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How Innovative Is Mexico?

CSIS-COMEXI Conference | October 23, 2018

AUTHOR
Richard Miles

A Report of the CSIS AMERICAS PROGRAM

CSIS | CENTER FOR STRATEGIC &
INTERNATIONAL STUDIES

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KEY TAKEAWAYS

On October 23, 2018, with the sponsorship of Rassini, the Center for Strategic and International Studies (CSIS), in partnership with the Mexican Council on Foreign Relations (COMEXI), hosted a conference in Mexico City on innovation. CSIS invited experts and senior government officials from Mexico and the United States to discuss the state of innovation in Mexico, how to increase it, and what the new Mexican government should do to promote it.

The presentations and discussions yielded six major insights:

1. Despite low rankings on current global metrics, Mexico has the human capital to become a more innovative country, especially in its export-led sectors.
2. A strong system of intellectual property rights and clear regulatory frameworks are fundamental to growing an innovation economy in Mexico.
3. Educational reform, especially in higher education, is critical to developing a new culture of innovation.
4. The linkages in Mexico between research universities and the private sector are weak and are holding back innovation and affecting competitiveness.
5. The lack of financing in Mexico, especially risk capital, is a serious obstacle to forming and building innovative start-up companies.
6. Mexico's growth potential is not uniform, by region or by sector. Certain industries, regions, and demographic groups have the capacity to compete at a global level, while others are being completely left behind.

THE PURPOSE OF THE CONFERENCE

On October 23, 2018, CSIS, in partnership with COMEXI, were joined by Mexican and U.S. experts on innovation and technology transfer, as well as senior government officials from both countries, to discuss innovation in Mexico. They were asked to consider three main questions:

1. How innovative is Mexico today?
2. How can a country become more innovative?
3. What should governments do, and not do?

The audience at the Club de Industriales in Mexico City consisted of over 200 people from academia, business, government, and research centers. In addition, the meeting was live-streamed to hundreds more viewers on the CSIS and COMEXI websites.

CONFERENCE PARTICIPANTS

INTRODUCTORY REMARKS

Mariana Campero,
Executive Director, COMEXI

Richard Miles,
Senior Fellow, CSIS

KEYNOTE ADDRESS

Andrei Iancu,
Director, U.S. Patent and Trademark Office

FIRST PANEL

HOW INNOVATIVE IS MEXICO TODAY?

Lynne Bairstow,
Founder and Managing Partner, MITA Ventures Fund

Ruy Cervantes,
Founder, Ideas to Results, ID2R

Alejandra Palacios,
President of the Mexican Federal Commission on Economic Competitiveness (COFECE)

Alberto Saracho Martinez,
Executive Director, Fundación Idea

Vlatko Vlatkovic,
Director General, General Electric Infrastructure Querétaro

SECOND PANEL

HOW CAN A COUNTRY BECOME MORE INNOVATIVE?

Richard Miles,
Director of the U.S.-Mexico Futures Initiative, CSIS

Dr. Paul Sanberg,
Founder, National Academy of Inventors, University of South Florida, Tampa, Florida

Jackson Streeter,
Director, Florida Institute for the Commercialization of Public Research, Gainesville, Florida

Demetrio Strimpoulos,
Founder, BanRegio Labs

THIRD PANEL

WHAT SHOULD GOVERNMENTS DO, AND NOT DO?

Sergio Alcocer,
National Autonomous University of Mexico

Mario de la Cruz,
Director of Government Affairs, CISCO

Jacobo González Torres,
Jalisco State Government

Nicolás Grosman,
McKinsey Global Institute for Latin America

Miguel Ángel Margain,
Director, Mexican Institute for Industrial Property (IMPI)

MEXICO'S LOW SCORE ON GLOBAL METRICS

According to global metrics, Mexico is mediocre when it comes to innovation. In the 2018 Global Innovation Index, it scored fifty-sixth out of 126 countries. In Latin America, it ranked behind Chile (47th) and Costa Rica (54th). This was a slight improvement over 2017 and there were a few bright spots. For instance, as a percentage of total trade Mexico was ranked second in “creative goods” exports, seventh in high-tech net exports, and nineteenth in the percentage of graduates in science and technology.

However, when compared to its fellow industrialized countries in the Organization for Economic Development and Cooperation (OECD), Mexico is near the bottom of most rankings. Whether it is the number of top-ranked universities, the amount of money spent on research and development, the number of scientific publications and patents filed, or public internet usage, Mexico is well behind other industrialized countries by almost any measure.

FIGURE 1¹



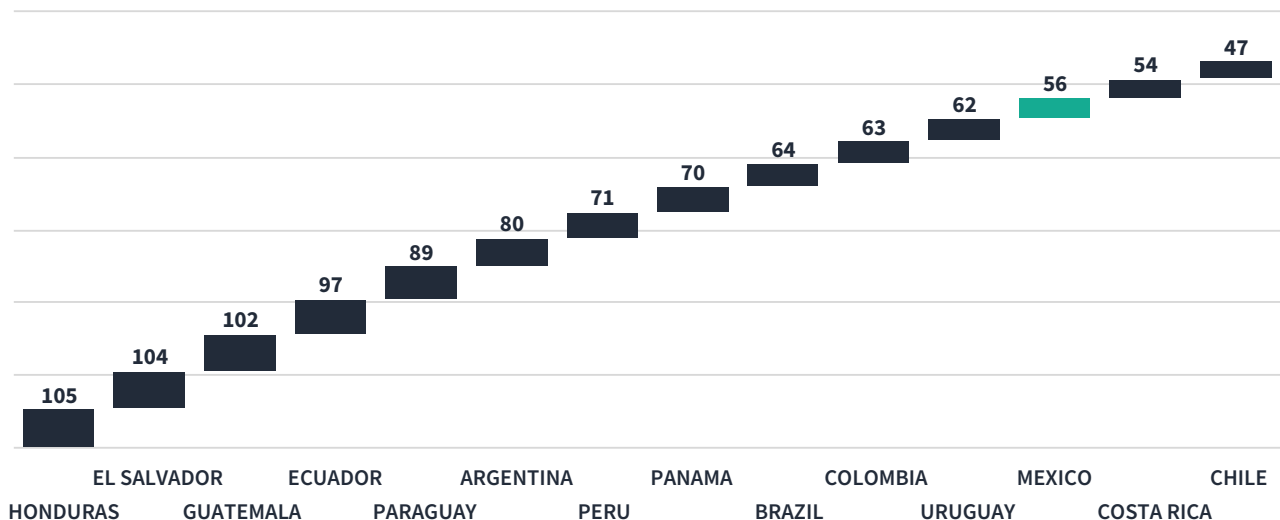
Mariana Campero



Lynne Bairstow, Alberto Saracho, Alejandra Palacios, Vlatko Vlatkovic, Ruy Cervantes (left to right)

Global Innovation Index 2018

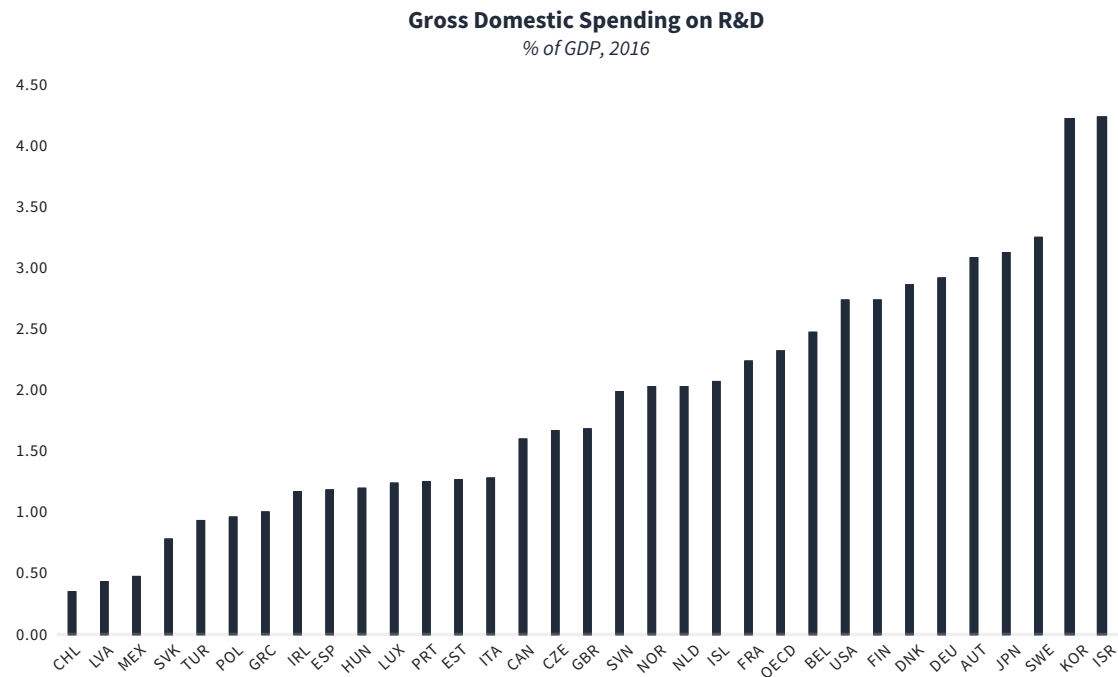
Rank Among 126 Countries



Sources: Cornell University, INSEAD, and WIPO

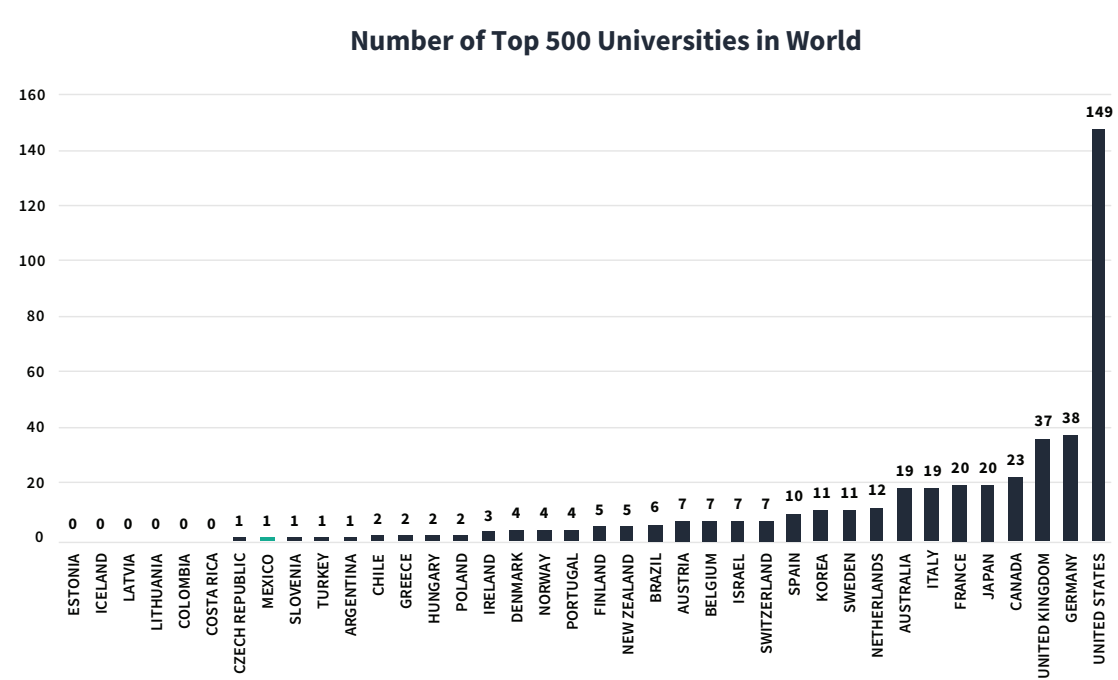
1. Cornell University, INSEAD, and the World Intellectual Property Organization, *The Global Innovation Index 2018: Energizing the World with Innovation* (Geneva: World Intellectual Property Organization, 2018), xx, file:///C:/Users/JeLee/Downloads/GII%202018%20Full%20print.WEB.pdf.

FIGURE 2²



This gap partially explains Mexico’s relatively low productivity per person, which directly affects the country’s competitive position in the world. According to the World Economic Forum’s.

FIGURE 3³

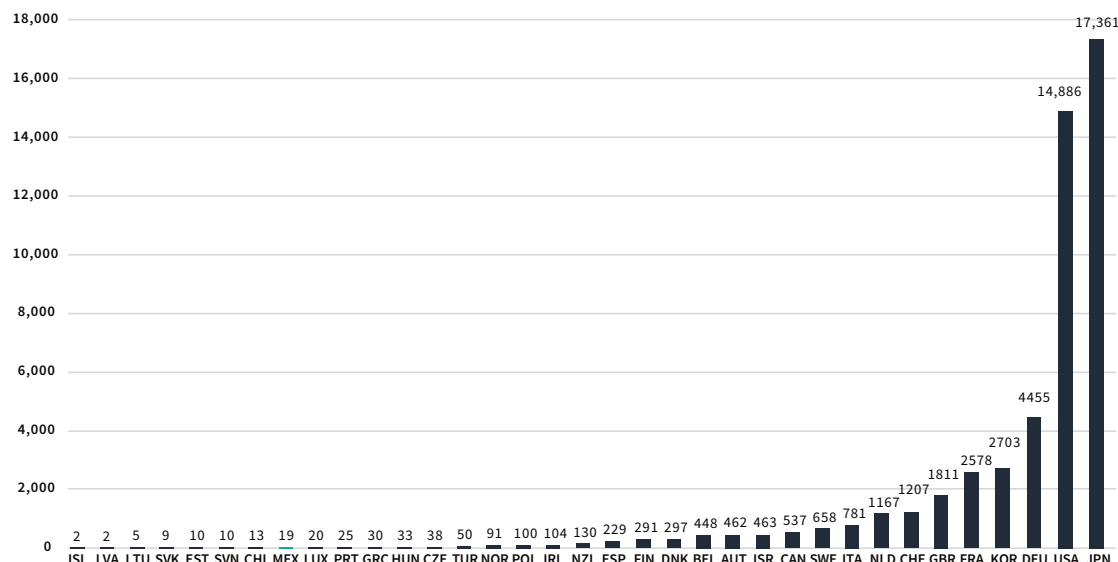


Source: OECD Data

2. OECD, *OECD Science, Technology and Industry Scoreboard 2015* (Paris: OECD Publishing, 2015), 97, http://www.secti.pe.gov.br/wp-content/uploads/2016/04/OECD_Science,%20Technology%20and%20Industry%20Scoreboard_2015.pdf.
3. OECD, *OECD Science, Technology and Industry Outlook 2014* (Paris: OECD Publishing, 2014), 285, https://www.oecd-ilibrary.org/science-and-technology/oecd-science-technology-and-industry-outlook-2014_sti_outlook-2014-en.

Triadic Patent Families, 2015

Patents filed in Japan, Europe and U.S.



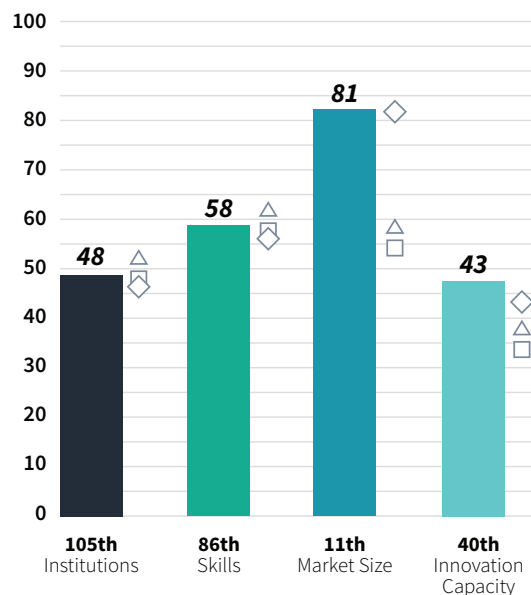
Source: OECD Data

FIGURE 4⁴

Global Competitiveness Index 4.0 2018 edition

MEXICO 46th/140

- ◇ Previous edition
- Upper middle income group average
- △ Latin America and the Caribbean



Source: OECD Data

(WEF) 2018 Global Competitiveness Index (GCI),⁵ Mexico ranked forty-sixth out of 140 nations, that is, in the top third. Interestingly, the WEF report was more positive than the Global Innovation Index (GII) on Mexico's innovation ecosystem, ranking it forty-first for "business dynamism" and fiftieth for "innovation capacity."

THE HUMAN CAPITAL IS THERE

According to Lynne Bairstow of MITA Ventures, Mexico has a population that is favorable for innovation and start-ups. With a median age of 27, an 86 percent penetration of the mobile phone market, and with 90 percent of smartphone users active on social media, Bairstow argues that there is a "tidal wave of creativity" that is not necessarily linked to patents and therefore not showing up in traditional metrics. The entrepreneurial ecosystem is growing—especially in states like Jalisco and Guanajuato—creating lots of opportunities and ideas.

4. Klaus Schwab ed., The Global Competitiveness Report 2018 (Cologny/Geneva: World Economic Forum, 2018), 391, <http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf>.

5. "Mexico, Economy Profiles" in Klaus Schwab ed., The Global Competitiveness Report 2018 (Cologny/Geneva, Switzerland: World Economic Forum, 2018), 391-393, <http://www3.weforum.org/docs/GCR2018/05FullReport/TheGlobalCompetitivenessReport2018.pdf>.



Vlatko Vlatkovic, General Electric Infrastructure Querétaro

Mexican engineers are very strong. Mexico graduates 114,000 engineers per year, which is more per capita than the United States or Germany.

“We don’t need to teach Mexican [engineers] to innovate and we don’t need to educate them in technical matters. We provide a framework and make it easy for them to innovate.”

– Vlatko Vlatkovic, GE Infrastructure Querétaro

Vlatko Vlatkovic of General Electric Infrastructure Querétaro (GEIQ) confirmed what the statistics show within the traditional manufacturing sector. Mexico is generating plenty of very capable engineers and others with strong STEM skills. If there is a bottleneck in Mexico’s innovation economy, it does not appear to be with the inability to produce a skilled workforce.

Strong Intellectual Property Rights

A strong system of intellectual property (IP) rights “incentivizes original innovation,” according to Andrei Iancu, the director of the U.S. Patent and Trade Office. An original invention followed by

endless rounds of innovative tweaking to the original idea is “the genius of a modern patent system [and] creates a perpetual innovation machine.” Iancu said that “IP-intensive industries supported nearly one-third of all U.S. employment.”

To illustrate the importance of patents as incentives to drive growth, Iancu told the story of the “War of the Currents,” the battle in the 1880s between George Westinghouse (using technology developed by Nikola Tesla) and Thomas Edison. Without patent protection, Edison would not have invested years searching for the perfect filament material for the world’s first electric light bulb. Yet Edison’s success incentivized Tesla and Westinghouse to come up with alternating current, which eventually beat out Edison’s direct current. It was an example of patent protection and competition being tightly intertwined, harnessing the strong ambitions of a few individuals to the benefit of society.

Although Mexico has a decent system of IP protection (65 out of 140 on the GCI) there are significant regulatory and intellectual property barriers, according to Alejandra Palacios, president of the Mexican Federal Commission on Economic Competitiveness. She cited the example of the long wait for generic drugs in Mexico. For generics to make it to market, they must be shown not to violate any patents still in force. (A single drug can have multiple patents for various ingredients.) However, there is no list of expiring patents, making it difficult for the pharmaceutical industry to determine whether their generic versions will be challenged in court or by regulators.

THE REGULATORY ENVIRONMENT

There should be a balance, Palacios said, between protecting patents and encouraging competition. Regulators of new technologies should be pro-competition, but often they are biased towards established models. She pointed out that previously companies had to innovate to enter a market. Now, companies have to innovate just to remain in the market.



Westinghouse Wins: AC Lights at 1893 World Colombian Exposition in Chicago

“Patent protection . . . tends to attract increased foreign investments and businesses that can operate more confidently that their intellectual property will be protected.”

– Andrei Iancu, Director of the U.S. Patent and Trade Office

Super Model: The Fintech Law

Since regulation plays a very important role in the development of entrepreneurial ecosystems, the start-up community should be included in any new regulatory efforts. Many of the conference participants held up the Law Regulating Financial Technology Institutions (the “fintech law” passed in March 2018) as a good example. Start-ups in the fintech space were invited to talk with regulators and share ideas about what they were working on, what problems they were seeing, and what they needed. By offering start-ups the chance to be involved in shaping the law, the start-up community helped make the law more effective and to get it adopted.

Mexico is the first country in Latin America to have a fintech law. Lynne Bairstow believed it will attract more entrepreneurs and inspire investor confi-



Alejandra Palacios

“Through patents, [drug companies] are stretching the law and limiting competition and making money through rent-seeking activities.”

– Alejandra Palacios, President, Federal Commission on Competitiveness

dence. Better yet, the law also contends with cryptocurrencies that use blockchain technology. This establishes a good precedent for future applications of blockchain, which has the potential to revolutionize many types of public and private transactions. The potential applications are numerous, and Mexicans should maneuver to take advantage of

POTENTIAL BLOCKCHAIN APPLICATIONS

- Public records
- Property deeds
- Car ownership
- Open-source technology that is not patentable
- Tokens that can be exchanged for future services or assets

them. For instance, in 2016 digital token sales were only \$5 million, and in 2017 they were \$5 billion. The fintech law has considered this, setting the stage for future regulation.

However, Alejandra Palacios pointed out that the original draft of the law was overly restrictive and biased in favor of traditional banks. The Federal Commission on Competitiveness weighed in, and the Mexican Senate made important changes to the final version. “The banking system is very protective of traditional banking,” said Palacios, “and this is one of the topics that the new government should address.”

Demetrio Strimpopulos, founder of BanRegio Labs, added that the fintech law was a good effort to address various business applications, but it should cover more. “We need mechanisms to verify identity, better mechanisms to calculate risk, and payment mechanisms are fundamental.” Mario de la Cruz believed that the high-tech sector in Mexico needs a specific regulatory framework for high technology. Without a specific public policy, he said, it will develop in an “irrelevant manner.”

Confidence and Continuity

Palacios argued that ultimately good regulations are based on confidence between the regulators and the industries being regulated. The regulators must find the balance between that which helps innovation and that which helps society, entrepreneurs, and innovators.



Lynne Bairstow

“[The Financial Technology Law] is a fantastic framework and Mexico is taking a leadership role . . . it will attract more entrepreneurship and investors because it is creating certainty and clarity.”

– Lynne Bairstow, Founder, MITA Ventures Fund

Continuity and certainty in regulations is also very important, stressed Miguel Angel Margain, director of the Mexican Institute for Industrial Property (IMPI). A good system of intellectual property rights is one way to offer legal certainty to inventors and entrepreneurs. After 25 years of the North American Free Trade Agreement (NAFTA), Margain believed Mexico has the “maximum standards of protection for intellectual property rights,” which act as a powerful incentive to foreign investors. “Our policies need to be aligned with the rest of the world because innovation doesn’t respect frontiers.”

RISK-TAKING AND THE CULTURE OF INNOVATION

Invention and innovation require a willingness to take risks. That risk-taking mentality needs to occur along the entire chain of development,



Miguel Angel Margain

“We still don’t have a patent culture in Mexico.”

– Miguel Angel Margain, Director, Mexican Institute of Industrial Property (IMPI)

from the university laboratory to store shelves and showrooms.

Yet, Mexico has not yet developed a risk-taking culture, especially in academia. This problem is not unique to Mexico. “A university is a traditional institution,” said Paul Sanberg, founder of the Tampa-based National Academy of Inventors (and a research scientist himself). “Many professors don’t want to change, they’re used to living within their paradigm.” Academic culture rewards publishing in traditional journals, which results in recognition but not necessarily in an application or development of the underlying discovery.

To spur more innovation, Mexico needs a wholesale transformation of its higher education system, according to Sergio Alcocer, a professor at the National Autonomous University of Mexico (UNAM).

Alcocer laid out three principal courses of action for universities to participate in the innovation ecosystem:

1. Universities “need to become more involved in the problems that communities



Sergio Alcocer

“We need to rethink the careers of the future. No one is thinking about robot psychologist. No one is thinking about drone mechanic. Those are the careers of the future.”

– Sergio Alcocer

face.” Regional universities have an outsized influence in their local communities and need to be more involved in the productive sector and establish alliances. He cited the example of the state of Puebla, which has a regional innovation agenda that includes a role for higher education.

2. Institutions of higher learning should be linked together by one umbrella institution that promotes innovation within the universities themselves. They can then learn from each other.
3. Universities need to reimagine the careers that employers and society will need in the future, not simply turn out more graduates for the jobs of today, many of which are rapidly disappearing.

More broadly, how does Mexico teach succeeding generations of students, employees, business leaders, and investors to think differently about risk? Demetrio Strimpoulos, who runs



Demetrio Strimpoulos, BanRegio Labs



Jackson Streeter, Florida Institute for the Commercialization

“Culturally in Mexico we place a lot of value on individual effort. That’s why we do very well in individual sports, but it’s hard for us in group sports. Developing a collective culture is the foundation for innovators and entrepreneurs.”

– Demetrio Strimpoulos, BanRegio Labs.

“[In Israel] as entrepreneurs fail, that gives them more experience to start their next companies. It’s sort of a cultural thing and you have to accept the fact that there will be failure in early-stage innovation.”

– Jackson Streeter

BanRegio Labs, said there should be greater emphasis placed on teamwork, communication, and collaboration. In particular, Mexican companies need to build upon the technological achievements of others rather than constantly starting anew.

Other cultures, said Strimpoulos, build on previous efforts and construct “technologies upon technologies. Because of our emphasis on individual culture we have to start from zero lots of times.” There is no effort to standardize or communicate with each other, and no “bridges upon what we have already built.” This kind of iteration is fundamental to manufacturing better things.

Mexico has risk-takers, but it may be losing them to countries where risk is rewarded. Jackson Streeter, director of the Florida Institute for Commercializa-

tion of Florida Technology, said that creating the right incentives could prevent a “brain drain” of Mexico’s best innovators. He gave the example of Alfredo Quiñones-Hinjosa, who left Mexico at 19 to become a migrant farm worker in Fresno, California. Quiñones-Hinjosa is now the chairman of neurosurgery at the Mayo Clinic in Jacksonville, Florida, working on stem cell treatments of brain cancer. “These are the types of people who are leaving Mexico today,” said Streeter. “But if you create opportunities they will stay here and do really incredible things.”

There are many interesting models from which Mexico could learn as it develops an innovation economy. One model is Israel, whose path to be a “Start-Up Nation”⁶ has been well documented

6. Dan Senor and Saul Singer, *Start-up Nation: The Story of Israel’s Economic Miracle* (New York: Twelve, 2009), 4.

over the last decade. It transformed itself from a quasi-socialist agrarian nation in the 1990s to a country with the third most companies per capita listed on the NASDAQ stock exchange, behind the United States and China.⁷ The Israeli transformation had many components, including a sudden influx of Russian immigrants after the collapse of the Soviet Union in 1990, universal military service, and the immediate existential threat posed constantly by its neighbors.

Obviously, these specific factors don't apply to Mexico. However, Mexico does face crises in governance, in violence, and in economic competitiveness. Can addressing these problems lead to a more innovative mindset among Mexico's leaders and citizens?

Several speakers alluded to the role of crisis in innovation. "In questions of life and death," said Paul Sanberg, "there is a tendency to retrench." An emergency by itself will not necessarily lead to fresh thinking because people will fall back on what they already know. The job of leaders is to reduce stress to get people to think about more innovative solutions. "If your competitor has gotten really stressed and they're going backwards," Sanberg said. "This is your opportunity to go forwards."

An interesting example of an industry that constantly must deal with tremendous risk and high rates of failure is the video game industry. Demetrio Strimpoulos explained how each game must conquer virtually the entire market when it is released or be quickly sidelined and forgotten. Yet it is very expensive to develop a game before it goes to market.

How does the gaming industry mitigate this risk? Its response is to incorporate as many relevant disciplines as possible to anticipate what gamers want. For instance, a typical game by a major gaming company will draw on the expertise of psychologists, anthropologists, mathematicians, physicists, and designers. They all become involved in crafting

"A common denominator in successful start-ups is the character and personality of the CEO. The people who refuse to quit no matter how bad things get."

– Jackson Streeter

"For academics, the patenting process is risky but something that is invaluable for the university and for young students."

– Paul Sanberg, Founder, National Academy of Inventors

an interesting narrative and reducing the chances that a game fails.

Strimpoulos said other sectors have benefited from the video game example in several ways. Video games drove the increase in computing power and the use of big data. Furthermore, financial technology services have learned to incorporate other disciplines, like behavioral economics, psychology, and anthropology, to understand the relationships between people and their money. There is still a risk in constructing something that may not work. "What we are building," said Strimpoulos, "gives us a capacity to learn every time we fail."

CREATING AN INNOVATION ECOSYSTEM

Several of the conference participants said that the official statistics on innovation in Mexico did not capture the vitality and growth of the start-up sector. "The start-up culture is real," said Ruy Cervantes,

7. Steven Williams, "How Israel Became the Startup Nation Having the 3rd Most Companies on the NASDAQ," Seeking Alpha, February 17, 2018, <https://seekingalpha.com/article/4151094-israel-became-startup-nation-3rd-companies-nasdaq>.



Paul Sanberg, Founder, National Academy of Inventors



Mario de la Cruz

THE SAN DIEGO MODEL

- Iver Royson, a University of California San Diego professor, created the PSA test, the standard for prostate cancer testing.
- This helped start the biotech industry in San Diego, now a multi-billion-dollar industry with around 400 companies.
- Early entrepreneurs stayed in San Diego and started new companies.

founder of Ideas to Reality (ID2R). The access to capital is much better than a decade ago, and more start-ups are staying in Mexico, especially in Guadalajara. Mexican start-ups have generated confidence different from what is experienced in other industries. Yet, there are not enough patents in the start-up community because it has been focusing on very simple problems with quick solutions. Those companies, however, may have reached a maturation point and can connect with large companies and universities to gain intellectual property protection.

Weak Links between Universities, the Private Sector, and Governments

Most of the participants stressed the need for more and improved linkages between research universities, the private sector, and government at all levels—local, state, and federal.

“In IT there is a deficit of 150,000 professionals every year. We need to work much more closely with the universities to accelerate the preparation and development of those youth that the market is demanding but aren’t there.”

– Mario de la Cruz, Director of Government Affairs, CISCO

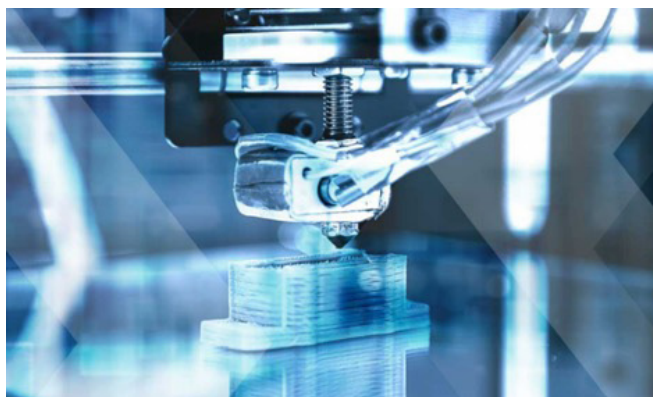
Paul Sanberg said it is important for universities to change the culture from traditional measures for promotion and tenure, like research and publishing, to also recognizing academic entrepreneurs who translate research into patents, licenses, and commercial products. Even if patents aren’t successful, they create a bar for the next patent, which must be, by definition, better. If society’s goal is to generate more useful ideas, patents are a better incentive than academic publications.

Many U.S. universities, Sanberg said, also have “offices of corporate partnerships.” Their mission is to reach out to local companies and tell them what universities can do in research, educational programming, and philanthropy.

For their part, universities need to understand the context of the competitive demands that the

“A big part of the economy in Mexico is metal manufacturing. China, Malaysia, Poland, Italy, Europe and the U.S. are all investing in 3D printing, which is either going to kill your industry completely 10 years from now, or it’s a great opportunity for you to lead in something that’s new and emerging and innovate and be a leader in the world.”

– Vlatko Vlatkovic



3D printing: Mexico could be a world leader

private sector faces, and the research and skills needed to fill them.

According to Vlatko Vlatkovic, additive manufacturing (3D printing) is an opportunity for Mexico to lead in manufacturing. But it must move quickly, or it will cede the advantage to global competitors. Major investments in additive manufacturing are already under way in China, the European Union, and the United States, among others. In response, General Electric has formed an additive manufacturing consortium with universities, other companies, and the state government of Queretaro.



Nicolas Grosman, McKinsey Global Institute for Latin America

“The best inspiration is from outside, but ‘copy and paste’ won’t work. We have to build our own solution because we’re a region that is substantially different.”

– Nicolás Grosman, McKinsey Global Institute for Latin America

The consortium will build a micro-factory at a university campus, allowing graduate students and professors to do materials research. The goal is to build an entire ecosystem around additive manufacturing, taking it from the lab to the marketplace.

Similarly, fintech entrepreneurs are staying in simple product lines because they are missing lines of communication to universities that would give context to what is happening in the banking industry.

True ecosystems of innovation are rare, said Ruy Cervantes. Public policies, competition, regulation, and intellectual property all have important roles, but how do these actors help smooth out the learning curve, identify risks, and collaborate? The private sector, academia, and civil society must be partners in design and implementation of a strategy that fits Mexico.

Nicolás Grosman of McKinsey warned governments against starting a program without a plan and before answering some basic questions: Who does what and what does the public sector need?” Grosman said that companies will say “I need the government to do this or that. But for what? What are you guys doing to do? It’s inconceivable that the governments on their own are going to move the needle.”

The most successful examples of cooperation, according to Grosman, are outside of Latin America. Germany is a good example of how governments, the private sector, and academic institutions work together. “Latin America is arriving late,” Grosman said. “Real late.”

Lack of Financing for New Ideas

According to Lynne Bairstow, “Mexican entrepreneurs are no longer afraid of risk, but investors are.” She attributed this in part to a poor understanding of risk capital and how it differs from private equity or real estate. According to Bairstow, a typical venture fund has 75 percent of its investments collapse and only a small percentage exit at a multiple of in the range of 100 or 1,000 times the initial investment. Additionally, the due diligence requirements for risk capital are significantly more than, for example, investments in stocks, mutual funds, or bonds. Risk capital investors must understand the underlying technology and the potential market for a new idea.

However, Bairstow was upbeat about Mexicans’ willingness to provide more capital to start-ups and the technology sector. “Pension funds have a great opportunity and have funds available. I would encourage them to look at investing in venture capital.” She also welcomed the July 2018 opening of the Bolsa Institucional de Valores (BIVA), Mexico’s second stock exchange, but noted that stock ownership in Mexico is not as common as in the United States.

During the Q&A, Santiago Urquiza, CEO of CENCOR, a national brokerage association, said

THE FLORIDA MODEL

- Florida’s universities engage in \$3 billion of research every year.
- In 2012, a bipartisan effort established the Florida Technology Seed Capital Fund.
- The fund invests in companies with intellectual property that comes out of the universities.
- An independent advisory board from outside the state evaluates the patents and technologies.
- The state’s investment must be matched 1:1 by the private sector.
- Since 2012, Florida has invested almost \$30 million in 62 companies.
- 1,300 high-paying jobs have been created, with \$1.5 billion in economic impact.

THE ISRAEL MODEL

- The Israeli government provides high-risk loans to early-stage companies.
- The country generates about 1,100 startup companies per year in a population of 8.5 million.
- Although there is an 80 percent failure rate, Israel has the third largest number of NASDAQ-listed companies in the world.

that the securities market in Mexico should be four to five times bigger than it is. Yet there are definitely people that are willing to put money into non-traditional investments. Bairstow said that Bitso, a cryptocurrency trading in Mexico, has 570,000 accounts while the stock exchanges have only 240,000 accounts.

A lack of funding for start-up companies is a common problem in other innovative countries and regions. Jackson Streeter recounted Flori-

“Getting patents isn’t quite enough. Companies need to be formed, and that requires capital, and money, and entrepreneurs. And there’s a role for government, especially in that very early stage.”

– Jackson Streeter

“You’ve got some incredible entrepreneurs in Mexico, but they have a really tough time getting funding.”

– Lynne Bairstow

da’s experience over the last two decades. For a state with excellent research universities and a high number of patents, relatively few start-up companies were emerging. They were unable to make it through the “valley of death,” the phase where the company is starting to grow rapidly and develop its idea, but before it has steady operational revenue.

Two Florida state senators, one Democrat and one Republican, worked with the Republican governor to establish a fund dedicated to financing research that had been paid for with taxpayer money, had market potential, and had matching private sector investment. According to Streeter, since 2012 \$30 million of investment has resulted in \$1.5 billion of economic impact.

How to Balance Uneven Growth Across Regions and Groups

The innovation economy is not evenly distributed across Mexico. Certain states are experiencing rapid growth in start-up formation and advanced manufacturing, and others are not. Likewise, some demographic groups are learning to compete at a world-class level, and others are

being left behind. In the excluded part of the economy, workers are getting less productive. Additionally, most “informal” businesses (i.e., operating without licenses and permits) are very small, and don’t generate very many new jobs. Their ability to make the jump into an innovation economy on their own is very limited.

“We see highly developed ecosystems in Jalisco, Baja California, Chihuahua, and in manufacturing clusters in the north,” said Mario de la Cruz. “If you go and see those factories, they already are solutions to Industry 4.0.”

According to Miguel Angel Margain, regional governments should make commitments to innovation and then follow them up with action. “We need to have a government that says ‘invent’ and then moves from talking to doing.” He said states like Jalisco and Guanajuato have committed themselves to a program of protecting intellectual property but also exploiting the it by focusing on the patents that have market viability. Some of the state-level incentives include awards for patents and trademarks.

Nicolás Grosman argued that part of the solution lies in creating a local ecosystem that can push the limits and increase competition. He said cities and regions should focus on areas that have export potential, help develop the local economy, and help develop the more advanced local companies.

From a Mexican public policy perspective, however, there are bigger problems than regions traveling at different speeds on their way to an innovation economy. Those include: (1) the allocation of scarce resources for education, job training, and infrastructure investment; and (2) the care and treatment of the people that are permanently displaced or shut out from the job market by new technologies. For political leaders, the tradeoffs remain hard. How do they justify funding high-tech initiatives for relatively well-off Mexicans when so many citizens still lack basic services?

WHO GETS WHAT? AND HOW?

Policymakers must begin, Grosman said, by focusing on several strategic questions:

1. What are the most important problems, and where can technology add the most value in solving them?
2. Do you help all the firms that know very little or the ones that are more advanced and need a little more investment?
3. Do you invest a lot to include everyone or less to take specific firms to a higher level?

Beyond picking winners, Grosman believes the government needs to prioritize. The question is not “which sectors are we going to bet on?” but “how do we assure that the traditional sectors capture the maximum opportunities of the digital revolution?” Finally, “there is a need to rethink how to evaluate [economic growth]. For instance, think of Spotify. We are listening to a lot more music, but the GDP share of music is falling. GDP is an obsolete metric.”

Among the key challenges is reversing the slow productivity growth that is common to Mexico and Latin America. Per capita productivity is directly related to the incorporation and mastery of new technologies and innovative methods. According to Grosman, more than 90 percent of Mexico’s growth in the last 15-20 years came by adding more people to the labor force rather each person producing more. Mexico has captured only 5 percent of its economic potential. This trend was directly opposite to Asia’s growth pattern, argued Grosman, where most of the region’s economic growth came from productivity gains.

How can governments prepare their citizens and close the productivity gap? “There’s a huge responsibility [for] the private sector,” said Mario de la Cruz, “in determining what should be on the [government] roadmap, especially in the digital sector.” Noting that 50 million Mexicans still have no internet access and that 30 million still use dial-up

“There are two Mexicos. There is a part of the economy that is productive, that is growing, that is connected with the world, and there is a part that is completely excluded.”

– Nicolás Grosman

access instead of broadband, de la Cruz called for a pledge between industry and government “that we can get those 20-30 million that have 2G phones into 3G or 4G and increase their inclusion into a digital economy.”

While everyone agreed that education is a fundamental part of the solution, participants had mixed views on the capacity of the Mexican educational system to change the equation. “The governments that effectively educate their populations,” said Vlatko Vlatkovic, “will pull ahead over the long term because they will innovate more effectively and quickly.” However, according to Sergio Alcocer “with the educational system we have now, we’re not going to achieve the metrics of impact and value.”

He advocated reform from the earliest stages. “We need to realize that the youth have a more algorithmic mind, a more heuristic manner of thinking which is a way to solve problems more broadly, which is what the market is demanding, what reality is demanding.” If the government would agree to change the basic principles of what an educational system could be, then there could be progress “little by little.”

One way to address the problem is to reframe it. Alcocer said that the new Mexican government needs to think of innovation not just as a path to addressing low economic productivity but also as a means of solving social problems. “It is a way of creating wealth, better jobs, and better salaries.” Then, Grosman argues, the government should lead by example. It should fully digitize, use advanced technologies and analytics, and show how these innovations

“If you present innovation as a path to solve social problems, it could have more possibilities to be part of the conversation.”

– Sergio Alcocer

“Much of Mexico is trapped by barriers to a digital economy. Companies have no idea what these technologies are good for and how they could help them.”

– Nicolás Grosman

can help improve the lives of citizens. Ruy Cervantes said that the new administration should “create hope” for entrepreneurs. He saw opportunities in “social innovation” focused on how to help the poorest of the poor. For the youth, there must be an opportunity to be an entrepreneur.

What will happen to the workers that will be displaced by new machines and methods? Over time, there will be a large displacement in manual labor. Is it possible to reskill all of those workers? In the short term, labor displacement in Mexico will not be as high as in other parts of the world because of the cheap cost of labor; it is still relatively easy in Mexico to replace humans with humans. But as new technologies and processes make their way to the factory floor, and if current workers cannot master new technologies, the potential for displacement is very high. Who will support these people?

Vlatko Vlatkovic stressed that innovation is not a zero-sum game. The top line of the economy must grow. Mexico must increase its competitiveness vis-à-vis the rest of the world, a world driven by innovation, growth, and appetite for new

challenges. Additionally, the tax revenue generated from the innovation economy can be used to address diverse social programs for those workers outside of the tech sector.

Again, participants did not believe that the educational system was up to the task of fixing the displacement problem. There won't be enough time and money to retrain people who have already completed a formal education but do not have the skills for a new economy.

The private sector, being closer to market realities, has a better grasp of what skills are needed and when. Therefore, businesses have a much more important role to play with displaced workers.

KEY RECOMMENDATIONS

Based on the discussions from the conference, CSIS offers the following recommendations to improve the state of innovation in Mexico.

For the private sector:

1. Companies that are undergoing technological change should have constant lines of communication with regional universities to communicate their workforce needs and their technological gaps.
2. Firms in highly competitive industries (like additive manufacturing) should consider forming consortiums with local and state governments as well as regional universities. These consortiums would be the basis for shared training, research, and development.
3. Businesses, especially those in the digital sector, should provide a roadmap for the government on how to include all of Mexico in an innovation economy.
4. The private sector must take the lead in recommending how those who are displaced by new technologies should be retrained and reemployed. They should work together with local educational institutions and regional governments to implement a strategy before displacement becomes a crisis.

For educational institutions:

1. Educational institutions at all levels should consider instituting training for entrepreneurs and on how to build a risk-taking business culture.
2. Researchers should be incentivized to seek patents for technologies that have commercial potential. This could be through prizes, recognition, or financial rewards.
3. Research universities should establish technology transfer offices to help their researchers secure patents, negotiate licenses, and start companies.
4. Educational institutions should establish constant lines of communications with com-

panies in their regions, especially those firms that depend on innovation and are producing for the export market.

For local, state, and federal government agencies:

1. Governments should view the creation of an innovation economy as a path to achieve broader social ends. Innovative economies can increase productivity, create meaningful employment, and produce wealth for entire communities.
2. Before designing an innovation agenda, governments should resolve basic strategic questions, including defining the most important problems, how technology can help, and whether all sectors should receive attention or just the most advanced.
3. Policymakers should do everything possible to maintain a strong intellectual property regime that is consistent with international norms.
4. To spur competition, the Mexican Institute of Industrial Property (IMPI) should consider making the database of existing patents, including expiration dates, easily accessible to entrepreneurs and the public.
5. Regulators of new technologies should take into the account the effect of regulations in a competitive market.
6. Laws like the fintech law provide a useful regulatory framework for new technologies. Policymakers should consider using this model again.
7. Policymakers should encourage all Mexicans who are able to invest in domestic financial markets, such as the stock market, or funds specifically supporting innovative companies.
8. State and local governments should consider partnering with private investors to establish risk capital funds. These funds would help launch local start-up companies producing goods or services in a competitive market with high-growth potential.

APPENDIX 1

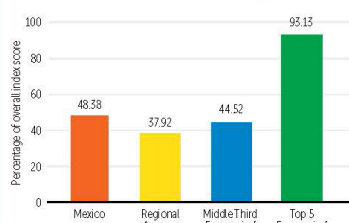
2018 US Chamber of Commerce IP Index - Mexico⁸

MEXICO

Rank 24 / 50



Overall Score in Comparison



Strengths and Weaknesses

KEY AREAS OF STRENGTH

- ✓ Standard exclusive rights for patents and trademarks
- ✓ Efforts to ease ability to commercialize IP assets and develop public-private partnerships, particularly for public research organizations and universities
- ✓ Dedicated endeavor to streamline IP review process and criminal justice system and to meet international standards
- ✓ Efforts to increase awareness of importance of IP rights

KEY AREAS OF WEAKNESS

- ✗ Partial and ambiguous protection of IP in certain aspects for life sciences
- ✗ Lack of sufficient framework to promote action against online piracy (with some improvements)
- ✗ Significant gaps in application of remedies, such as severe delays and difficulty securing adequate damages
- ✗ Inadequate border measures for trade-related infringement of IP rights

INDICATOR	SCORE
Category 1: Patents, Related Rights, and Limitations	
1. Patent term of protection	1.00
2. Patentability requirements	0.50
3. Patentability of computer-implemented inventions (CIIIs)	0.00
4. Pharmaceutical-related patent enforcement and resolution mechanism	0.25
5. Legislative criteria and active use of compulsory licensing of patented products and technologies	1.00
6. Patent term restoration for pharmaceutical products	0.00
7. Membership in Patent Prosecution Highways (PPHs)	0.50
8. Patent opposition	0.50
Category 2: Copyrights, Related Rights, and Limitations	
9. Copyright (and related rights) term of protection	0.79
10. Legal measures that provide necessary exclusive rights that prevent infringement of copyrights and related rights (including Web hosting, streaming, and linking)	0.25
11. Expedient injunctive-style relief and disabling of infringing content online	0.25
12. Availability of frameworks that promote cooperative action against online piracy	0.00
13. Scope of limitations and exceptions to copyrights and related rights	0.50
14. Digital rights management (DRM) legislation	0.25
15. Clear implementation of policies and guidelines requiring that any proprietary software used on government ICT systems should be licensed software	0.75
Category 3: Trademarks, Related Rights, and Limitations	
16. Trademarks term of protection (renewal periods)	1.00
17. Ability of trademark owners to protect their trademarks: requisites for protection	0.50
18. Legal measures available that provide necessary exclusive rights to redress unauthorized uses of trademarks	0.50
19. Availability of frameworks that promote cooperative private action against online sale of counterfeit goods	0.25
20. Industrial design term of protection	0.60
21. Legal measures available that provide necessary exclusive rights to redress unauthorized use of industrial design rights	0.50
Category 4: Trade Secrets and Related Rights	
22. Protection of trade secrets	0.50
23. Regulatory data protection (RDP) term	0.25
Category 5: Commercialization of IP Assets	
24. Barriers to market access	0.50
25. Regulatory and administrative barriers to the commercialization of IP assets	0.50
26. IP as an economic asset	0.50
Category 6: Enforcement	
27. Physical counterfeiting rates	0.48
28. Digital/online piracy rates	0.48
29. Civil and procedural remedies	0.50
30. Pre-established damages and/or mechanisms for determining the amount of damages generated by copyright infringement	1.00
31. Criminal standards including minimum imprisonment and minimum fines	0.75
32. Effective border measures	0.00
33. Transparency and public reporting by customs authorities of trade-related IP infringement	0.25
Category 7: Systemic Efficiency	
34. Inter-governmental coordination of IP rights enforcement efforts	0.50
35. Consultation with stakeholders during IP policy formation	0.75
36. Educational campaigns and awareness raising	1.00
Category 8: Membership in and Ratification of International Treaties	
37. WIPO Internet Treaties	1.00
38. Singapore Treaty on the Law of Trademarks	0.50
39. Patent Law Treaty	0.00
40. At least one free trade agreement (FTA) with substantive and/or specific IP provisions such as chapters on IP and separate provisions on IP rights provided it was signed after WTO/TRIPS membership	0.00
TOTAL	19.35

8. Global Innovation Policy Center, "Mexico," U.S. Chamber International IP Index, (<https://www.theglobalipcenter.com/wp-content/uploads/2018/02/Mexico.pdf>).

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