global demand for energy and the heightened concern over climate change provides opportunities to create new energy technologies and to expand existing clean energy sources. The United States' rapidly developing natural gas sector provides a reliable and affordable energy source for the entire region that emits much less carbon dioxide than coal or oil, and its expansion has proven beneficial to U.S. energy security and job creation. Mexico has an opportunity to play a greater role in the region's natural gas and renewable energy development.

Mexico is currently a natural gas importer, mostly from the United States, but its demand for natural gas is growing.²⁵ Mexico's demand is so high that it has to import from regions outside of North America, since U.S.-Mexico pipelines are already functioning at capacity. An expansion of its domestic natural gas sector would enable the country to benefit from cheaper and more reliable energy, and it would strengthen the energy trading relationship with the United States. According to the U.S. Energy Information Administration (EIA), Mexico ranks 6th in the world in technically recoverable shale gas resources.²⁶ The Government of Mexico has taken steps toward opening its energy industry to outside investment, which would unlock the potential of its massive shale resource potential. New legislation for PEMEX and the Federal Electricity Commission are making the energy sector attractive to foreign direct investment like never before.

Renewable energy technology provides another innovation opportunity to accelerate economic growth, improve energy security, boost

innovation and competitiveness, and significantly reduce greenhouse gas emissions. The country's geography and growing attractiveness to foreign investment provide a great opportunity for further renewable energy innovation. Mexico has recently encouraged innovation in the energy sector by building a framework to increase investment opportunities in clean energy. In 2008, the Mexican Congress passed the Law for Better Use of Renewable Energy and the Financing of the Energy Transition (LAERFTE) to define and regulate the use of renewable energy for power.²⁷ Mexico's Secretariat of Energy (SENER), the National Council on Science and Technology (CONACYT) and the Inter-American Development Bank (IDB) have partnered to encourage Mexican innovation for sustainable energy research.²⁸ In 2012, the Government of Mexico passed climate change legislation mandating a reduction in carbon dioxide emissions by 30 percent below business-as-usual levels by 2020 and by 50 percent below 2000 levels by 2050.²⁹ The Government has also set a goal to generate 35 percent of its energy from renewables by 2024.³⁰ Mexico currently generates 26 percent of its electricity through renewables,³¹ but it would have to raise generation capacity from renewables by 400 percent within the next decade to reach its emissions reduction goal.³² Some experts suggest Mexico has the potential to become a world leader in the development of renewable energy given the recent landmark energy reforms and the government's emphasis on renewable energy production.³³

This year, SENER and CONACYT, through the CONACYT-SENER-Sustainability Energy Sector Fund, established three Mexican Energy Innovation Centers (CEMIE) focusing on the development solar, geo-thermal, and wind energy generation. The purpose of the centers is to strengthen linkages between Institutions of Higher Education and centers of public and private research and companies and / or public-private partnerships. These innovation centers are similar to Canada's Innovative Centers of Excellence for Commercialization and Research, the United Kingdom's SUPERGEN Bioenergy Hub, and the United State's Energy Innovation Hubs.³⁴ Mexico's innovation centers aim to:

- Advance technologies for early exploration and characterization of geothermal resources.
- Promote awareness of geothermal energy between business and the general public,
- Increase efficiency and reduce the costs of construction technology for geothermal wells,
- Promote the direct use of heat from low resources and medium enthalpy, like fluid waste heat used in the operation of geothermal plants, and
- Assimilate and develop technology for the exploitation of geothermal resources of very low permeability or of hot dry rock, among others.³⁵

Programs such as these will enable innovative entrepreneurs to maximize Mexico's renewable energy potential and strengthen the future of North American energy integration and security.

Ambassador Medina-Mora also mentioned the importance of learning from the United States with regards to technological innovation. He referenced the World Intellectual Property Indicators report, demonstrating the United States is second in the world in patent creation, while Mexico is 10th.³⁶ The United States has some of the most innovative companies in the world, and Mexico can learn from the United States' entrepreneurial history.

The Impact of New Technologies

An important theme from the innovation forum was that new technologies have changed the means of production. The dynamics of many industries are changing drastically. Traditional closed models based on large manufacturing plants are being replaced by distributed and open manufacturing models, where science and experimentation is happening in small offices and bedrooms across the globe. David Rejeski, Director of the Science and Technology Innovation Program (STIP) at the Woodrow

Wilson Center, described this phenomenon as a “shift in the innovation system,” where new technologies have brought about a rapid diffusion of know-how and tools through sharing and open source systems. The traditional model of mass production

is increasingly shifting to a model of mass customization, where the consumer or customer is able to customize products to their needs. An outcome of this transition is the growing impact and influence of individuals. Today’s technology allows individuals to organize and share goods, services, and ideas at a much faster and greater scale. Small-scale technologies such as the 3-D printer have changed the way individuals create and experiment with ideas. People are increasingly becoming empowered to engage, shape their communities, and share ideas to meet the needs of society. 21st century technologies and this new distributed innovation system have contributed to a rising entrepreneurial spirit. Countries and businesses must design innovation strategies that capitalize on these changing dynamics.

To remain competitive, the United States and Mexico must deepen their understanding of the connections between innovation and productivity, and the ways in which policy levers can fuel entrepreneurship.

Conclusion

As Public Policy Scholar and the former Director of the Program on America and the Global Economy (PAGE) at the Woodrow Wilson Center, Kent Hughes states, “[innovation] will largely define the future prosperity of our countries.” The growing emphasis on innovation is a byproduct of the rapidly changing global economic landscape. To remain competitive, the United States and Mexico must deepen their understanding of the connections between innovation and productivity, and the ways in which policy levers can fuel entrepreneurship. The capability to innovate will not only be a driver of economic progress, but a solution to some of the world’s greatest health, environmental, and technical challenges. Progress, however, lies not only in creating new ideas, but transforming those ideas into profitable commercial enterprises, and generating conditions that can extend the returns on investment to society.







Chapter 2. Adopting the Right Mind-Set: *How should we be thinking about innovation?*

Sound solutions come from having a clear understanding of the problem and the desired outcome. The ability to develop effective public policies that will support innovation growth in Mexico depends on policy makers' understanding of why innovation is important and consensus on the type of innovation they hope to foster. As outlined earlier in the report, innovation has the potential to strengthen Mexico's productivity and competitiveness in today's rapidly changing global economy, but what should that innovation look like? A number of presenters at the High Level Policy Forum explained how we should be thinking about innovation and described some effective innovation models.

The Innovation Ecosystem

Perspectives on innovation tend to focus on individuals rather than the structures that promote a culture of innovation. However, because innovators can only thrive when they are provided with support mechanisms, such as technological expertise, human capital, and access to capital, it is understood that innovation exists within a system of relationships and conditions that allow it to thrive or wither. Kent Hughes put it this way, "high-impact entrepreneurs are embedded in



another world.” He explains that Steve Jobs, for instance, built his success by combining existing technologies that were developed at research institutions funded by the United States government (specifically DARPA). Jobs was innovative, but his success encompassed a system of innovation, with research and development efforts by firms, public entities, and existing science. This system is a subsystem of the national economy in which various institutions and organizations interact with each other in the innovation process. The national innovation systems concept was introduced in the late 1980s (see Freeman (1987), Dosi et al. (1988)) and expanded in the 1990s (see Lundvall (1992), Nelson (1993), Edquist (1997)) to inspire a broader approach to innovation development. Scholars and practitioners have more recently used the phrase “innovation ecosystem” to describe this phenomenon, suggesting every condition or relationship within the system has a function in maintaining the stability and health of the ecosystem.

FIGURE 2: THE INNOVATION ECOSYSTEM



An innovation ecosystem comprises a complex set of relationships formed between actors (e.g., material resources and human capital) and entities (e.g., universities, firms, venture capitalists, and policy makers) whose goal is to enable technology development and innovation.³⁷ Strengthening the integration of these various components and identifying how they can achieve mutually beneficial outcomes will maximize innovation development and economic growth. Presenters at the forum highlighted four main components of the innovation ecosystem: government, community, infrastructure, and funding. A framework and culture that builds productive linkages between these four areas is required to ensure the resources invested in the knowledge economy produce a profit in the commercial economy. Below is a brief explanation of the four areas and their roles within the ecosystem.

GOVERNMENT

Governments play an important role in either advancing or hindering innovation's potential through legislation. The primary responsibility of government is to generate and support a regulatory framework that is supportive of innovation. Reforms focusing on key policy areas such as the business environment, international trade and investment, financial markets, labor markets, and education can help foster greater innovation. International cooperation to strengthen competitiveness through sharing best practices and integrating infrastructure that supports innovation is another valuable government responsibility. Governments can also play a role in promoting innovation by implementing programs that celebrate and encourage entrepreneurship.

COMMUNITY

Entrepreneurship community-building can support innovation via business-to-business mentorship ties and knowledge sharing. Communication networks between firms, students, and customers create risk- and reward-sharing partnerships that encourage greater engagement and effort in knowledge creation and application.

INFRASTRUCTURE

Universities are the fundamental innovation-building infrastructure. A strong education system that is broadly accessible facilitates the creation and diffusion of innovation. Policies that enhance formal education and link universities to the business sector will help people acquire and deploy the skills necessary for innovation. The internet, too, is an important resource for innovative activity. It is impossible, for instance, to receive a first-rate education without access to the internet, where the majority of today's research and educational exchanges occur. Many

An innovation ecosystem comprises a complex set of relationships formed between actors (e.g., material resources and human capital) and entities (e.g., universities, firms, venture capitalists, and policy makers) whose goal is to enable technology development and innovation.

effective business applications are also beginning to use cloud platforms and other broadband services, so that digital exclusion directly hinders entrepreneurial opportunity. It is also increasingly difficult to find jobs without access to the internet, since job postings are mostly found online. Currently, only 43 percent of

Mexicans have access to the internet, compared to 84 percent of U.S. citizens.³⁸ The internet must be an open platform with few barriers to entrepreneurial activities to strengthen innovation.

FUNDING

Foreign, public, private, and community-based finances are key ingredients for business creation and growth. Increasing and integrating various funding sources (seed capital, state and federal grants, foreign investment, crowdfunding, research competitions, etc.), and eliminating barriers to accessing funding will help startups transition into larger businesses.

A productive knowledge economy cannot develop if the factors work in isolation, or if one of the factors is weak. It is important that the four factors overlap and interact with each other. Government, for instance, has a role in providing funding for research and development, strengthening community networks between public and private institutions, or promoting a civic appetite for science and technology. An important take-away from the forum is that the interactions among actors

The interactions among actors and entities in the innovation development process are just as important as funding research and development. This suggests the responsibility of government extends far beyond budgeting and allocating resources.

and entities in the innovation development process are just as important as funding research and development. This suggests the responsibility of government extends far beyond budgeting and allocating resources.

P*olicy* ideas

Understanding that innovation operates within a system can help policy makers develop a comprehensive approach for stimulating innovation.

What an Ecosystem Looks Like

Allan Friedman, fellow in Governance Studies and research director of the Center for Technology Innovation at the Brookings Institution, described the innovation ecosystem surrounding the development of fitness technologies such as the Fitbit or the Xbox Connect. Entrepreneurs took their knowledge of electrical engineering and biomechanics and combined them to create a new market consisting of personal fitness and data collection. Friedman suggested this new market is an ecosystem where different companies step in and begin to apply their various specialties. On the one hand there are scientists with white lab coats, and on the other hand there are people using existing technologies in a new way. Friedman highlighted that government and private funding for basic and applied research are both necessary for science to become valuable to society. According to Friedman, the value of science is also more than just papers and patents, it is about human capital and ensuring people are getting advanced degrees. He concludes that an ecosystem of innovation is one where different actors and entities come together to ensure “research is being used in the real world.” The ongoing challenge is creating efficient means of communication and interaction between different actors within the new market.

Adopting a Solutions-based Framework

The primary goal of innovation should be to find solutions to real world problems. Major problems such as rampant population growth, water and food insecurity, the availability of energy, life-threatening diseases, persistent poverty, and social or political instability are having a great impact on the social and economic livelihood of countries and people alike. Douseph Yazdi, Executive Director of the Johns Hopkins Center for Bioengineering Innovation & Design, suggested innovation is about “building a bridge between human knowledge and human need.”

Businesses understand that consumers are looking to satisfy a need, and researchers are increasingly thinking about how science and technology can improve the quality of life. “The education system shouldn’t

just be about expanding the knowledge base,” Yazdi stated, “it should be about solving problems.” One of Mexico’s strengths is its young population of motivated entrepreneurs that have the mind-set of solving problems at a very low cost. As Mexico looks to expand its innovation ecosystem, the commitment should be to address global needs.

Rodrigo Canales highlighted three characteristics of solutions-based innovation models:

**Innovation is about building a bridge between human knowledge and human need –
Youseph Yazdi**

Characteristics of a Solutions-based Innovation Model

- Requires countries to have a deep understanding of the ways customers behave in the global economy
- Embodies a process of discovery and experimentation
- Has a greater propensity for collaboration

The first characteristic is a deep understanding of the ways customers behave in the global economy. He mentioned countries need a “better understanding of the needs of customers and how those needs are evolving.” The second characteristic of the new innovation model is that it embodies a process of discovery and experimentation. Because of the complexity and dynamism of the global economy, coming up with effective solutions “intellectually or theoretically” has become more difficult. Instead, entrepreneurs should be conducting smaller experiments to learn how the global system reacts to their products or services. Experimentation can help build confidence that the proposed innovation would actually meet a market need. Lastly, Canales suggests

today's successful innovation models have a greater propensity for collaboration. He proposes a much more open and fluid relationship between organizations and sectors. Innovation in the health sector, for instance, cannot occur without collaboration from the science and technology and government communities. According to Canales, adopting a solutions-based mind-set for innovation will have less to do with finding the right products or services and more to do with creating new ways of "analyzing, doing, or organizing."

Emphasizing the "Right" Businesses – the Gazelles

Panelists at the High-Level Policy Forum encouraged a change in innovation discourse from advancing small businesses to strengthening high-impact startups, or "gazelles." The OECD defines gazelles as "all enterprises up to five years old with average annualized growth greater than 20% per annum, over a three year period, and which have 10 or more employees."³⁹ David L. Birch coined the term "gazelles" in a 1994 essay aiming to identify what types of companies create the most jobs. "The big companies, elephants, are slow and not very innovative," he said, "Then there are a large number of very small firms—mice—that run around but fail to develop. And then the gazelles...small firms that grow quickly and create employment."⁴⁰

He later concluded that gazelles were responsible for all net job generation during his time of study. The analysis challenges the viewpoint that small businesses or large corporations create the most jobs. The Kauffman Foundation also found that younger companies, rather than smaller companies, are actually creating more jobs in the United States. As a recent McKinsey Global Institute publication stated, Mexico's economic challenge involves the gap between its large corporations that contribute to economic growth and its smaller, low-productivity businesses that slow its economy.⁴¹ Presenters agreed that the policy focus should be less on small companies and more on high potential start-ups.

In line with the McKinsey report, Rob Atkinson suggested Mexico has too many small businesses. This is problematic because the small

business sector is creating more jobs than the more modern economy, shifting labor from high productivity to low productivity work.⁴² Atkinson stated, "I think the focus should be on the right type of small business... Large businesses have higher productivity, pay higher wages, export more, patent more, and have fewer worker disability claims." Atkinson suggested the right types of small businesses are those that are going to be gazelles, companies that grow to have thousands of employees. Donna Harris, Co-Founder of 1776, a comprehensive initiative to convene and accelerate startups from around the world, shared the same sentiment, "there is an enormous difference between small businesses and high growth startups." She stated that gazelles are the "kinds of companies that are having an economic impact." Harris highlighted that the most important thing to understand about small businesses and gazelles is that each group requires unique sets of support systems.



P*olicy* idea

Mexico's innovation strategy should focus on identifying the types of small firms that want to grow, that are actually innovating, and that are creating new jobs.

The central question, then, is how to identify potential gazelle businesses. Donna Harris explained that small businesses and high-growth startups think differently, and highlighted two main differences that could help identify enterprises with greater growth potential: ownership perspective and pace of development. Companies that bring about the greatest impact are those that do not see their start-up as something they own; they view themselves as founders and are willing to give up their ownership stake to see the company grow. Also, growth-oriented enterprises do not rely on traditional business plans when starting a company. The traditional strategy for small businesses is to spend millions of dollars over years to build a company, whereas modern gazelles are spending thousands of dollars over several weeks or months validating assumptions about their businesses. The point of being a startup is not to create a company, it is to validate the hypothesis that the product or service provided meets a need. The lesson learned is that governments must understand that there are different things they must do to address the needs of small businesses and gazelles.

Randy Mitchell, Senior Trade Strategist for Private Equity and Venture Capital at the U.S. Department of Commerce, argued that in the United States, firms that are less than five years old create more net new jobs than larger corporations.⁴³ Mitchell shared that a healthy entrepreneurial system is “not so much about size as it is about age.” His analysis shows there is a churn pattern in the development of entrepreneurship, where entrepreneurs experience bankruptcy and have to be able to move to another business or start another business with relative ease. Mitchell insists a country must have “reasonable bankruptcy laws” to facilitate the churn of business births and deaths and not slow the development of new businesses. The United States recognizes failure is normal, and works to ensure entrepreneurs can recover from failure quickly. Innovation occurs in environments that encourage experimen-

tation and accept failures as a necessary part of the process. Almost all innovation success stories are the result of failure and a willingness to try again. Mexico's ability to raise productivity will depend in part on its ability to find startups that want to grow into high-impact enterprises, and supporting that growth by accepting failure as an integral part of the innovation process.

Lean Models of Innovation

The pace of development was a central theme in discussions on new innovation models. Erran Carmel, Professor at the Information Technology Department of the Kogod School of Business at American University, and Donna Harris described a rising start-up development approach called the "lean startup methodology." Citing the book, *The Lean Startup* by Eric Ries, they explained the latest trend in innovation development: creating more value faster with fewer resources. The central idea of the lean innovation model is that entrepreneurs are making constant adjustments during the product development process instead of making complex plans based on a lot of assumptions.⁴⁴ Eric Ries introduces the notion of "validated learning," –"the process of demonstrating empirically that a team has discovered valuable truths about a startup's present and future business prospects."⁴⁵ High-impact startups are looking to validate their assumptions quickly, so maximizing their growth will depend on fostering local ecosystems that remove barriers to rapid product development cycles.

P^olⁱcy idea

New innovation models are about encouraging experimentation and celebrating failure as entrepreneurs learn how to best deliver to society's needs as quickly as possible.

Conclusion

Innovators and entrepreneurs are not the same thing. Innovators create ideas, entrepreneurs create value. To bring value to society, new ideas must have entrepreneurs that can transform knowledge into capital. Talents such as strong business management and leadership skills are important for entrepreneurial success, but having favorable economic and institutional environments can help individuals transform ideas into profitable commercial enterprises.⁴⁶ In light of the changing models of innovation, the strategies to promote innovation growth must also adapt. There are a number of policy levers that could foster the creation of a healthy innovation ecosystem. The following section will describe the conditions necessary for a strong innovation ecosystem, the various barriers to growth, and the role that the Government of Mexico can play in promoting a culture of innovation.



Chapter 3. **Innovation in the United States:** *The Interplay of History, Institutions, and American Culture*

An Essay by Kent Hughes
Wilson Center

I would like to give a brief overview of the American innovation system and how it has evolved. It has evolved in terms of the basic structure of the American economy. It has responded to crises. Sometimes it has responded to opportunities. We never had a group that sat down and said, "Here's what the 21st century innovation system is going to look like." It evolved over time to be what remains one of the world's powerhouses of innovation. It's interesting to see how the approach to innovation did change as the American economy itself developed and became more outward looking and more globally competitive.

One of the striking features of the American Constitution is how little it says about the economy. But one of the few specific economic aspects of the Constitution deals, in fact, with innovation. If you look at Article I Section 8, you will find that Congress was explicitly given the power to promote the progress of science and useful arts by securing, for a limited time, to authors and inventors the exclusive right to their respective writings and discoveries. In other words, the idea of patents and copyrights was actually embedded in the American Constitution. Most Americans don't know that the very first patent was issued by future President Thomas Jefferson, when he was our Secretary of State



and also served as one of three commissioners of patents.

Abraham Lincoln was also a champion of innovation. He is often quoted as saying that patents “added the fuel of interest to the fire of genius.” In the middle of the Civil War, Abraham Lincoln took a historic step of signing the Morrill Act, which established the land-grant colleges in the United States. Many of the very prominent universities that are top research universities today had their start as land-grant colleges; that is, the government gave federal lands to the states to establish universities.

From the start, they had a practical orientation. This is quite a distinction between the land-grant college and the European tradition. You see echoes of the focus on agriculture and mechanical in the names of some of today’s top universities. One example is Texas A&M (Texas Agricultural and Mechanical), one of the two major university systems in the state of Texas. The American Civil War, a brutal civil war, drove many improvements in manufacturing. This pattern would be repeated as America entered into other wars, World War I, and World War II.

In the first half of the 20th century, innovation, again, was partly opportunity, partly driven by a sense of necessity. You saw American

innovation definitely influenced by World War I. In part, it was opportunistic that being at war with Germany, the United States confiscated the patents of the German pharmaceutical and chemical industries, which gave American industries a significant leg up in future competition.

The military also felt in World War I that the United States had lagged behind in terms of radio communications. The government stepped in, pulled together some of the key patents, which led to the founding of what became the Radio Corporation of America (RCA), which, for many years, was a very prominent electronics company in the United States. When RCA was founded, I believe, the U.S. Navy, held 30 plus percent of its stock. This was something that was not a long-term plan. It was driven by that exigency of World War I.

The United States was different from Europe, in that instead of founding a public post, a telegraph system, and telephone system, we created a regulated monopoly: the famous AT&T; the Bell system.

AT&T founded the Bell Laboratories in 1925. If you talk to leaders in today's electronic world in the United States, you would find that Bell Labs played a very significant role in many aspects of the evolution of electronics. It wasn't exactly a public entity, but nor was it a typical private entity.

At the same time, we had an evolving system of public health. It started at the very end of the 19th century with a public health service that evolved over time in what is today the National Institute of Health. Then, there were National Institutes of Health, several separate institutes that were founded along the way and then put together under one broad heading. That has become a major source of funding for innovation, and, in many cases, of innovation itself.

World War II was another benchmark in terms of the evolution of the American innovation system. As President Roosevelt famously said, "Dr. New Deal gave way to Dr. Win the War." And then looking back at the winning of that war led to an understanding of how critical science and technology were, in terms of giving the Allies a real military edge. One of Roosevelt's science advisors became a prominent advisor to President Truman: Vannevar Bush, who wrote a seminal proposal under the title of "Science: The Endless Frontier." That thinking gave birth to what became

the National Science Foundation, which then and today became a major source of funding for research in the physical sciences.

At the same time, there was an awareness that, as I said, that science and technology played a critical role in actually giving the Allies an edge. That led to the Department of Defense also being a major source of funding for research in the physical sciences.

Venture capital started to emerge as an institution shortly after the end of World War II. The first venture capital fund was founded in Massachusetts, but it has continued to spread and has been one of the sources, not always the most important source, but one of the sources for funding smaller startup innovative companies that have been a distinctive feature of America's innovation system.

Let me jump forward now to 1957. Most of you will remember Sputnik, the Soviet success in launching the first human satellite to circle the Earth. This was quite a shock to the United States. It was viewed, in part, as a challenge to our national security, but it also was a major blow to American pride. The response to Sputnik was nationwide. It included not only the national government, but also local governments and local school boards all across the country. Every one of them thought it was critical that they emphasized mathematics, science, and foreign languages because they saw this as a global struggle with regard to the Soviet Union.

There were, of course, other changes at the federal level that had significant impact on the innovation system in the U.S. The institution that had been established to promote civilian air power switched to becoming the National Aeronautics and Space Administration, and it was that group that helped fulfill President Kennedy's commitment to have a man on the moon by the end of the 1960s.

Then, the administration established a new institution in the Department of Defense. It's now known as the Defense Advanced Research Projects Administration (DARPA). With an assignment to take chances on cutting-edge technologies that would support the national security mission of the United States, it has also had an enormous impact on our innovation system here and around the world. At one point, DARPA felt it was important to facilitate communication between military research laboratories. The National Science Foundation thought, "That's really a

good idea. Let's see if we can't link civilian research authorities." At some point, this became a functioning institution better known today as the Internet. You see the enormous impact that has had here, in Mexico, Europe, China – everywhere in the world. DARPA continues to do that kind of cutting-edge research with the distinction that their customer is well defined. Their customer is the Department of Defense, even though the impact of what it invents has had much wider applications.

Let me give you a recent example: Dean Kamen, a Manchester, New Hampshire-based inventor, was asked by DARPA to develop an artificial arm that would be of use to so many American soldiers who were coming home with having lost a limb. Dean was successful in developing an arm that has almost all the functions of a human arm: it is sensitive enough; and it could actually pick up a grape without crushing it. Although this was targeted at soldiers returning from the battlefields of Iraq or Afghanistan, clearly, it has enormous applications in the civilian world.

The response to Sputnik also led to what may seem surprising now but was unprecedented at the time. As you may know, the U.S. has a very different kind of education system than most countries. We have some 16,000 local school boards that have a lot of influence on what is done and what isn't done. We have thousands of universities that set their own standards. The federal government really had not been involved in education at all up to Sputnik. But in the wake of Sputnik, they established the National Defense Education Act, which was targeted at scientists, engineers, and economists for graduate study. I benefited from that myself, so I think that was a good idea!

One of the things that also started to emerge – and, again, there was a spin-off in some ways from the defense activity – is innovative clusters, groupings of firms in Silicon Valley and in Route 128, in greater Boston. An element of this idea of clusters has been written about a good deal by Professor Michael Porter at the Harvard Business School. He has more recently looked at clusters of innovation and would certainly point to Austin, Texas, as one of those centers. Michigan has an Automation Alley. Oregon has Silicon Forest. There's a whole series of these innovation clusters that have emerged. What is different and interesting today is these clusters also have, in many cases, an international link as research and innovation becomes more and more of a global activity.

The next real evolution in America's innovation system came from the Japanese challenge in the 1980s that you may remember. Many popular books were highlighting Japan as number one. There was a sense that Japan was marching from one industry to the next. This led to a real look at some of the Japanese strengths. One was process. The Toyota lean production technique certainly gave a number of Japanese industries an edge. Process technology was adopted and adapted in the U.S. And there were a whole series of efforts to bring our research institutions, universities, and national laboratories closer to the market. A series of acts were adopted over the late 1970s and 1980s that allowed national laboratories or created incentives for universities to work more closely with business as a way of speeding innovations from the laboratory to the living room. In part, this was in response to Japan's success at rapid commercialization.

You can see this kind of collaboration still taking place at a state level, where most governors would view their Tier 1, or top research university, as very much part of their own growth, development, and employment strategy.

The Japanese success also triggered the beginning of a rethinking of America's education system. There was a famous publication that came out in 1983 under Secretary Terrence Bell, President Reagan's Secretary of Education. It was called "A Nation at Risk." One of the famous quotes from that publication was: "Had a foreign power imposed America's education system on the United States, it would have been viewed as a hostile act." Despite the rhetoric and the national attention, nothing really much happened.

President George H. W. Bush, the first President Bush, wanted to be the education president. He pulled together all the governors. It was only the third time in U.S. history that a president had held a summit with the nation's governors, and the focus was education. The governors chose a then-obscure governor from Arkansas to be their key representative in education. That young, obscure governor from Arkansas was Bill Clinton. He went on to be president of the United States. Clinton built on what George H. W. Bush had started. George W. Bush did the same and only now, after that long period of time since 1983, have we developed a system of national standards in mathematics. It's an example of how we responded to a challenge, but not necessarily in the kind of expeditious way that you would like.

The 1980s gave birth here to what I would call the “competitiveness movement.” Part of that was the making research more available to the private sector that I mentioned. There were also some specifically public innovations: the Advanced Technology Program, manufacturing extension partnership – something like our agricultural extension – that has grown to the point where there is now a manufacturing extension facility within two hours of every small manufacturer in the United States.

There was a period where, I think, America was tempted to rest on its laurels. At the end of the 1990s, the Soviet Empire had disappeared and the Soviet Union itself collapsed. Germany had an initial struggle to absorb the German Democratic Republic. Japan was wrestling with the bursting of a double bubble, and there was a sense that this really was

In the U.S., we have a particular attitude toward risk. You will often hear that Joe or Jane in Silicon Valley have earned their fortune in their seventh start-up. Failure, in some parts of the country, is defined as “not trying again.”

the American moment.

Well, America has reawakened to see that, in fact, the world has changed dramatically.

One of the responses has been led by a bipartisan coalition in the U.S.

Congress and by the private sector. A report

done by the National Academies, “Rising Above the Gathering Storm,” is now in its second edition. This led, eventually, to an America Competes Act that, again, focused on aspects of education, science, engineering, and mathematics, as well as emphasizing the importance of research in the physical sciences.

Before I conclude, let me just say a word about American culture. I think there is something different about America. In the U.S., we have always had an emphasis on the individual and a kind of self-reliance. And that continues to be a reality today. You heard an echo of how the frontier continues to be an element in our thinking when Vannevar Bush chose to say, “Science: The Endless Frontier,” not the frontier that had closed because of land was exhausted, but the frontier that was always open to innovation.

The cowboy is still an icon in American thinking and he was a proxy for mobility here. For much of our history, we've been a very mobile and adaptable people. We started totally freed of any traditional, hereditary monarchy, and a cast of nobles. I think former Governor Huey Long of Louisiana expressed America's sensibility very well, when in the 1930s he said, "Every man, a king, but no man wears a crown." We have been open to talent from everywhere. We've had our own troubled past, with racism and clashes of ethnic groups and so forth. But by and large, we have been welcoming to talent and individuals from around the world, and that has paid enormous dividends.

Anna Lee Saxenian, who is something of a Boswell of Silicon Valley, has noted that about a third of the businesses in Silicon Valley had been started by Indian or Chinese immigrants. And that doesn't include immigrants from the rest of the world. Andy Grove, an immigrant from Hungary who headed Intel, is a fine example.

In the U.S., we have a particular attitude toward risk. You will often hear that Joe or Jane in Silicon Valley have earned their fortune in their seventh start-up. Failure, in some parts of the country, is defined as "not trying again." I think that has been a strength.

Finally, I want to point to the lemonade stand. I don't know if any of you have been here in the summer. If you drive through any American neighborhood, you'll see small children selling lemonade. You'll see the parents proudly standing behind them. Neighbors come over and will say, "John" or "Jenny, this is terrific. You're on your way. You're going to be a great business success." So I think we're one of the few countries that, right from the start, emphasize not only democracy – first grades will have election to get the president of the first grade – but the sense that business is a good thing. Entrepreneurial activity is a good thing.

Chapter 4.

An Ecosystem that Promotes Innovation

Who are the main actors and entities of innovation, and what are the framework conditions that enable a healthy innovation ecosystem? Policy makers can create a policy and regulatory environment for the development and use of new technologies, while businesses and investors can provide security and financing for product development. Framework conditions within this ecosystem are important because their absence or weakness may reduce the effectiveness of policy measures. Presenters at the High Level Policy Forum described some key conditions necessary for the development of a strong innovation ecosystem, including sufficient funding for research and development, access to finances, strong linkages between universities and the private sector, building entrepreneurial networks, openness to international collaboration, and the promotion of a culture of innovation. This chapter addresses each one and explains why they are important for innovation to thrive.

Factors Enabling Innovation

RESEARCH AND DEVELOPMENT

Research and development (R&D) is crucial in the innovation process; it produces knowledge that eventually leads to new products, new businesses, and new industries. Simply put, discovery and inventions do not happen without learning and expertise from research and experimentation. As Carlo Pietrobolli highlighted, there are studies that show a positive correlation between R&D, probability of innovation, and productivity. He notes that increasing spending on R&D increases the likelihood of introducing new and / or improved products, services, and processes to the market. Data from a recent IDB report, "Science, Technology, and Innovation

in Latin America and the Caribbean: A Statistical Compendium of Indicators,” demonstrates this correlation. The chart below shows that countries with higher R&D investments typically have a higher total factor productivity level.

PRODUCTIVITY VS. R&D EXPENDITURE

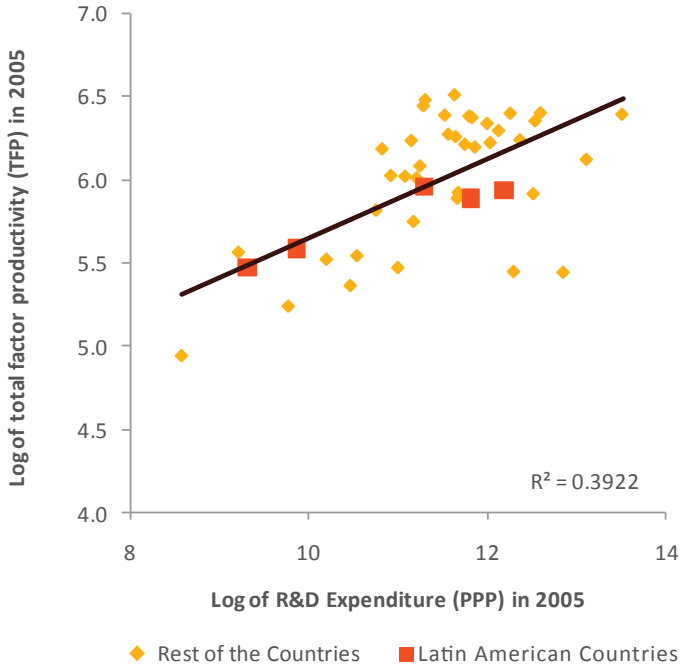


Figure 3: Source: IDB, 2010. Calculations are based on data from Daude and Fernandez Arias (2010).

Investment in R&D can come from the federal government, states, universities, and the private sector. The United States is considered one of the most innovative countries in the world, and spends more on research and development as a percentage of its GDP than the global average. The United States spends about 2.8 percent of its GDP on R&D, while Mexico spends about 0.4 percent.⁴⁷ Mexico spends very little on R&D as a percentage of its GDP, but has a shown commitment to increase R&D incentives and services.

R&D Spending as a percentage of GDP, 2011	
United States	2.76
India	0.81
China	1.84
Brazil	1.21
Japan	3.39
Mexico	0.43

Table 3: Source: World Bank, World Development Indicators, 2011

R&D Expenditure by Funding Source

(2007 or latest available)

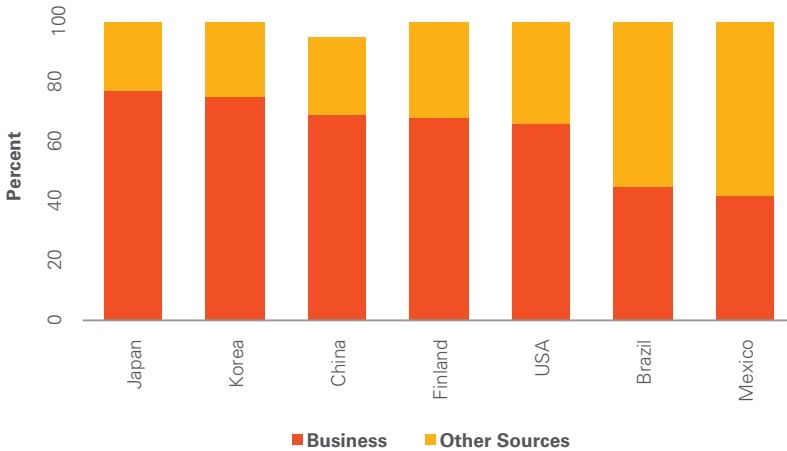


Figure 4: Source: OECD Stat Research and Development Statistics Gross Domestic Expenditure on R&D by sector of performance and source of funds, and OECD Main Science and Technology Indicators database (MISTI) and RICYT.

Note: Government, Higher Education, Private Non-Profit, Foreign and Other have been combined to form "Other Sources". Earliest available data for China and Korea are 2006 and for Mexico are 2005.

In December 2012, President Peña Nieto vowed to increase spending on research and development to 1 percent of GDP by 2018.⁴⁸ In 2013, the National Council for Science and Technology (CONACYT) increased its financing for R&D by 28 percent, and the government increased funding further this year to US\$230 million, up from US\$130 million last year.⁴⁹ According to the federal budget, the overall science budget is approximately US\$ 6.23 billion.⁵⁰ Although recent policy measures have encouraged greater investments, R&D expenditures financed by industry remain very low, especially compared to other countries. The chart below describes R&D expenditure by funding type. In Japan, South Korea, Finland, China, and the United States, the business sector accounts for over 70 percent of R&D expenditure, whereas in Mexico it accounts for just over 40 percent.⁵¹

Forum participants agreed that Mexico's level of spending on research and development will not be enough to achieve higher innovation outcomes. The Innovation Policy Platform has found that Mexico lags significantly behind other OECD countries in many science and innovation performance indicators, including R&D expenditures, and R&D performed by the business sector decreased between 2006 and 2009.⁵²

FINANCING

Entrepreneurs develop knowledge gained from research and development of technology and marketable products or services, but they need sufficient funding to do the work. Underinvestment results in low levels of innovation output, but also is a barrier to growth and competitiveness. Funding comes in all shapes and sizes from family, friends, founders, government, foreign investment, and angel investors. In a 2013 survey conducted by EY and G20, 72 percent of Mexican entrepreneurs stated access to funding (especially venture capital) remains a key challenge to starting a business.⁵³ Access to seed capital from family and friends is an important contributor to entrepreneurship activities, but policy efforts should focus on improving access to venture capital or bank lending and channeling global investment capital to Mexican owned venture capital funds. However, there are a number of other funding opportunities available to entrepreneurs, and the panelists at the High Level Policy Forum detailed some of them.

P*olicy* idea

Promoting diverse funding methods such as crowdfunding can help inform entrepreneurs of funding opportunities outside of venture capital or bank lending and spur greater entrepreneurship.

A funding strategy that has grown increasingly popular is the use of crowdfunding platforms. **Crowdfunding is the practice of raising small amounts of money from many individuals via the internet to fund innovative projects.** David Rejeski explained that entrepreneurs can advertise their product on the web and encourage individuals to donate by offering reward incentives. Rejeski highlighted that one U.S. company raised almost half a million dollars in just 30 days. According to a report commissioned by the Multilateral Investment Fund, “there is an adequate foundation on which a robust crowdfunding industry may be built [in Mexico]. Rapidly expanding access to the internet and related technologies, combined with strong economic conditions, will enable more Mexicans to engage in crowdfunding.”⁵⁴ The Secretary of the Mexican Senate’s Science and Technology Commission has also stated, “Nowadays crowdfunding is a real and sustainable social alternative that should be adopted as public policy for financing entrepreneurs in Mexico. Crowdfunding mechanisms are exactly what the government needs to support in order to stimulate and foster innovation and business culture in our country.”⁵⁵ A number of crowdfunding sites are already operating in Mexico, including “Fondeadora,” “Crowdfunder,” “Idea.me,” and “Kiva.org.” David Rejeski stressed these platforms have tremendous potential, especially given the willingness of the large Mexican diaspora to provide remittances and participate in other development programs.

EDUCATION AND UNIVERSITY-INDUSTRY LINKAGES

Innovation relies heavily on the creation of knowledge and the integration of that knowledge with the “real economy.” Mexico spends more on its education system (as a percentage of its GDP) than the G20 average, but enrollment rates remain lower than the G20 average.⁵⁶ The enrollment rate for tertiary education is about 21 percent, compared to 31 percent in other middle income countries.⁵⁷ It is clear that a strong higher education system can help boost innovative outcomes, and that it is important to better integrate university research with social and economic needs.

Concentrating research efforts in relevant fields will be pivotal to turn knowledge into practical applications that lead to economic growth. Strengthening public-private partnerships through joint research projects can also boost the availability of funding for entrepreneurs and increase the likelihood of technology transfer to the market.

Examples of strong academic-industry linkages are “innovation clusters.” Mexico does not have a direct cluster policy, but the country has seen the development of clusters such as the Information and Communications Technology (ICT) cluster in the State of Jalisco and Queretaro’s Aerospace Park. Clusters generally contain companies, universities and research institutions, suppliers of specialized inputs, and customers within a particular geographic area. The Technological Institute of Monterrey (ITESM) for instance is located in a cluster that emphasizes applied research by managing a small set of incubators, helping firms access angel capital and venture funds, and providing IP-related services.⁵⁸ These clusters are interactive, have a degree of self-management, and each member has a common purpose – to contribute to and benefit from a thriving entrepreneurial ecosystem.

ENTREPRENEURIAL APPRENTICESHIPS AND NETWORKS

Creating synergies within the private sector and between private, public, and entrepreneurial entities brings much more value than simply creating funding partnerships. Small and medium sized businesses, for instance, have much to learn from larger corporations. **Donna Harris emphasized that “startups need customers, people with domain experience, and people with functional expertise” – all things that larger businesses are able to provide.** Business incubator and accelerator programs can help facilitate this integration. Business incubators are offices that facilitate collaboration between entrepreneurs to help establish mentorships between companies. They often provide work space, support services, networking opportunities, funding, and training.

The Ministry of Economy in Mexico has recently promoted entrepreneurship through the establishment of incubators in private and public institutions. There are now over 500 incubator and accelerator programs

P^{OL}icy idea

Continuing regional dialogue can help engender policy reforms that strengthen regional innovation and productivity outcomes.

1776 – A Business Incubator

Donna Harris is a co-founder of 1776, a “startup hub” organization in Washington, DC. At the forum, Ms. Harris detailed the many benefits her organization provides for entrepreneurs. 1776 has a school, an incubator program, an accelerator program, an angel network, and a fund reserved for promising startups. She explained that 1776 has 80,000 square feet of space three blocks from the White House that houses more than 180 startups, and has room to host about 600 companies. She stated, “1776 aims to create for any entrepreneur around the world that is tackling really complicated regulated industries (like education and healthcare and transportation and energy) an ecosystem that allows them to take advantage of the connections and the power and the influence and the subject matter expertise that is available in Washington, DC.” She mentioned that the organization works to bring all communities (heads of major corporations, think tanks, associations, etc.) to a physical place and “aims those connections to the most promising startups from around the world.”

A significant advantage of 1776 is raising awareness among government and private entities that there are thousands of startups in the DC metropolitan area. Ms. Harris described there was a “perception issue,” where individuals did not know there were so many startups in the area. 1776 was able to become successful so quickly because its initial effort was to do outreach in the community. She mentioned that 1776 brought together dozens of members of Congress, the Secretary of Commerce, the Queen of Jordan, many lobbyists, and several CEOs of major corporations to inform people about the diversity of startups in Washington, DC. This type of outreach has been very important because it has brought visibility to the growing entrepreneurship that is taking place and has provided networking and funding opportunities for entrepreneurs. Consequently, on July 3, 2014, President Obama visited 1776 and encouraged and promoted a greater spirit of entrepreneurship in the United States.

throughout Mexico, and INADEM provides the location and contact information for each of these programs. However, only about 5 percent of incubators serve high-technology firms, and 60 percent of them are located in the Federal District and the states of Mexico, Jalisco, and Nuevo Leon.⁵⁹

INTERNATIONAL COLLABORATION

Collaboration with foreign partners, especially cross-border neighbors, can play an important role in strengthening integration and regional competitiveness as well as sharing expertise on innovation policy. The OECD provides several rationales for cross-border collaboration on innovation policy, including “larger labor markets or access to wider business and knowledge networks to increase critical mass; innovation support services can be more specialized and thus of higher quality; and attractiveness and recognition of the area to firms and skilled labor both within the cross-border area and beyond.”⁶⁰ **Mexico can draw useful lessons from other countries that have seen significant progress in innovation, especially the United States.**

The United States and Mexico have formalized a partnership on innovation by establishing the Mexican-U.S. Entrepreneurship and Innovation Council (MUSEIC) in 2013. Caroline Croft, Senior Advisor in the Department of State’s Office of Commercial and Business Affairs in the Bureau of Economic and Business Affairs, outlined MUSEIC’s seven subcommittees, each coordinated and chaired by a Mexican and a U.S. partner with over 100 private and public members, and focused on:

- Strengthening the legal framework to encourage entrepreneurship;
- Promoting women entrepreneurship;
- Engaging the Latin American diaspora living in the United States;
- Integrating the infrastructure supporting entrepreneurship;
- Developing regional innovation clusters and marketing chains;

Policy idea

Celebrating the growth and success of local entrepreneurs and intentionally engaging with entrepreneurial support organizations such as incubator programs can help promote a culture of entrepreneurship and enhance awareness of the many support programs available to high-impact startups.

- Developing joint projects on technology commercialization; and
- Sharing best practices on financing and promoting high-impact entrepreneurship.⁶¹

Ms. Croft explained that each of the subcommittees have already formalized their working plans and are instituting plans and programs to boost innovation in both countries. **Ms. Croft stressed that entrepreneurs “need a solid base of institutional, legal, and fiscal support that allows their expansion and development.”** Ms. Croft outlined the subcommittees’ progress in addressing challenges and declared each of the countries consider MUSEIC a great opportunity.⁶²

Regarding the United States, Scott Peters, United States Representative for the 52nd District of California, which encompasses all of the cities of Poway and Coronado, and most of the northern half of City of San Diego, shared that immigration policy may be hindering innovation. He expressed that innovation generates a competition for talent, and much of the talent developed in the United States by immigrants leaves the country. He explains that U.S. immigration policy allows individuals to obtain a degree in the country, but that it must also work to ensure individuals are allowed to implement their ideas domestically. Through initiatives like MUSEIC, both countries can work together to critically analyze issues that are hindering innovative activity and consider ways to eliminate barriers to innovation.

There have been other bilateral efforts to enhance innovation. In May 2013, Presidents Peña Nieto and Obama created the Bilateral Forum on Higher Education, Innovation, and Research (FOBESI) to strengthen linkages between governments, higher education institutions, and private industry in Mexico and the United States. On July 31, 2014, Governor Edmund Brown from California signed an agreement with Mexico’s Ministry of Economy to strengthen economic ties and

encourage innovation. As part of the pact, Mexican companies are able to access California's Innovation hub (iHub), a network of research parks, incubators, universities and federal laboratories, business groups, and venture capitalist.⁶³ In August, the U.S. Department of Commerce, Department of State, and the Organization of American States collaborated with INADEM to host the Second Americas Competitiveness Exchange on Innovation and Entrepreneurship, which brought leading entrepreneurs from the United States and Latin America to innovation clusters in Mexico City, Guadalajara, and Aguascalientes to create networking opportunities and foster more bilateral and multilateral initiatives. Mexico is also launching a pilot version of the National Science Foundation program, the Innovation-Corps (I-Corps) in January 2015, which aims to help scientists commercialize their product and become a startup themselves. These types of initiatives are important to develop best practices and produce a culture of innovation.

CULTURE OF INNOVATION

When describing the development of innovation culture in the United States, Kent Hughes explained that the United States evolved with a long history placing value on autonomy, independence, and freedom and has therefore always placed emphasis on the individual. Furthermore, because it is a nation of immigrants who took major risks moving from their native country, the United States has a strong culture of risk-taking and entrepreneurship.⁶⁴ His analysis suggests behaviors, ideas, and attitudes about entrepreneurial activity can influence how and to what extent society pursues innovative activities. Panelists at the forum shared the view that a culture of innovation is one that tolerates risk and failure, and encourages openness to new ideas. As innovation becomes more popular around the world, countries have sought to establish a culture of innovation through the creation of National Innovation Strategies, detailing their advocacy of increased entrepreneurial activity as a means for achieving greater economic growth and competitiveness. Mexico has created national strategies and programs in an effort to encourage innovation, creativity, and new ideas, and the world is beginning to recognize the innovative potential of the country. Strengthening innovation in Mexico will stem from empowering people through a strong education system and financial and institutional support. There is an opportunity to capitalize on this momentum by reinforcing the country's ecosystem strengths and eliminating factors that hinder innovation.

Policy idea

Governments with weak tax, legal, and fiscal policies and with a lack of political will to promote a culture of innovation tend to stymie productive innovation outcomes.

Factors Hindering Innovation

Factors that hinder innovation are generally based on weaknesses in the four areas of the innovation ecosystem: government, community, infrastructure, or funding. Governments with weak tax, legal, and fiscal policies and with a lack of political will to promote a culture of innovation tend to stymie productive innovation outcomes. Panelists at the forum emphasized the importance of tax incentives to stimulate greater R&D investments, the protection of intellectual property rights to encourage domestic product development, and a fiscal environment that emphasizes higher education, foreign direct investment, and venture capital availability to foster innovation.

As discussed earlier in this report, the Global Innovation Policy Index prepared by the Kauffman Foundation and the Information Technology and Innovation Foundation ranks Mexico as having poor performance in Science and R&D policies that spur innovation. All of these indicators suggest there is a lot of opportunity for Mexico to enhance policy and strengthen its innovation ecosystem.

CONCLUSION

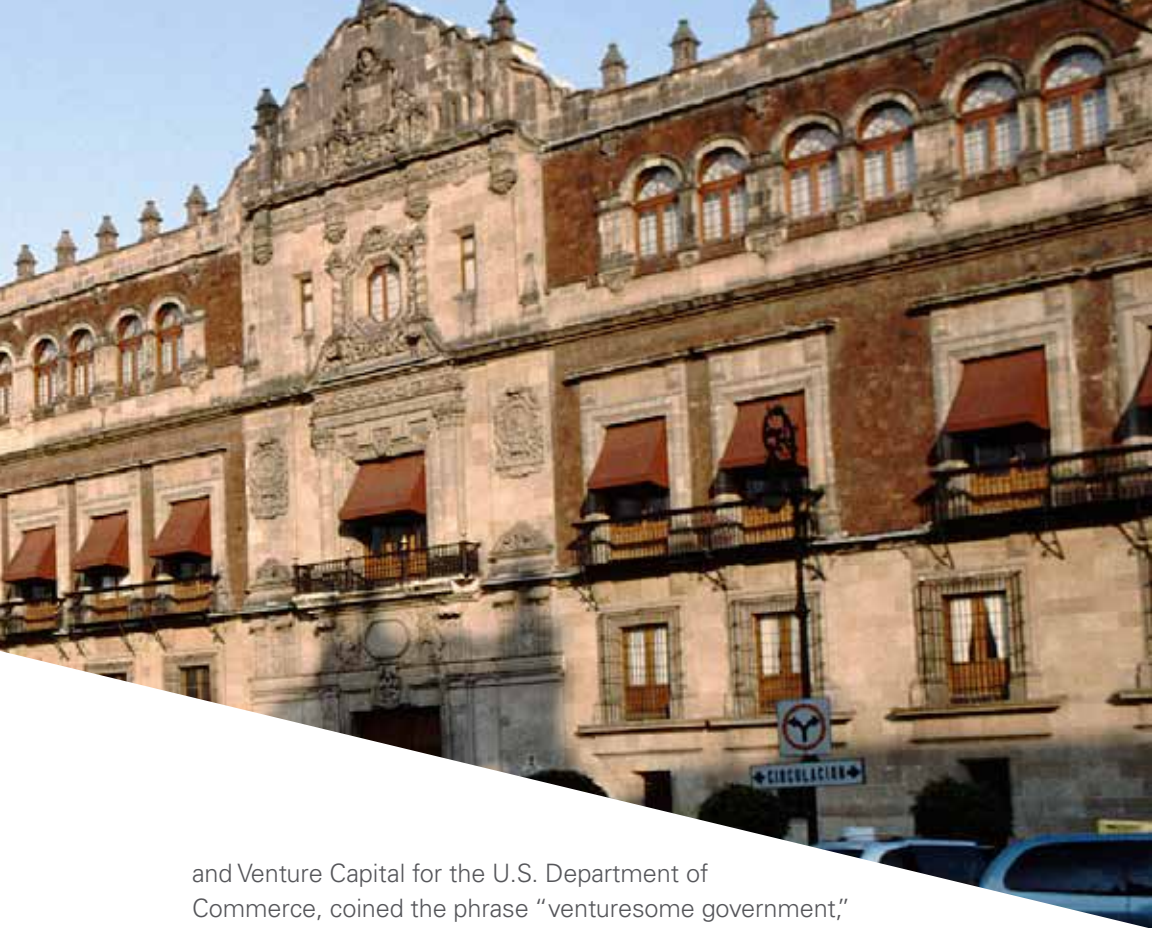
Innovation will happen because people of the 21st century are innovative, but the pace and scale of innovation and the extent to which innovation will lead to greater productivity and competitiveness depend on an ecosystem where every part is functioning appropriately. Businesses, universities, investors, government, and civil society all play a role in promoting innovation, and all parts of the ecosystem are necessary for innovation to flourish. The following chapter describes various policy levers the Government of Mexico can institute to strengthen the ecosystem and fuel entrepreneurship.

The top portion of the page features a photograph of the Mexican flag flying on a tall pole. The flag is partially visible, showing the green, white, and red vertical stripes with the national coat of arms in the center. Below the flag, the upper part of a large, ornate, light-colored stone building with many arched windows is visible. The sky is a clear, pale blue. The bottom half of the page is a white diagonal shape that contains the text.

Chapter 5. Understanding the Role of Government

Innovation has historically been the mission of entrepreneurs and the private sector, but the role of government has always been crucial. The choice in innovation policy is not between government involvement and non-government intervention, but rather choosing the right role for government in supporting innovation development. Dozens of countries have generated national innovation strategies with the aim of linking science, technology, and innovation with job creation and productivity. Policy makers have great influence in enabling healthy innovation activity and fostering a productive innovation ecosystem. On the other hand, countries are unlikely to achieve great innovation outcomes without implementing core policies that create conditions for entrepreneurs to thrive.

Public policy can improve innovation by strengthening the linkages between and within the system. As policy makers explore innovation and technology policy, it is important to recognize that legislation is not the only tool governments have. There are a number of things governments can do to strengthen their countries' innovation ecosystem. Presenters at the forum detailed traditional, non-traditional, long term, and short term efforts that the Government of Mexico can implement to enhance innovation. Randy Mitchell, Senior Trade Strategist for Private Equity



and Venture Capital for the U.S. Department of Commerce, coined the phrase “venturesome government,” (based on the book *The Venturesome Economy* by Amar Bhidé) encouraging Mexican legislators to take risks and think outside the box.

The “Venturesome Government”

The U.S. government and U.S. corporations work in a venturesome way with the country’s entrepreneurial class. According to Mitchell, a venturesome government “describes a relationship where the government interacts with entrepreneurs to help them develop their business better with the ultimate goal being that the government becomes a customer of the entrepreneur as the entrepreneur is developing their innovation.” Mitchell emphasized that “to secure the latest and greatest, U.S. government agencies work in a venturesome manner with researchers whether it be with individuals or via universities.” He highlights, for instance, that over 400 university startups are created nationally each year based on federally funded R&D, among them are major corporations like Google, Netscape, Genentech, Lycos, Sun Microsystems, Silicon Graphics, and Cisco Systems. A lesson

learned is that a venturesome government does not exclusively think about how it can help its entrepreneurs, but about what it needs and how businesses can address that need.

Beyond the “Washington Consensus”

Many governments around the world are taking a more active role in managing their economies. Frank Dubois, Associate Professor of International Business at the American University’s Kogod School of Business, described that government interaction in many countries in Latin America has transitioned from the 1980s and 1990s “Washington Consensus” characterized by privatization of state owned enterprises,

Over 400 university startups are created nationally each year based on federally funded R&D, among them are major corporations like Google, Netscape, Genentech, Lycos, Sun Microsystems, Silicon Graphics, and Cisco Systems.

reduction in tariff barriers, floating exchange rates, and neoliberal philosophies, to an approach characterized by an increase in state involvement in economic programs and initiatives.

Dubois highlights the role of the Brazilian

government in the oil industry as an example of a state engaging in economic development efforts. The government recognized that Petrobras needed to increase its fleet size to enhance economic activity and development, so President Lula initiated a Growth Acceleration program to focus investment in northeast Brazil, create a naval innovation cluster, and create more jobs. Under this system, state-owned enterprises drove the demand for ships, the government provided funding from the Brazilian Development Bank, established a Merchant Marine Fund to provide resources for Brazilian shipbuilding and repair, and to provide accountability in production through training programs and technical institutes. Dubois concludes that innovation requires extensive state guidance. Government has an important role to play in ensuring that good ideas can become successful businesses, but government should be wary of policy tools that force it to pick the winners and losers itself.

The case of Querétaro is another example of government actively engaging in innovation initiatives. Federal and state governments located a new aerospace university, Universidad Aeronáutica en Querétaro

(UNAQ) in the region to foster strong linkages between university students and industry. The state of Querétaro also has an Office of International Relations and Government Innovation, which maintains an International Leaders Network with representatives from industry, government, NGOs, universities, and other members of civil society.⁶⁵ According to the Mexican Federation of Aerospace Industries (FEMIA), the aviation sector has grown 18 percent a year in exports since 2003.⁶⁶ The Ministry of Economy states foreign and national investment in the sector exceeded 1 billion dollars in 2010 and 3 billion in the last three years.⁶⁷ Mexico has become a global leader in the aerospace industry thanks to government-sponsored support.

Traditional vs. Non-traditional

Creating a healthy innovation ecosystem is challenging because it involves many complex policy areas, but a common theme throughout the forum was that there are traditional and non-traditional policies governments can implement to strengthen innovation. The traditional strategy is regulatory reform. According to the OECD, the traditional regulatory framework embodies three types of regulation: economic regulation (intended to improve the efficiency of markets in delivering goods and services), social regulation (protecting the environment and the safety and health of society at large), and administrative regulation (governing the practical

The overarching role of government should be uniting all the aspects of the innovation ecosystem—funding, community, infrastructure, and government.

functioning of the public and private sectors).⁶⁸ There is no “one size fits all” approach to guarantee success, but governments can play a role by creating laws that do not penalize entrepreneurs. Policies to enhance innovation may involve government funding of innovation, migration policy, education and labor reform, strengthening the financial sector, reviewing intellectual property law, and restructuring tax laws.

John Mayo, Professor of Economics, Business and Public Policy at Georgetown University’s McDonough School of Business, stressed that **regulation is imperfect and should be results-based**. The question governments should be asking themselves is “how do we design effective regulations, and not just have regulations?” Mayo stated that

“the goal should be to study existing policies and innovate the design of regulation to better accomplish sound economic policies.” He also explained that “regulators should engage in empirical counterfactual scrutiny of alternative governance mechanisms” in different cities, states, and countries. He suggests policy makers should focus on retail economic metrics rather than loftier and more elusive public interest goals.

Non-traditional initiatives are those that fall outside the regulatory framework and include efforts to inspire an entrepreneurial culture and coordinate support networks between entities in the ecosystem. Promoting the use of crowdfunding, incubator programs, building and expanding innovation clusters, tapping into the Mexican diaspora, and implementing programs that celebrate entrepreneurship at the local level can also help drive innovation. Duncan Wood, Director of the Mexico Institute at the Woodrow Wilson Center stated that “the overarching role of government should be uniting all the aspects of the innovation ecosystem—funding, community, infrastructure, and government.”

Long-term vs. Short-Term

Long-term efforts are all about regulatory changes and systematic issues that will take years and great political will and clout. Because these types of efforts will be the most challenging and require a lot of time, Donna Harris insists governments should focus on short-term initiatives. In the short-term, governments could focus on programmatic activities outside of government regulation to foster an environment for entrepreneurship. She mentions that the entrepreneur of today is going to start their business regardless of the regulatory climate because it is in their nature to do so. Furthermore, she argued that much more of today’s younger generation see entrepreneurship as a career path compared to their counterparts decades ago. Thus, systematic changes may not be as important for people that are trying to start their businesses today. Harris encouraged governments to look at the education system, to analyze programs like Venture for America that work to connect university students to industry, and to consider incubator and accelerator programs that create a celebratory environment that reward entrepreneurial activity.

Policy ideas

Governments can work on non-traditional, short-term efforts outside of the regulatory framework while they pursue structural changes in the system to support innovation.

A U.S. Model: Small Business Innovation Research Grants (SBIR)

Randy Mitchell described a framework the Mexican government may consider legislating in their country, the Small Business Innovation Research Grants (SBIR) program. SBIR was created in 1982 after the United States government recognized they were not getting access to the prime innovations in the marketplace. The government's interactions until then were with large corporations, and it was not getting access to what it needed to address the problems of the future. Today, "small business concerns are recognized as a unique national resource of technological innovation to meet Federal research and development needs," asserts Mitchell.

The SBIR program is a competitive awards-based program that enables businesses to explore their technological potential and provides the incentive to profit from its commercialization.⁶⁹ Under the SBIR program, federal agencies with extramural R&D budgets over \$100 million are required to administer SBIR programs using an annual set-aside of 2.5%. Each agency is autonomous; they determine what they want to fund and accept applications on the research need. Since its enactment, over \$38 billion have been awarded by the SBIR program to various small businesses, and total venture capital investments in SBIR awardees has been \$47 billion.

"By reserving a specific percentage of federal R&D funds for small businesses, SBIR protects the small business and enables it to compete on the same level as larger businesses. SBIR funds the critical startup and development stages and it encourages the commercialization of the technology, product, or service, which, in turn, stimulates the U.S. economy. Since its enactment in 1982, the SBIR program has helped thousands of small businesses to compete for federal R&D awards.

Their contributions have enhanced the nation's defense, protected our environment, advanced health care, and improved our ability to manage information and manipulate data.”⁷⁰

THE FOUR MAIN PURPOSES FOR THE SBIR PROGRAM ARE TO

- Stimulate technological innovation;
- Meet federal research and development needs;
- Foster and encourage participation in innovation and entrepreneurship by socially and economically disadvantaged persons; and
- Increase private-sector commercialization of innovation derived from federal research and development funding.⁷¹

There are three phases to the program. In the first phase, the government provides up to \$150,000 for six months to help small businesses determine the feasibility of their concept. If it proves successful, the entrepreneur is able to apply for phase two where it may receive about \$1,000,000 for two years. Phase three is not funded by the federal government, but by other sources such as programs within the federal government or private venture capital or from a company that wants to acquire it or revenue from sales.

Clara Asmail, Senior Technical Advisor at the National Institute of Standards and Technology (NIST), concluded that the SBIR program helps entrepreneurs “assemble a portfolio for a technology worthy of entering the marketplace... it serves as a credential to obtain third party funding.” Because of this portfolio facilitated by the government, venture capitalists are finding companies less risky and are willing to invest in their endeavors. Companies have a commercially viable product through SBIR.

Randy Mitchell stated that the Government of Mexico can think of the SBIR program as a program to stimulate entrepreneurial opportunities by identifying what government agencies need. The Government of Mexico can send “signals” of its needs by way of the research it seeks. Programs like SBIR are a win-win for entrepreneurs and the government.

P^olⁱcy idea

Instituting a government-sponsored program such as the Small Business Innovation Research grants program can stimulate venture capital fund development by minimizing risks for venture capitalists.

Conclusion

The key lesson learned is that the government can play an important role in spurring innovation in several ways. The government can take on the traditional role of providing financial, tax, and legislative support like increasing R&D spending or providing tax incentives and patent protections; but it can also take on a non-traditional role of promoting a culture of entrepreneurship by celebrating entrepreneurial activity through awards, supporting the expansion of incubator programs, and promoting other funding opportunities such as crowdfunding. Perhaps the most important and overarching role of government is to facilitate the dynamic interplay between the different actors and institutions within the innovation ecosystem. Fostering greater linkages between public policies, foreign partnerships, the private sector, the education system, and the labor force is important to creating a strong foundation for innovation to thrive.

Government involvement in innovation development is a win-win opportunity for entrepreneurs and government interests. In the United States, the SBIR program allows U.S. government agencies to identify a need and be intentional about partnering with entrepreneurs that can meet that need. Through the program, the U.S. government behaves in a venturesome way with its entrepreneurial sector and is making it easier for startups and private funders to achieve their goals.

Given the imperfections of regulation, policymakers must be vigilant about continuously improving regulatory policies and designs. Policymakers have the responsibility of empirically analyzing alternative governance mechanisms at the state, national, and international level to finding a comprehensive and effective framework that encourages innovation and economic growth.





Conclusion: The Way Ahead

Innovation is characteristic of the 21st century economy—humans are naturally innovative and will capitalize on today's technological opportunities—but ensuring innovation's growth and that its benefits are transferred to greater productivity measures and economic opportunity will depend on policy makers' commitment to fostering an ecosystem conducive to its development. In essence, because innovation operates within a system, policy makers must develop a comprehensive approach for stimulating innovation. Experts at this High-Level Innovation Forum for Policy Makers stressed that the structural conditions needed to support Mexico's growing entrepreneurial momentum can be improved.

The general consensus is that Mexico's innovation system remains generally disintegrated, with weak links between industry, academia, and government. Other challenges include the low investment in research and development and harmful tax policies. Improving these structural conditions will require political will, continuing dialogue, and a considerable amount of time. Fostering innovation will be challenging because there are a number of overlapping economic and policy elements involved in its development. A key takeaway, however, is that there is much that the Government of Mexico can do outside of traditional policy levers to stimulate a more productive entrepreneurial culture.

Recommendations

Based on the discussions in this High-Level Innovation Forum for Policy Makers, we make the following recommendations:

- **Emphasize innovation as a policy priority.** Innovation is the key driver of economic growth and productivity in today's global economy, but Mexico is behind other emerging economies with regards to productivity. Traditional business models do not have the processes in place to thrive in a 21st century environment. This has put innovation policy at the top of the agenda for decision makers in business and government all over the world. Mexico's greater reform agenda should include and emphasize innovation policy as an integral aspect of broader economic and development goals.
- **Continue dialogue with regional partners to increase understanding of policy reforms that strengthen regional innovation and productivity outcomes.** Collaboration with foreign partners, especially cross-border neighbors, can play an important role in strengthening integration and regional competitiveness as well as sharing expertise on innovation policy. To remain competitive, the United States and Mexico must deepen their understanding of the connections between innovation and productivity, and the ways in which policy levers can fuel entrepreneurship.
- **Acknowledge that innovation operates within a system of actors and entities (government, infrastructure, funding, and community), and develop a comprehensive approach for stimulating innovation.** A framework and culture that builds productive linkages between these four areas is required to ensure the resources invested in the knowledge economy produce a profit in the commercial economy. A productive knowledge economy cannot develop if the factors work in isolation, or if one of the factors are weak. The overarching role of government should be uniting and enhancing all the aspects of the innovation ecosystem.
- **Focus on identifying gazelles—the types of small firms that want to grow, that are actually innovating, and that are creating new jobs.** Mexico's economic challenge involves the gap between its large corporations that contribute to economic growth and its

smaller, low-productivity businesses that slow its economy. The small business sector is creating more jobs than the more modern economy, shifting labor from high productivity to low productivity work. The policy focus should be less on small companies and more on high potential start-ups.

- **Encourage experimentation and accept failure as entrepreneurs learn how to best deliver to society's needs as quickly as possible.** Knowledge is created, shared, and applied at an unprecedented rate in today's global market place. As a result, product life cycles have shortened, reflecting a lean model of innovation. High-impact startups are looking to validate their assumptions quickly, so maximizing their growth will depend on fostering local ecosystems that remove barriers to rapid product development cycles.
- **Promote diverse funding methods to help inform entrepreneurs of funding opportunities outside of venture capital or bank lending and spur greater entrepreneurship.** Funding comes in all shapes and sizes from family, friends, founders, government, foreign investment, angel investors, and even from the general public through creative new mechanisms like crowdfunding. Access to funding continues to be the number one challenge for Mexicans hoping to start a business, so policy efforts should focus on enabling greater access to funding while also creating and promoting a variety of funding opportunities.
- **Sustain the growth of innovation clusters and enhance integration between universities and businesses to help turn research initiatives into market realities.** Concentrating research efforts in relevant fields will be pivotal to turn knowledge into practical applications that lead to economic growth. Strengthening public-private partnerships through joint research projects can also boost the availability of funding for entrepreneurs and increase the likelihood of technology transfer to the market.
- **Celebrate the growth and success of local entrepreneurs and intentionally engage with entrepreneurial support organizations such as incubator programs to help promote a culture of entrepreneurship and enhance awareness of the many support programs available to high-impact startups.** Startups need customers, people with domain experience, and people with functional expertise – all

things that larger businesses are able to provide. Business incubator and accelerator programs can help facilitate these pivotal community and mentoring relationships. Strengthening innovation in Mexico will stem from creating a culture of innovation where individuals are empowered and have the necessary fiscal, institutional, and mentoring support systems in place.

- **Design pro-innovation tax, legal, and fiscal policies, with a particular focus on increasing public and private funding for R&D.** Governments with weak tax, legal, and fiscal policies tend to stymie productive innovation outcomes. Innovation-friendly policies emphasize tax incentives to stimulate greater R&D investments, the protection of intellectual property rights to encourage domestic product development, and a fiscal environment that emphasizes higher education, foreign direct investment, and venture capital availability. Although recent policy measures have encouraged greater investments in R&D, expenditures remain very low, especially compared to other countries. Mexico's level of spending on R&D must increase to achieve higher innovation outcomes.
- **Work on non-traditional, short-term efforts outside of the regulatory framework while pursuing structural changes in the system to support innovation.** Non-traditional initiatives are those that fall outside the regulatory framework and include efforts to inspire an entrepreneurial culture and coordinate support networks between entities in the ecosystem. Promoting the use of crowdfunding, incubator programs, building and expanding innovation clusters, tapping into the Mexican diaspora, and implementing programs that celebrate entrepreneurship at the local level can help drive innovation in the short-term.
- **Explore a government-sponsored program such as the SBIR grants program to minimize risks for venture capitalists and stimulate venture capital fund development.** The SBIR program helps entrepreneurs assemble a portfolio for a technology worthy of entering the marketplace and serves as a credential to obtain third party funding. The U.S. government funds the critical startup and

development stages and it encourages the commercialization of the technology. As a result, venture capitalists are finding companies less risky and are willing to invest in SBIR startups. Mexico can benefit from such a program.

We must emphasize that Mexico does not need to copy the American innovation model. In fact, what works in one country may not work in another, given their unique economic, social, and cultural makeup. Mexico has the opportunity to learn from other innovation models, but it needs to understand its own economic profile and work to design a framework suitable for Mexican entrepreneurs that is creative, flexible, and risk-friendly.

The way ahead for Mexican legislators is to continue to engage the academic community, business, innovation experts, and international partners, and to review existing policies and strategies around the world to develop and tailor effective solutions.

Further Reading

Robert Atkinson, *The Past and Future of America's Economy: Waves of Innovation that Power Cycles of Growth* (Northampton, MA: Edward Elgar, 2005).

Philippe Aghion and Peter Howitt, "On the Macroeconomic Effects of Major Technological Changes," *General Purpose Technologies and Economic Growth* ed. Elhanan Helpman (Cambridge, MA: MIT Press, 1998) 21-144.

Esko Aho, *Proposal for Finland's National Innovation Strategy* (Helsinki, Finland: Ministry of Industry and Employment, 2008)

Bjørn T. Asheim and Meric S. Gertler, "The Geography of Innovation" in Fagerberg, J., Mowery, D., Nelson, R. (Eds.), *The Oxford Handbook of Innovation*. Oxford: Oxford University Press, (2004) p. 291-317.

Markus Balzat and Horst Hanusch, "Recent Trends in the Research on National Innovation Systems," Discussion Paper Series 254 (Universitaet Augsburg, Institute for Economics, 2003).

Markus Balzat and Andreas Pyka, "Mapping National Innovation Systems in the OECD Area," Discussion Paper Series 279 (Universitaet Augsburg, Institute for Economics, 2007).

Johannes Bauer, "Governing the Networks of the Information Society. Prospects and Limits of Policy in a Complex Technical System," (Vienna: Institute of Technology Assessment, 2004).

Ann Bergek et al., Analyzing the functional dynamics of technological innovation systems: A scheme of analysis, *Research Policy* 37: (2008) 407-429.

Bradford De Long, Claudia Goldin, and Lawrence F. Katz, "Sustaining U.S. Growth," in *Agenda for the Nation*, ed. H. Aaron et. al. (Washington, DC: Brookings Institution, 2003) 17-60.

Giovanni Dosi, *Innovation, Organization and Economic Dynamics* (Northampton, UK: Edward Elgar Publishing, 2000).

Charles Edquist, "Systems of Innovation: Perspectives and Challenges" in Fagerberg, J., Mowery, D., and Nelson, R (eds.) *Oxford Handbook of Innovation*, Oxford: Oxford University Press, (2004) p. 181-208.

Jan Fagerberg et al., (eds.) *Innovation, Path Dependency and Policy: The Norwegian case*, (Oxford: Oxford University Press, 2009).

Christopher Freeman, *The Economics of Industrial Innovation* (Harmondsworth, UK: Penguin, 1974).

Christopher Freeman, "Networks of Innovations: A Synthesis," *Research Policy* 20 (1991): 499.

Kodama Fumio and Jun Suzuki, "Characterizing Receiver-Active National System of Innovation," Discussion papers 06013 (Japan: Research Institute of Economy, Trade and Industry, 2006) .

Christopher Freeman and Francisco Louca, *As Time Goes By: From the Industrial Revolution to the Information Revolution* (New York, NY: Oxford University Press, 2001).

John Hagedoorn, Albert Link and Nicholas Vonortas, "Research Partnerships," *Research Policy* 29:4 (2000): 567-86.

Kent Hughes, *Building the Next American Century: The Past and Future of Economic Competitiveness* (Washington, DC: Woodrow Wilson Press, 2005).

Abraham Garcia, "National Systems of Innovations and the Role of Demand. A Cross Country Comparison," UNU-MERIT Working Paper Series 027 (United Nations University, Maastricht Economic and social Research and training centre on Innovation and Technology, 2007).

Kenan Jarboe, and Robert D. Atkinson, "A Case for Technology in the New Economy" (Washington, DC: Progressive Policy Institute, 1998).

Stephen Knack, and Philip Keefer. "Does Social Capital Have an Economic Payoff? A Cross-country Investigation," *Quarterly Journal of Economics* 112:4 (1997): 1252-88.

Maureen Lankhuizen and Rosalinde Klein Woolthuis, "The National Systems of Innovation Approach and Innovation by SMEs," Scales Research Reports (EIM Business and Policy Research, 2004).

Daniel Lederman and William F. Maloney, "R&D and Development," The World Bank (2003).

Dennis Leyden, and Albert Link, "Why are Government R&D and Private R&D Complements?" Applied Economics 23 (1991): 1673-81.

Bengt-Åke Lundvall, National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning, (London: Pinter, 1992).

Richard R. Nelson and Sidney G. Winter, An Evolutionary Theory of Economic Change, (Cambridge, Mass: Harvard University Press, 1982).

Richard R. Nelson, (ed) National Innovation Systems: A Comparative Study, (Oxford: Oxford University Press, 1993).

Bart Nooteboom and Erik Stam (eds.), Micro-foundations of Innovation Policy (Amsterdam: Amsterdam University Press, 2008).

Michael E. Porter, The Competitive Advantage of Nations, (New York: The Free Press, 1990).

Annalee Saxenian, Regional Advantage: Culture and Competition in Silicon Valley and Route 128 (Cambridge, MA: Harvard University Press, 1994).

Lakhwinder Singh, "Globalization, National Innovation Systems and Response of Public Policy," MPRA Paper 641 (2006).

Joseph A. Schumpeter, The Theory of Economic Development, (Cambridge, Mass: Harvard University Press, 1934).

Gregory Tassej, "Globalization of Technology-Based Growth: The Policy Imperative," The Journal of Technology Transfer June (2008).

James Turner, "The Next Internet Revolution: Laying the Groundwork in the United States," Innovations Spring (2006): 126-129.

The White House. National Economic Council, Council of Economic Advisers, and Office of Science and Technology Policy. A Strategy for National Innovation: Securing Our Economic Growth and Prosperity. Washington: Government Printing Office, 2011.

Endnotes

- 1 “Anuncia el Presidente Peña Nieto mayor inversión pública en Ciencia, Tecnología e Innovación,” *Mexico: Presidencia de la República*, December 14, 2012, accessed August 15, 2014, <http://www.presidencia.gob.mx/articulos-prensa/anuncia-el-presidente-pena-nieto-mayor-inversion-publica-en-ciencia-tecnologia-e-innovacion/>.
- 2 Steve Holand and Mark Felsenthal, “Obama tells Mexico a ‘new Mexico’ is emerging,” *Reuters*, May 3, 2013, accessed August 15, 2014, <http://www.reuters.com/article/2013/05/03/us-usa-mexico-obama-idUSBRE9420OP20130503>.
- 3 “Mexico,” The Innovation Policy Platform, accessed August 15, 2014, <https://innovationpolicyplatform.org/content/mexico>.
- 4 Luis de la Calle and Luis Rubio, “Mexico: A Middle Class Society: Poor No More, Developed Not Yet,” *Centro de Investigación para el Desarrollo, A.C. and Woodrow Wilson International Center for Scholars*, (2012), <http://www.wilsoncenter.org/sites/default/files/Mexico%20A%20Middle%20Class%20Society.pdf>.
- 5 James A. Lewis, “National Policies for Innovation and Growth in Mexico,” *Center for Strategic and International Studies*, (2006), <http://csis.org/files/media/isis/pubs/natpoliciesinnovation-4webuse.pdf>.
- 6 Álvaro Rodríguez Arregui, “Venture Capital is Taking Off in Mexico,” *CNBC*, September 18, 2012, accessed August 15, 2014, <http://www.cnb.com/id/49074128>.
- 7 “Crea el Presidente Enrique Peña Nieto el Instituto Nacional del Emprendedor,” *Presidencia de la República, México*, January 11, 2013, accessed August 15, 2014, <http://www.presidencia.gob.mx/articulos-prensa/crea-el-presidente-enrique-pena-nieto-el-instituto-nacional-del-emprendedor/>.
- 8 “2013 Annual Report of the Mexican-U.S. Entrepreneurship and Innovation Council (MUSEIC),” *Bureau of Economic and Business Affairs, U.S. Department of State*, February 5, 2014, accessed August 15, 2014, <http://www.state.gov/e/eb/cba/entrepreneurship/museic/rpts/221245.htm>.
- 9 “Mexico boosts innovation funding for private sector,” *SciDevNet*, accessed August 15, 2014, <http://www.scidev.net/global/innovation/news/mexico-boosts-innovation-funding-for-private-sector.html>.
- 10 “Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data,” *OECD and Eurostat* (2005): 46, accessed August 15, 2014, doi: 10.1787/9789264013100-en
- 11 Robert A. Atkinson et al., “Global Innovation Policy Index,” *Information Technology and Innovation Foundation and the Kauffman Foundation*, (2012), <http://www.itif.org/publications/global-innovation-policy-index>.

- 12 "The STEM Workforce Challenge: the Role of the Public Workforce System in a National Solution for a Competitive Science, Technology, Engineering, and Mathematics (STEM) Workforce," U.S. Department of Labour (2007), accessed August 15, 2014, http://www.doleta.gov/youth_services/pdf/STEM_Report_4%2007.pdf.
- 13 "The Knowledge-Based Economy," *Organization for Economic Co-operation and Development*, (1996), <http://www.oecd.org/sti/sci-tech/1913021.pdf>.
- 14 See Data from Daude and Fernandez Arias (2010), Lederman and Saenz (2005) and RICYT in "Science, Technology, and Innovation in Latin America and the Caribbean: A Statistical Compendium of Indicators," Inter-American Development Bank (2010), accessed August 15, 2014, <http://www.iadb.org/en/topics/competitiveness-technology-and-innovation/moving-data/data-for-science-technology-and-innovation-in-latin-america-and-the-caribbean-a-statistical-compendium-of-indicators,3293.html>.
- 15 "Mexico Policy Note: Labor Markets for Inclusive Growth," *The World Bank*, (2012), accessed August 15, 2014, http://www.worldbank.org/content/dam/Worldbank/document/Mexico%20Policy%20Note%204.%20Labor%20markets_Aug_20.pdf.
- 16 "OECD Reviews of Innovation Policy: Mexico 2009," Organization for Economic Co-operation and Development, (2009): 08, accessed August 15, 2014, doi: 10.1787/9789264013100-en
- 17 *Ibid.*, 102.
- 18 "Mexico," The Innovation Policy Platform.
- 19 Nathaniel Parish Flannery, "Mexico's Silicon Valley," *America's Quarterly*, March 7, 2012, accessed August 15, 2014, <http://www.americasquarterly.org/mexicos-silicon-valley>.
- 20 Mónica Ortiz Uribe, "Mexico's Tech Startups to Look to Overcome Barriers to Growth," NPR, June 18, 2013, accessed August 15, 2014, <http://www.npr.org/blogs/alltechconsidered/2013/06/18/188322814/mexicos-tech-startups-look-to-overcome-barriers-to-growth>.
- 21 "Mexico," HSBC Global Connections, accessed August 18, 2014, <https://global-connections.hsbc.com/us/en/tools-data/country-guides/mx/introduction>.
- 22 Sergio Martin and Juan Carlos Mateos "Mexico Handbook: Competitive, open, and only a truck ride away," *HSBC Global Research* (2012), http://www.hsbc.com.mx/1/PA_esf-ca-app-content/content/promo_delivery/personas/inversiones/archivos/hsbc_mx_handbook_october_2012.pdf?Wt.ac=HBMX_RLPB_PRE_CONINV_006.

- 23 Atkinson et al., "Global Innovation Policy Index."
- 24 Soumitra Dutta, Bruno Lanvin, and Sacha Wunsch-Vincent, "The Global Innovation Index 2014: The Human Factor in Innovation," *Cornell University, INSEAD, and WIPO*, (2014), <http://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2014-v5.pdf>.
- 25 "Mexico Overview," U.S. Energy Information Administration, accessed August 15, 2014, <http://www.eia.gov/countries/cab.cfm?fips=MX>.
- 26 Ibid.
- 27 Sergio Romero-Hernández et al., "Renewable Energy in Mexico: Policy and Technologies for a Sustainable Future," *USAID, Wilson Center, and ITAM*, (2013), http://www.wilsoncenter.org/sites/default/files/Renewable_Energy_in_Mexico.pdf.
- 28 "Mexico and the IDB will support innovative ideas for sustainable energy technologies," Inter-American Development Bank, accessed August 15, 2014, <http://www.iadb.org/en/news/news-releases/2011-09-07/ideas-energy-innovation-contest,9531.html>.
- 29 "Renewable Energy Factsheet," *U.S. Embassy - Mexico, U.S. Department of State*, January, 2013, accessed August 15, 2014, <http://photos.state.gov/libraries/mexico/310329/Econ-Apr-13/Renewable-Energy.pdf>.
- 30 Mexico Ministry of Energy, *Estrategia Nacional de Energía 2013 -2027*,(2013), http://www.sener.gob.mx/res/PE_y_DT/pub/2013/ENE_2013-2027.pdf.
- 31 "Renewable Energy Factsheet," *U.S. Embassy - Mexico, U.S. Department of State*.
- 32 "Energías renovables, único camino para un futuro sustentable," *Greenpeace México*, February 20, 2014, accessed August 15, 2014, <http://www.greenpeace.org/mexico/es/Noticias/2014/Febrero/Energias-renovables-unico-camino-para-un-futuro-sustentable/>.
- 33 Nathan Paluck, "Mexico's Newly Opened Energy Market Attracts Renewables," *Renewable Energy World.com* May 8, 2014, accessed August 26, 2014, <http://www.renewableenergyworld.com/rea/news/article/2014/05/mexicos-newly-opened-energy-market-attracts-renewables>.
- 34 Fondo de Sustentabilidad Energetica, *Proyecto, Abril-Mayo* (2014), http://sustentabilidad.energia.gob.mx/res/ProyectoFSE02_web.pdf.
- 35 Ibid.

- 36 "2013 World Intellectual Property Indicators," *World Intellectual Property Organization*, (2013), http://www.wipo.int/export/sites/www/freepublications/en/intproperty/941/wipo_pub_941_2013.pdf.
- 37 Deborah J. Jackson, "What is an Innovation Ecosystem?," (research paper, Engineering Research Centers, National Science Foundation), http://erc-assoc.org/sites/default/files/topics/policy_studies/DJackson_Innovation%20Ecosystem_03-15-11.pdf.
- 38 The World Bank. Internet Users (per 100 people), accessed August 25, 2014, <http://data.worldbank.org/indicator/IT.NET.USER.P2>.
- 39 Ditte Rude Peterson and Nadim Ahmad, "High-Growth Enterprises and Gazelles – Preliminary and Summary Sensitivity Analysis," Organization for Economic Co-operation and Development and Eurostat, accessed August 15, 2014, <http://www.oecd.org/industry/business-stats/39639605.pdf>.
- 40 Bo Burlingham, "Who Really Creates the Jobs?," *Inc.*, October 1, 2012, accessed August 15, 2014, <http://www.inc.com/magazine/201209/bo-burlingham/who-really-creates-the-jobs.html>.
- 41 Eduardo Bolio et al., "A tale of two Mexicos: Growth and prosperity in a two-speed economy," *McKinsey & Company*, (2014), http://www.mckinsey.com/insights/americas/a_tale_of_two_mexicos.
- 42 Ibid.
- 43 See Fort, Teresa, John Haltiwanger, Ron S Jarmin, and Javier Miranda (2013), "How firms respond to business cycles: The role of firm age and firm size," *IMF Economic Review*; Haltiwanger, John, Ron S Jarmin, and Javier Miranda (2013), "Who creates jobs? Small versus large versus young," *Review of Economics and Statistics*, 95: 347–361; and Dane Stangler et al., "Where Will the Jobs Come From?," *Kauffman Foundation*, (2009), http://www.kauffman.org/~media/kauffman_org/research%20reports%20and%20covers/2009/11/where_will_the_jobs_come_from.pdf.
- 44 Eric Ries, *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*, (New York: Crown Business, 2011), 22.
- 45 Ibid., 38.
- 46 Daniel Lederman et al., "Latin American Entrepreneurs: Many Firms but Little Innovation," *The World Bank*, (2014), <http://www.worldbank.org/content/dam/Worldbank/document/LAC/LatinAmericanEntrepreneurs.pdf>.

- 47 The World Bank. Research and Development Expenditure (% of GDP), accessed August 15, 2014, <http://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS/countries/1W-US-MX?display=default>.
- 48 Marion Lloyd, "Mexico Gets Serious about R&D," *The Chronicle of Higher Education*, June 13, 2014, accessed August 15, 2014, <http://chronicle.com/blogs/worldwise/mexico-gets-serious-about-rd/33941>.
- 49 "Mexico boosts innovation funding for private sector," SciDevNet.
- 50 Laura Vargas-Parada& Erik Vance, "Mexico bolsters science funding," *nature*, November 19, 2013, accessed August 15, 2014, <http://www.nature.com/news/mexico-bolsters-science-funding-1.14204>.
- 51 See data from OECD Stat Research and Development Statistics in "Science, Technology, and Innovation in Latin America and the Caribbean: A Statistical Compendium of Indicators," Inter-American Development Bank (2010), accessed August 15, 2014, <http://www.iadb.org/en/topics/competitiveness-technology-and-innovation/moving-data/data-for-science-technology-and-innovation-in-latin-america-and-the-caribbean-a-statistical-compendium-of-indicators,3293.html>.
- 52 Mexico," The Innovation Policy Platform.
- 53 Guadalupe Castañeda and Moises Alcalde, "The Power of three: Together, governments, entrepreneurs, and corporations can spur growth across the G20: Mexico at a Glance," *EY and G20*, (2013), [http://www.ey.com/Publication/vwLUAssets/EY-G20-country-report-2013-Mexico/\\$FILE/EY-G20-country-report-2013-Mexico.pdf](http://www.ey.com/Publication/vwLUAssets/EY-G20-country-report-2013-Mexico/$FILE/EY-G20-country-report-2013-Mexico.pdf).
- 54 "Crowdfunding in Mexico: The Power of Digital Technologies to Transform Innovation, Entrepreneurship, and Economic Inclusion," *Multilateral Investment Fund*, http://www.scribd.com/fullscreen/214702516?access_key=key-ygnxk0f15fa-04jd8uuk&allow_share=true&escape=false&view_mode=scroll.
- 55 Chance Barnett, "Is Equity Crowdfunding Coming to Mexico?," *Forbes*, May 24, 2013, accessed August 15, 2014, <http://www.forbes.com/sites/chancebarnett/2013/05/14/is-equity-crowdfunding-coming-to-mexico/>.
- 56 Castañeda and Alcalde, "The Power of three."
- 57 "Mexico Increases Access to Tertiary Education: Scholarships for Disadvantaged Tertiary Education Students in Mexico," *The World Bank*, July 4, 2013, accessed August 15, 2014, <http://www.worldbank.org/en/results/2013/07/04/mexico-increases-access-to-tertiary-education>.

- 58 "Knowledge-based Start-ups in Mexico," *OECD* (2013): 57, accessed August 15, 2014, doi:10.1787/9789264193796-en.
- 59 *Ibid.*, 44.
- 60 "Regions and Innovation: Collaboration Across Borders," *OECD* (2013): 21, accessed August 15, 2014, DOI:10.1787/9789264205307-en.
- 61 "2013 Annual Report of the Mexican-U.S. Entrepreneurship and Innovation Council (MUSEIC)."
- 62 For a detailed description of each of the MUSEIC committees and their work, see <http://www.state.gov/documents/organization/221457.pdf>.
- 63 Christopher Simmons, "California and Mexico Sign Pact to Strengthen Economic Ties and Expand Trade," *California Newswire.*, July 31, 2014, accessed August 15, 2014, http://californianewswire.com/2014/07/31/CNW20098_103949.php/california-mexico-sign-pact-strengthen-economic-ties/.
- 64 Robert Atkinson, "Understanding the U.S. National Innovation System," *The Information Technology & Innovation Foundation*, (2014), <http://www2.itif.org/2014-understanding-us-innovation-system.pdf>.
- 65 Alan Berube and Joseph Parilla, "How Querétaro Goes Global," *Brookings*, November 13, 2013, accessed August 25, 2014, <http://www.brookings.edu/blogs/the-avenue/posts/2013/11/13-queretaro-global-berube-parilla>.
- 66 "Sector aeronáutico en Querétaro crece 18% al año desde 2003," *am de Querétaro*, August 22, 2014, accessed August 25, 2014, <http://amqueretaro.com/2014/08/sector-aeronautico-en-queretaro-crece-18-al-ano-desde-2003/.html>.
- 67 Mexico Ministry of Economy, *PRO México: Trade and Investment*, (2013), http://mim.promexico.gob.mx/work/sites/mim/resources/LocalContent/319/2/Onepager_2013.pdf
- 68 "Regulatory Reform and Innovation," *OECD*, <http://www.oecd.org/science/inno/2102514.pdf>.
- 69 United States Government. "The SBIR Program," SBIR / STTR, accessed August 15, 2014, <http://www.sbir.gov/about/about-sbir>.
- 70 *Ibid.*
- 71 *Ibid.*

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