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CORONA-TREVIÑO (Leonel), « Les défis pour l'innovation dans les services dans les pays en développement. Les cas du Mexique et de l'Amérique latine »

RÉSUMÉ – Cet article s'inspire de la méthodologie de deux études prospectives, l'une de Martin (2016) et l'autre de Djellal et Gallouj (2016), pour proposer un agenda de recherche qui comprend 22 défis posés aux études sur l'innovation et les services, dans le contexte du Mexique et de l'Amérique latine. Il met en lumière certains problèmes économiques et sociaux spécifiques au Mexique et à l'Amérique latine et rend compte de l'évolution de la réflexion sur l'innovation. En fonction de la manière dont les défis posés sont relevés, quatre scénarios sont proposés, vers lesquels les économies peuvent évoluer : 1) Développement régional et croissance inclusive, 2) Polarisation sociale et économique, 3) Disparité régionale avec distribution des revenus, 4) Développement régional et inégalité des revenus.

MOTS-CLÉS – innovation, innovation de service, défis, Mexique, Amérique latine

CORONA-TREVIÑO (Leonel), « Challenges for service innovation in developing countries. The cases of Mexico and Latin America »

ABSTRACT – Following the methodology of two prospective studies, one by Martin (2016) and the other by Djellal and Gallouj (2016), this article's proposed agenda comprises 22 challenges faced by studies of innovation and service innovation in the context of Mexico and across Latin America. Highlighting certain specific economic and social problems in Mexico and across Latin America, it presents a review of the evolution of innovation thinking. Four scenarios have been designed, towards which economies may evolve, depending on how the challenges posed are taken up: 1) Regional development and inclusive growth, 2) Social and economic polarization, 3) Regional disparity with income distribution, 4) Regional development and income inequality.

KEYWORDS – innovation, service innovation, challenges, Mexico, Latin America

CHALLENGES FOR SERVICE INNOVATION IN DEVELOPING COUNTRIES

The cases of Mexico and Latin America

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INTRODUCTION

The primary objective of this article is to focus on innovation and service innovation across Latin America as a whole and in Mexico, in particular. While studies on innovation do exist, there is not enough awareness in either Latin America or Mexico of innovation's present-day importance as it relates to the growth of the service society. In 2018, Mexico's service economy generated 63% of gross domestic product (GDP), employing 61% of the economically active population (56 million people). Similarly, in 2017, the service economy across Latin America accounted for 62% of GDP (CEPAL, 2017c) and 65% of the active population (CEPAL, 2018a). A further objective of this article is to examine, in a prospective way, those trends that are particularly important for innovation and service innovation¹.

1 Prospective studies find a propitious moment when they are related to a commemorative event. As a matter of fact, Martin's 20 challenges (Martin, 2016) arrived after the 50th anniversary of the Science Policy Research Unit (SPRU) of the University of Sussex. Later, the publication of Djellal and Gallouj's paper on 15 service innovation challenges was presented at the 27th Annual RESER Conference in 2016 (Djellal and Gallouj, 2016). The present paper, proposing 22 challenges in innovation and service innovation for Mexico and Latin America, also came out in 2016, based on the studies conducted

To that end, we draw inspiration from two publications: Martin (2010) and Djellal and Gallouj (2016). Martin's work entailed 1) accounting for the evolution of innovation studies, highlighting the main advances and authors (Martin, 2010) and 2), using this information to draw up a list of 20 future challenges for innovation studies (Martin, 2016). Next, Faridah Djellal and Faiz Gallouj (2016), using the same methodology, described the evolution of service innovation as being based on the shift from "assimilation" to "demarcation" and "integration" perspectives, identifying 15 advances in service innovation studies; they then suggested 15 challenges for these studies².

Emulating the steps taken by Martin, and Djellal and Gallouj, the first task was to select certain leading economic and social problems that could be related to innovation and service innovation in Mexico and Latin America, using the latest available statistic (around the year 2018):

1. In Mexico, *urbanization* (cities with 10,000 or more inhabitants) stands at 80.15%, while across Latin America, 80.6% of the population lives in urban areas (World Bank, 2018b). Urbanization is increasing demand for services, and thus creates opportunities for service innovation.
2. Many people work in *informal* activities: 44% in cities (of more than 10,000 inhabitants) and 70% in rural areas and smaller cities. 27% of informal workers are part of the total employed population (INEGI, 2018a). Across Latin America, 48.4% of urban dwellers work in informal activities (CEPAL, 2017a). These are largely concentrated in commerce and services, so both could require service innovations.
3. *Violence* is widespread in Mexico. In 2018, there were 28,269 victims of crime³ per 100,000 people, 97% of which never

during the 40th anniversary of Seacyt (Spanish acronym of the Seminar on Economics in Science and Technology), which was founded in 1976 at UNAM in Mexico, by Theotonio dos Santos (†) and Leonel Corona.

- 2 These results were later published in two separate publications, one devoted to advances in Services Innovation Studies (Djellal and Gallouj, 2018a), the other to challenges in this field (Djellal and Gallouj, 2018b).
- 3 This number of victims is measured by the perception of crimes having directly affected people or their homes in 2018. These crimes could be one or more per victim from a wide spectrum, such as total or partial theft of a vehicle, home burglaries, robbery or

came to trial (INEGI, 2018b). Across Latin America, the victimization rate is 36% (CEPAL, 2016b). There is therefore a significant increase in security services, which can be improved by technology and service innovations.

4. In 2018, *poverty* affected 42% of Mexico's total population of 125 million inhabitants (CONEVAL, 2018). Across Latin America, 30.2% of the population lives in poverty (CEPAL, 2019). In 2017, of Mexico's 11 million indigenous people⁴, 72% were living in poverty (CONEVAL, 2018) – a much higher proportion than the 38% indigenous population in poverty found in some Latin American countries⁵ (CEPAL, 2014). One solution could be to support collaborative economic activities based on techniques, technologies, and services suited to the different regional and indigenous contexts. These involve organisational innovations in services.
5. Income is *polarized*: higher-income households (30%) account for 63% of total income. Just 9% of total income finds its way to lower-income households (also 30%); this results in a Gini Index of 0.5 (INEGI, 2019). Across Latin America, higher-income households (30%) earn 56% of total income, with just 12% going to lower-income households (also 30%). This results in a Gini Index of 0.46 (CEPAL, 2018b). Another indicator of well-being polarization is expressed in access to information and communication technologies (ICT), as measured by the percentage of households having internet access at home: 52.2% across Latin America, and 50.9% in Mexico (CEPAL, 2017b). Frugal service and technology innovations could help provide access to communication and other resources in lower-income households (Koerich *et al.*, 2019).

assault on the street or on public transport, etc. ENVIPE (acronym in Spanish for the National Survey of Victimization and Perception on Public Safety (INEGI, 2018b).

⁴ 2018 data about people that speak an indigenous language.

⁵ In Latin America, 38% of poverty in the indigenous population is the double of the poverty of the rest of population, 19% (Calvo-Gonzalez, 2016). Indigenous people as a percentage of the population: Bolivia (62%), Guatemala (41%) and Mexico (15%), which has the largest indigenous population with 17 million, followed by Peru (24%) with 7.5 million and Bolivia with 6.2 million. Data circa 2015 about people self-declared as indigenous (Cruz-Saco, 2018).

6. In Mexico, Central America and the Caribbean there is substantial dependence on foreign material imports for the “*maquila duty-free industry*”. In Mexico there are 2.7 million maquiladora workers, *i.e.* 5% of the total active population (INEGI, 2018a). Consequently, there are opportunities to both upgrade the internal position within those global production chains and offer incentives for local production by seeking innovations and service innovations.
7. Regarding *rule of law* and *public policy*, public spending amounts to 28.1% of GDP across Latin America, while it is 20.4% of GDP in Mexico (World Bank, 2017). Moreover, 70% of people aged 18 or over across Latin America, and 63% in Mexico are distrustful of political and state institutions (CEPAL, 2016a). In addition, on the list of countries categorised from lowest to highest levels of corruption, Mexico, with an index of 29, ranks 130th - the worst performance in the OECD. Some Latin American countries have better indexes, for example: Uruguay (71), Chile (67) and Costa Rica (56). The average corruption index for Latin America is 43 (Transparency International, 2019). The fight against corruption requires further effort; to a certain extent opportunities to innovate and apply service innovation in the distribution of public services and money do exist.

This article addresses both the need to highlight challenges requiring the attention of innovation (mainly service innovation) studies, and the need to consider some of Mexico’s and Latin America’s crucial political, economic and social problems – such as those mentioned above. Therefore, following the methodology of two prospective studies by Martin (2016) and Djellal and Gallouj (2018a; 2018b), we propose an agenda of 22 challenges that are faced by studies of innovation and service innovation, in the context of Mexico and Latin America.

This outline is organised into 4 parts: Part 1 is given over to a short literature review, largely based on the reviews by Martin (2016) and Djellal and Gallouj (2016, 2018a, 2018b). Part 2 is devoted to a discussion of the evolution of science, technology and innovation thinking across Latin America and in Mexico. In Part 3 we present and discuss the 22

challenges for service innovation studies identified for Mexico and Latin America. And in Part 4, we design four scenarios towards which economies can evolve, depending on how the challenges posed are taken up.

1. LITERATURE REVIEW: A COMPARISON OF METHODOLOGY

The literature⁶ has suggested 20 innovation and 15 service innovation challenges for the future (Table 1). As already stated, these have been developed based on the steps initially taken by Martin (2010) which consist of: 1) surveying the evolution of thinking on innovation to highlight the main advances and authors and in light of these findings, draw up 2) a list of 20 future challenges for innovation studies (Martin, 2016). Furthermore, Djellal and Gallouj (2016, 2018a and 2018b) first characterized the main advances in service innovation studies, using the “assimilation, demarcation, inversion and integration” framework (Gallouj, 2010). They went on to identify 15 challenges for service innovation studies in the future.

In order to draw a comparison of the two lists of challenges, they are classified into seven domains in this paper, namely: Innovation, Environment, Social, Economy, State, Institutional, and Academia – while maintaining the original challenge numbers assigned by each list. It should also be noted that there is no direct relationship between the classified challenges. For some challenges proposed by one author, there is no counterpart on the other list. For example, Djellal and Gallouj postulate a challenge concerning the environment, while Martin does not explicitly take this into account, and conversely, neither Martin nor Djellal and Gallouj suggest any public service challenges (Table 1).

For the purpose of comparison, the 20 challenges for innovation studies classified by Domain are also found in certain Fields – beginning, appropriately, with Innovation in a general sense⁷. In the first

6 This section concentrates on the methodology used by Martin (2016) and taken up by Djellal and Gallouj (2016, 2018 a and b). Other aspects are found in specific sections of the present paper.

7 Notwithstanding the fact that the other domains also relate to innovation.

challenge “Dark” innovation is noted (to indicate that it is not easily detected). Innovation challenges relate to different contexts: Sectoral, Regional and Global. There are also focal points and interests in which certain innovations could be introduced. These domains could be related to Djellal and Gallouj’s “Forgotten sectors”⁸ and the problems of Developing/Emerging countries. In the case of Developing/Emerging countries, other sectors (in addition to Djellal and Gallouj’s forgotten sectors) must also be included in such a category. Agriculture-related services, informal activities and housework, all of which are common in both Latin American and Mexican contexts, should be investigated via empirical research. In these countries, the assimilation of innovation capabilities (concentrated in sectors such as manufacturing and whose focus is cutting-edge technology) underscores the challenge of moving towards more domestic (or local) innovations in the services sector. From this perspective, the ability to boost these “Forgotten sectors”, mainly through organisation and social innovations, could improve the situation in developing countries (Table 1).

The Environment domain faces challenges – such as global warming and climate change – that “have been recognized as a real threat to the viability and sustainability of the planet” (Lundvall *et al.*, 2018, p. 144). However, only Djellal and Gallouj list this as a challenge to service innovation studies. Martin does not directly mention this topic, although he does, within “Disciplinary sclerosis”, advocate for the economy to be more attentive to other sciences, which could include ecology.

After the Environment, the Social Area carries significant weight for both authors. Martin’s innovation targets social well-being rather than wealth per se, ensuring fair distribution in place of the “winner takes all” approach. However, he also recognizes that certain risks inherent to the innovation process do make it necessary to move towards socially responsible innovations. As might be expected, one third of the challenges suggested by Djellal and Gallouj concern Innovation in the Social domain – yet their proposal also includes new issues not commonly

8 Djellal and Gallouj (2016, p. 414) mention examples of this kind of sector, such as “religious organizations, prisons, driving schools, hairstyling services or beauty treatments, body care services, laundry services, funeral services, police, fire services, social housing services, non-profit organizations...”

addressed in economic thinking, such as Ageing population, Religion, Gender perspective and Ethical concerns. These social aspects are not explicitly considered in Martin's challenges, which explains why some boxes in Table 1 remain blank.

In Martin's column, the Economy domain relates to theory – or, more accurately, to a “paradigm”. After the last major crisis in 2008, it became clear that conventional economic theory lacked the tools necessary to dealing with such a problem. In response, we must identify the causes, but we should leave aside “Ptolemaic economics” and rely more on an open-minded economy. Economic growth, while a necessary condition, should not be the sole focal point. The challenge is to reach “Sustainable development”. For Djellal and Gallouj, in Domain 4 (Economy), the emphasis is on individuals and their interrelationships. They point out that employment (and the skills it generates) both highlight the role of entrepreneurship and present an important challenge for innovation studies. All these considerations are examined through the challenge of systemic evaluation, i.e. moving together towards a smart service ecosystem.

The other half of the fields are mainly institutional challenges. The first of these are those concerned with the state, policy, intellectual property and the openness of innovation. Those following concern the exploitation and cooperation purposes of innovation and, lastly, the academic sphere where the topics are elitism, disciplinary sclerosis and ethical research concerns.

In Table 1, Djellal and Gallouj's 15 challenges are also included in the above-mentioned fields: 1) Innovation includes the “forgotten sectors” (similar to Martin's “dark innovation”) and the challenges faced by developing countries. 2) Half of the challenges are connected to the social field: social innovation, religion, population ageing, gender, ethical issues and evaluation challenges. 3) Topics such as employment, entrepreneurship, smart service ecosystem, and innovation networks are located within the economic challenges. 4) In academia, we find multidisciplinary challenges. Although the environmental challenge is added for service innovation, it clearly must also be related with innovation in general. Service innovation must also consider public services.

TAB. 1 – 20 challenges for innovation, and 15 for service innovation studies.

Domain	Martin's 20 Challenges for innovation studies*					Djellal and Gallouj's 15 Challenges for Service Innovation **
	Martin's number	Field	Shift		Forces/ actions (1)	
1. Innovation	1	Innovation in general	From (Current)	To (Challenge)	Revelation	Djellal and Gallouj's number 12 Forgotten Sectors
	2	Sectoral innovation	Visible	"Dark"	Integration approach (2)	
	3	Focuses	Manufacturing	Services	Interests, traditions (gender)	
	4	Regional	High-tech innovations	High impact of mundane innovations	Multi-scope analysis	
2. Environment (3)			National and Regional	Global		Developing/ Emerging countries
	5	Ecology (4)	Innovation productivity	Green innovation	Ecological crisis	Two empty Rows in Blank

Notes: (1) Forces/actions are the author's interpretation. (2) "The integrative or synthetic perspective provides more a balanced view of innovation in services. It seeks to provide the same analytical frameworks for both goods and services, and for both technological and non-technological forms of innovation (3) "Environmental science focuses on the interactions between the physical, chemical, and biological components of the environment, including their effects on all types of organisms". (4) "Ecology is the scientific analysis and study of interactions among organisms and their environment": <https://scienceprize-scilifelab.se/prize-categories-ecology-environment>

Domain	Martin's number	Field (in general)	Shift		Forces/ actions (I)	Djellal and Gallouj's number	Challenge
			From (Current)	To (Challenge)			
3. Social	8	Social (in general)	Wealth	Well-being	Democracy	2	Social innovation: skills and competences, entrepreneurship.
	9	Distribution	Winner takes all	Fairness for all	Looking for equality	4	Religious Trajectory
	7	Risk	Risk	Social responsibility	Government intervention	5	Population ageing
					Policy/ Education	6	Gender agenda
4. Economy					Social awareness	7	Ethical and societal issues
		Labour				9	Employment and skills
5. State	17	Crisis	Causes of the current crisis		Identification	10	Smart service ecosystems
	10	State	Fixer of failures	Entrepreneurial	Active Role	<i>This box is empty as there is no explicit content on the relation of Public service innovations (Djellal and Gallouj, 2018b). (5)</i>	
	11	Policy	Faith-based policy	Evidence based policy	Reality		

Notes: (5) Gallouj did not include public innovation in the challenges; there is however a current EU research project, 2020 CoVAL, that aims to find new ways of examining the co-creation of value and its integration in order to transform public administration services and processes (<http://www.co-val.eu/>).

Domain	Martin's number	Field	Shift		Forces/ actions (I)	Djellal and Gallouj's number	Challenge
			From (Current)	To (Challenge)			
6. Institutional Rules	12	Appropriation of knowledge	Intellectual property	Open Source	Tensions Balancing**	11	Innovation networks and innovation systems
	14	Innovation purpose	Closed	Open innovation			
	13		Exploration	Exploitation			
	15		Competition	Cooperation			
7. Academia	16	Academic	Case study (policy)	Innovation theory (explanation)	Pricking academic bubbles	13	Multi-disciplinarity: towards a service science?
	18	Research	Disciplinary sclerosis		Avoiding		
	20		Integrity, sense of morality and collegiality		Maintaining	15	Service innovation degrees

Source: Table based on *Table 6 (Martin, 2016, p. 443) and **Box 1.3 (Djellal and Gallouj, 2018b, p. 5).

2. THE EVOLUTION OF SCIENCE, TECHNOLOGY AND INNOVATION THINKING IN LATIN AMERICA AND MEXICO

In terms of Mexico and Latin America, the seven Domains of Table 1 bring the 20 “Innovation Challenges” for the future (Martin, 2016) together with the 15 “Service Innovation Challenges” (Djellal and Gallouj, 2018b). Table 1 also suggests concepts specifically developed for service innovation, such as “assimilation/demarcation” and “inversion/integration” perspectives⁹, which were adapted and supplemented in order to build Mexican and Latin American challenges for innovation and service innovation. This was achieved by reordering around the eight domains and consideration of the following two lines of analysis.

The first line of analysis is the evolution of economic thinking in Mexico and across Latin America, which has also generally followed a different emphasis, beginning in science and technology, which has both resulted in innovation and led to the National Innovation System (NIS).

The second line of analysis is a list of challenges drawn up and grouped both within each domain and within a specific field therein, on the basis of the social and economic problems of Mexico and Latin America. In drawing this up, we have taken into consideration both strengths and weaknesses, as well as the levers needed to improve each country’s performance (Table 2).

A prospective analysis of the forces of change framing the challenges of innovation and service innovation was then applied. Four scenarios were designed, based on two axes: one axis of income concentration-distribution and one axis of regional divergence-convergence development. Consequently, there is A) a desirable scenario relating to the forces of change for the proposed challenges and standing in contrast to B) a starting scenario covering the main Mexican and Latin American economic and social problems (Figure 1).

9 These lines of analysis are based on the different analytical focus of service innovation: the technologist approach (assimilation), the service-oriented approach (demarcation/differentiation), the integrative approach (synthesis) and a fourth perspective, inversion, in light of the active role played by KIBS (Djellal and Gallouj, 2018a, 2018b).

Because the other two scenarios are a blend of C) a desirable and a contrasting current problematic situation and D) regional development with income inequality (Figure 1), they have been used implicitly.

2.1 THE EVOLUTION OF SCIENCE, TECHNOLOGY AND INNOVATION THINKING ACROSS LATIN AMERICA

First, we present an evolution of economic innovation thinking that is based mainly on ECLAC¹⁰ publications. Second, we have identified eight periods for Mexico; these include certain milestones in economic innovation thinking in the Seacyt-UNAM.

2.1.1. *Latin America: science policy analysis of technology* (1950-1979)

A science policy analysis of technology was conducted within a Latin American network. Its central objective was to compare the causes of backwardness in the region that could be attributed (according to this vision) to the lack of any industrial development up to the task of tackling the centre-periphery relationship (in which negative terms of trade for the periphery tend to decrease, and transfer more value to, the centre). On that basis, industrialization had been built around an “imports substitution policy”, meaning that protective commercial import barriers had been imposed, to make room for an internal industrial sector.

“Dependency theory” focuses on external relations that limit development; external technology is one of its main mechanisms. This trend was oriented towards the interpretation of underdevelopment, and the need to change social relations. Although three forms featuring dependence are highlighted, only two are relevant to this analysis. The first of these is financial-industrial dependence, which is characterized by the dominance of large capital in hegemonic centres, and its expansion abroad to invest in raw materials and agricultural products that are consumed in hegemonic centres. This is known as “development out” (Novelo, 2014, p. 7). The second is technological-industrial dependence, which emerged in the post-war period and is characterized by the technological-industrial field of transnational companies that invest in

10 ECLAC, The Economic Commission for Latin America and the Caribbean (ECLAC) – the Spanish acronym is CEPAL.

industries for the internal market of periphery countries. The theory did not however work as described.

2.1.2. Debt crisis and the protection of scientific and technological capabilities (1980-1989).

With the debt crisis, most Latin American countries adopted neoliberal policies advocating that the state should reduce its participation in the economy and let the market operate on its own. These policies, supported by the International Monetary Fund (IMF), led to the privatization of public enterprises and the opening of economies to international markets, culminating in the abandonment of the “import substitution industrialization model”. Nevertheless, some public resources were assigned to the protection of specific scientific and technological capabilities.

The main objective had been to achieve economic growth – but an increment in income concentration ensued. In other words, the opening the *black box* of economic development in terms of reaching growth goals was not accompanied by improved equality (Faynzylber, 1990).

To counter the growing neoliberal trend, Latin America was therefore obliged to adjust its policy recommendations. The recessive adjustment of the balance of payments would be replaced by an expansive adjustment, driving exports via the dynamization of investments in the tradeable goods sectors. One feasible solution was a debt renegotiation agreement between debtors and bankers, with less protectionism on the part of the central countries and a more flexible and pragmatic use of economic policy instruments.

2.1.3. Productive transformation with equity: neo-structuralism and openness to foreign technology (1990-2007)

During this period, human resources training and an active technology policy for long-term productive transformation were highlighted. Though industry remained the axis of productive transformation, its articulations with the primary sector and services stood out, through an integral productive reconfiguration around those branches that would allow technical progress to spread to all sectors of the economy. The provision of a balanced macroeconomic environment was also considered

important. In addition, greater (though gradual and selective) economic openness was achieved as a way of introducing technical progress and increasing productivity.

In that context, the “great priority challenge” was “the recovery of politics as an innovative public action to establish a new balance that complements both state and market”, rejecting “the univocal vision of globalization and neoliberalism” (Sunkel, 2006, p. 24). It was not a matter of returning to the period of state-centred structuralist thinking, because the international environment had completely changed (history is not reversible). In fact, public action by the state was needed because significant corrections to the market model were needed. In a globalized world, the state’s forms of action had to be renewed. In short, the top priority challenge was to reinstate policy as an innovative public action, in order to establish a “new balance” that would “complement the state and the market in the context of globalization” (Sunkel, 2006, p. 24).

2.1.4. Returning to structuralism: public policy’s attempt at boosting innovation (2008-today)

Having realised that Latin American countries needed to seek the growth that would allow them to achieve social, external and environmental balance (Bárcena, 2019), ECLAC initiated a transition from neo-structuralism to structuralism. However, ECLAC also stated the need for international governance to modify international power relations between the Centre and the Periphery. This is where innovation takes on an important role – as a mechanism that allows others to adopt the “core technologies” that will enable them to boost innovation and generate internal productive capacity.

Here again, the state is advised to play a more active role in both the economy and public investment. But not all Latin American countries are ready for this new way of thinking. So far, most – with the notable exceptions of Venezuela, Uruguay, Costa Rica, Cuba, and (since 2019) Mexico – have maintained their neoliberal economic policies, in which the role of the state is restricted to that of a mere corrector of market failures, and its entrepreneurial role is minimized. Public spending has been reduced accordingly, first and foremost impacting public investment – which has always been an important support to the development of new

technologies and innovations. However, from the point of view of social goals, the quality of the technology has caused income inequality to rise. ECLAC also expressed the need for international governance. Sustained, balanced growth has been preserved at the cost of deterioration to the quality of life of most people. Various alternatives have been postulated in response to this, such as the idea of the state playing an active role in the economy, to boost innovation. This would be a move away from the orthodox thinking that is tied to the idea of a market failure corrector state.

2.2. THE EVOLUTION OF SCIENCE, TECHNOLOGY AND INNOVATION THINKING IN MEXICO

In light of the aforementioned four phases of Latin American thinking about innovation and economic evolution, this paper will describe below the eight stages in Mexico's use of Seacyt-UNAM for the pursuit of Science, Technology and Innovation research.

2.2.1. *Science policy analysis of technology (1959-1979)*

1. Gestation (1977-1979): Analysis of the basic economic and social problems of contemporary capitalism. Multinational corporations were considered cells of the system. A new social force of production was based on the scientific and technological revolution (Richta, 1969).

2.2.2. *Debt crisis (1980-1989), though some scientific and technological capabilities were preserved*

2. Take-off (1980-1983): Following the gestation phase of the political economy, the main subjects were the internationalization of capital, the crisis of capitalism and long waves. These topics were also being researched by SPRU (Freeman, 1984).

3. Internationalization (1984-1989): a Latin American research project on technological prospective was carried out by six groups. One of these focused on the political economy of technology, and was based at UNAM Mexico¹¹. The Bariloche group worked on an alternative to

11 The other groups were CENDES in Venezuela, the Campinas University in Brazil, and the Bariloche Foundation in Argentina. The main results of this project are available in Herrera *et al.* (1994).

the limits to growth (Meadows *et al.*, 1972), signposting a new society (Herrera, 1977).

2.2.3. Neo-structuralist openness to foreign technology (1990-2007)

4. Transition (1990-1995): Starting from the perspective that a crisis of economic theories had been caused by increasing the diversity and complexity of contemporary economic problems, a review of the concepts and economic problems relating to technology was conducted, from the standpoint of the main economic theories and approaches (Corona and Paunero, 2013).

5. Business Innovation (1996-2006): The ability to grasp and analyse real economic problems is essential to the development of new approaches; INDICO (Innovation – Diffusion and Competitiveness) – a business-centred index – was thus designed to measure a company's ability to innovate. (Corona-Treviño, 1997). It has also been applied internationally to compare innovation in the triple helix relationship of the new regulated market of NAFTA's three countries (Corona *et al.*, 2006).

2.2.4. A return to structuralism and a public policy attempt at boosting innovation (2008-present)

6. The 2008 economic crisis (2007-2013): three developments occurred in this period. The first was the collaboration that began in 2003 with a group of Management School professors examining approaches to innovation management. The second was a move towards prospective studies methodologies, and its implications as a tool to understand the 2008 world crisis, which began in the United States. One line of reasoning was the interdisciplinary approach to a broader outlook on innovation, centred on its role in the knowledge society. The third development was a deep dive into the agglomeration of regional companies, in a bid to look global but act locally, as well as generate solutions in the face of the economic crisis (Corona and Paunero, 2013).

7. Prospective studies and service innovation (2014-2018): some research has tackled the short- and long-term economic impacts of a prolonged economic crisis in Mexico as illustrated by the 36-year average of low (0.7%) annual per capita growth (World Bank, 2020). This

demonstrates the importance and necessity of: change to the production model; a profound examination of selected sectoral cases and dealing with growing insecurity and violence in Mexico (Kato Vidal, 2015). Such solutions require service organisation and innovation supported by information and communication technologies in Latin America (Cardoso, 2017).

8. Public services innovation in Mexico (2019-2020): Mexico's public sector is changing in line with the so-called 4th Transformation (4T)¹² by improving its ability to deal with certain historic societal demands such as well-being (education and healthcare), fairer distribution, justice, democracy, and combatting corruption (DOF, 2019).

3. 22 CHALLENGES FOR SERVICE INNOVATION STUDIES: MEXICO AND LATIN AMERICA

This paper's focus is on innovation and service innovation in Mexico and across Latin America. We should therefore consider Djellal and Gallouj's Challenge No. 3 (Table 1), which states that there is a service innovation gap in developing and emerging countries. Based on the economic line of innovation-related reasoning in this region, we propose a list of challenges designed to overcome the current situation through studies that help solve socioeconomic problems. In keeping with the Domains listed in Table 1, the challenges aimed at resolving the current situation in Mexico and across Latin America are described in Table 2. They seek to do so by either leveraging the forces of change or overcoming the obstacles¹³.

12 The current Mexican government (2019-2025) has styled itself the "Fourth Transformation", following three major historical events: 1) Mexican Independence (1810-1821) after 300 years of Spanish colonization; 2) The Reformation (1858-1861) that followed the war between liberals and conservatives and ushered in the "Reform Laws" and established separation between church and state, and 3) The Mexican Revolution (1910-1917), in which armed conflict against the dictatorship of Porfirio Díaz led to Mexico's current constitution and the beginning of agricultural land distribution.

13 The Domains of Table 2 have been rearranged to better align them with Latin American and Mexican priorities. See the correspondence with Table 1 in each Domain.

3.1. INNOVATION

Any import of foreign technologies must be designed to lead to internal development capable of assimilating such technologies (C1). However, technology capacity development of this type can only have a broad impact where institutional channels capable of disseminating innovations both exist (via either private firms or public incentives), and result in a wider benefit (C3). The challenges, then, involve both technology and non-technology development, as well as its transfer – including from science. (C1) However, the diffusion of frugal innovations is mainly found locally, predominantly within a single country, and only in rare cases globally (Hossain *et al.*, 2016). Mechanisms therefore need to be created for both the diffusion of “frugal innovations” and for imitation capabilities – those that offer the highest benefits with the lowest use of resources (C2). However, absorption capacities are also required (C4). In addition, because there are clearly inherent risks in the innovative process, risk management capabilities can render innovation more feasible.

3.2. SOCIAL INNOVATION¹⁴

This specific domain is associated with multicultural Mexican characteristics. The local context must be approached in two ways. On the one hand, the preservation and protection of traditions require the active participation of clients, users and providers, so that as they engage in social innovation, their contributions allow for cultural expression (C6). In other words, innovation should permeate the country’s cultures. On the other hand, the actors’ participation should be flexible enough to open up the local context through dissemination mechanisms (C5). Indigenous peoples are an asset that preserves Mexican cultures in a purer way, but because they have also been marginalized, their cultures tend to disappear. Ideally a relationship can be forged between the innovation process and the cultures embodied by indigenous people.

Next, social innovation allows production to change in a way that recognizes the multicultural features of Mexican society, adapts to it and is capable of coming up with solutions that reduce poverty – indigenous poverty in particular.

¹⁴ For a comprehensive view of social innovation see Mulgan (2019). This corresponds to Domain 3 in Table 1.

Violence is a strong inherent cultural trait that must be taken into consideration in order to recognize it as a multidimensional problem. In this sense, suggesting social participatory options that include the specific cultural characteristics of Mexican and Latin American society ultimately represents a social innovation challenge. The mechanisms necessary to reducing rates of violence and poverty, especially among indigenous people, can be generated by community-based projects that are developed comprehensively and cover all sectors of society¹⁵.

3.3. INNOVATION SYSTEMS¹⁶

Innovation systems can be analysed at three levels: national, regional and local. Correspondingly, outward extensions could exist, an important one being the Mexican diaspora (C8). Since there is abundant knowledge of the Mexican population in the United States, there is also the potential of increasing knowledge via connection services with in-country technology and scientific peers. As mentioned in the social innovation section above, the generation of effective channels of relations (C7) can both preserve a culture and use it as a springboard with which to empower the National Innovation System (NIS). The same thing happens with Latin American diaspora, in the sense that the population living abroad can be regarded as an opportunity to improve local, regional, national and Latin American innovation systems through the multidimensional exchanges that this population can provide.

The interrelations generated by innovation systems (both between and within countries) can help build their economic development through the diffusion of technology. In this way, solutions that reduce poverty could be found if an institutional environment were to exist allowing the results of innovation to be adapted to the sectors in which they are applied. Otherwise, income polarization could worsen, in the event that the highest-income segments of society were to monopolize the benefits of innovation systems.

15 An example is found in Cuetzalan, Puebla, Mexico, where different communities have organized to defend their lands and traditional culture, creating cooperatives around coffee production and commercialization (Cobo *et al.*, 2018).

16 Innovation systems correspond to 1.4 Regional and 7. Academia, in Table 1.

3.4. SECTORS: SERVICES¹⁷

Focusing on formal services, the servitization of manufacturing is an important process of the Division of Labour (C9). Mexico and Latin America, whose service sectors account for the largest share of the economy (62% of GDP in Mexico and 63% of GDP in Latin America), both participate in the New International Division of Labour through manufacturing. In other words, the region (mainly Mexico, Central America and some Caribbean countries) is presented as the factory of the world, especially in terms of the “maquiladora industry” (C10). In certain regions, tourism services are dominant as a result of their natural beauty and anthropological attractions (C11). Likewise, internationalization is flourishing, with offices, call centres, and research centres for multinational firms being set up in Mexico and across Latin America (C11). A further aspect is the internal division of services, in specific niches. All of these form an important focus for service innovation research (C11).

Urbanization is another source of services. Wherever the population is concentrated in specific locations, generating growing demand for services, this leads to the provision of those services, resulting in a growing circle of people migrating to urban areas, further increasing the degree of urbanization – and with it, the demand for services and all that this entails. Consequently, while both Mexico and Latin America as a whole have urbanization rates of close to 80% (World Bank, 2018b), this has not been used as leverage for improving services. The fact that urban concentrations are numerous, and that services are located in very specific big cities (Mexico City, as well as other Latin American cities and capitals), reveals a problem in terms of the redistribution and deconcentration of services. Although demand for services is located in urban areas, their supply needs to be expanded – which provides an opportunity for improvements through service innovations.

3.5. SERVICE INNOVATION¹⁸

From the assimilation/demarcation perspective (Gallouj, 2002, 2010), service innovation offers better opportunities for the product service system

17 Services are included in Field (1.2 Sector) of Table 1. It is separate because of its importance to service innovation.

18 Service innovation is also part of Field (1.2) of Table 1.

in terms of the internal domain of key technologies. The fields of e-banking, e-government, and e-city have different kinds of service innovations using ICT technologies (C12). These innovations could include market warnings and product maintenance, and even extend the life of goods. Although these and other Knowledge Intensive Business Services (KIBS) play a particularly important role in the knowledge society (C14), they currently represent an invisible service innovation opportunity (C15). Because it is difficult to include the use of more advanced services and technologies, informal activities (most of which have low productivity) are regarded as presenting a challenge to innovation in services. Only 50% of households in Mexico and across Latin America have ICT access¹⁹. There is a broad area in which innovation in services could be developed to improve access to existing ICT as well as to innovate in its use and development.

3.6. ECONOMY²⁰

As a basic input to the productive system, energy is one of the most important sectors. However, it is not always produced internally. Latin America as a whole is a net importer (6.6% of energy is imported), while Mexico is a net energy exporter (-4.6%) (World Bank, 2018a). In 2015, just 9% of the energy consumed in Mexico came from renewable sources, whereas across Latin America, this indicator stood at 27.6% (World Bank, 2015). The challenge, then, is to render innovation (in both technologies and services) capable of providing solutions or alternatives to current electricity generation, so as to move towards natural resource sovereignty (C16). In other words, the aim is to reduce the heavy reliance on foreign energy services – a sector in which both Mexico and the region as a whole could be self-sufficient.

Mexico, like Central American and Caribbean countries, has a significant “maquiladora” industry that produces goods and services. This industry struggles to attract local suppliers, and its development of internal capabilities and spillover innovations is sparse (C17). It is also a strongly reliant on imports of products and services to the Mexican economy in general, which reduces the possibility of generating internal capabilities. However, the “maquiladoras” could be used as leverage for the achievement of internal capabilities, perhaps helping it switch from

¹⁹ Measured as a percentage of households with Internet access.

²⁰ Economic and industrial sectors are included in Domain 4 of Table 1.

being a high-import industry to one with internal network providers. To that end, the Mexican economy faces the challenge of creating large, planned strategic investment projects to build domestic capability (C18).

In this case, low-productivity informal activities are seen as a challenge to innovation in services in the sense that it is difficult to introduce use of the most advanced technologies in this sector. In fact, high-tech exports as a percentage of manufactured products amounts to 21% in Mexico and 14.3% across Latin America (World Bank, 2018a). Therefore, were the informal sector to be absorbed by the formal economy, there could be improvement to endogenous capacities. Since nearly half of urban workers and 70% of rural workers are employed informally, one major challenge is to provide training in service and technology innovation (C19). The same goes for the “maquiladoras”, whose production dynamics generate little or no innovation. There is also an opportunity here to both absorb this portion of the population and increase productivity.

3.7. INSTITUTIONS²¹

The economic and social rules for both Mexico and Latin America as a whole reveal a low Rule of Law Index²²; Mexico stands at 44 and Latin America at 53 (World Justice Project, 2020). An institutional change would thus require, firstly, efficient organisation of those institutional rules and secondly – in order to apply the rules based on internal capacity – the generation of organisational innovation, either socially or privately. For this reason, top-down policies must be complemented by bottom-up communication channels. In addition, competition requires good-faith cooperation. To that end, the rules governing Public-Private-Partnerships (PPP) are in need of improvement (C20).

The same type of policies need to be applied in other areas (such as security, violence and poverty) in order to improve living standards and establish a solid institutional structure.

As a result, alongside a reduction in the state’s role in the region, there has been a rise in mistrust of public institutions. This is due to problems such as corruption and unlawful relations between public and private agents. A focus on social equity and regional development

21 It groups Table 1’s Domains: 5. State; and 6. Institutional rules.

22 The index goes from 0 to 100, where 100 is complete rule of law and 1 is total absence of rule of law.

is needed. Once economic progress has been achieved and the rule of law has been strengthened, income polarization could be reduced (C21). There are of course fields in which private initiatives will be essential to boosting studies of innovation in services (for example, the use of ICT or extending the life of goods), but the main issues are the institutionalization of innovation channels and taking into account the particular characteristics of Latin America as a whole and Mexico in particular – such as indigenous communities and their culture.

To sum up, an interrelationship between the private and public sectors, based on rule of law, represents a major challenge for service innovation in Mexico and across Latin America.

3.8. ENVIRONMENT²³

Similarly, the quest for sustainable development demands specific pro-environment policies. According to the circles of sustainability method (James, 2015), the institutional settings of both Latin America and Mexico must include such aspects as culture (identity and engagement, creativity and recreation, and enquiry and learning) and ecology (built form and transport, embodiment and sustenance and emissions and waste) (C22). The forces of change are local awareness, coupled with the participation of local people who have been affected by different kinds of pollution, and international cooperation, which at times involves international environmental agencies.

The increasing environmental damage generated by human activities has led to imbalances in wildlife ecosystems. Greater contact with wild animals puts both fauna and humans at risk. One example of this is the recent COVID-19 pandemic, caused by the mutation of a virus originally hosted by bats. It is not the only such disease: 8 out of 10 emerging diseases occur due to invasive wildlife (López-Gatell, 2020). Indeed, other conditions related to wild animals such as rabies (bats), hantaviruses (rodents) and Lyme disease (ticks) are more commonly found in regions having high deforestation rates (Suzán, 2020).

In addition to the direct effects of the COVID-19 lockdown measures on economic activity and social welfare (Deloitte, 2020), it has also opened opportunistic windows for organized crime, which has been able

²³ In table 1 it is Domain 2.

to adapt to the new circumstances by diversifying activities to cyber-crime, clandestine trafficking in drugs, medical supplies, etc. It has also taken advantage of the gap left by governments focused on the health and economic crisis, by attempting to become a “legitimate actor” in, for example, the provision of food and medicine (Mexico) or disinfection campaigns to protect controlled territories (Honduras) (AFP, 2020).

Innovation and service innovation studies thus face the challenge of taking the environment into account within the prevailing economic dynamics while minimizing the risks inherent in the exploitation of natural resources. In other words, of promoting sustainable development in harmony with nature while preventing the appearance of new diseases such as the COVID-19 virus.

TAB. 2 – 22 Challenges for Service Innovation Studies: Mexico and Latin America.

	C	Domain*	From... (current)...	... To... (challenge)	Through the Forces of/ Capabilities/Actors
1	1	Innovation	Import of technology and knowledge services	Development and management of technology and knowledge services	Risk Management
	2		Science	Diffusion of frugal innovations Internal capabilities	
	3		Frugal	Incentives to local innovation	
	4		Imitation	Absorption capacities	
2	5	Social innovation	local context	Channels to spread it	Culture Indigenous People
	6		Eventual participation of clients, users, providers	Institutionalize participation of clients, users, providers	
3	7	Innovation systems	National, NIS regional, local system,	Effective channels of relations	Research Centres Entrepreneurships Public policies
	8		ONIS, Open National Innovation System.	Open to Mexico's diaspora	
4	9	Sectors: Services	Manufacturing	Servitization	Urbanization: Big cities Urban Culture
	10		Factories worldwide	International offices, Call centres	
	11		Tourism	Niches: medical, cultural, sport, ecology, research	

	C	Domain*	From... (current)...	... To... (challenge)	Through the Forces of/ Capabilities/Actors
5	12	Service innovation	ICT	Service innovation applied to: e-banking, e-government, e-city	Diffusion of ICT's applications: Robotization
	13		Maintenance	Extend the life of goods	
	14		KIBS	Knowledge Society	
	15		“Dark”	Visible service innovation	
6	16	Economy	Energy generation and services	Internal energy produc- tion and services	Natural resource sove- reignty and control, use and conservation
	17		Strong dependence of maquiladoras industry on foreign product and service inputs	Maquiladoras as a leve- rage for the development of internal capabilities	Maquiladoras
	18		Large project investment	Strategic project based on internal capabilities	State Participation
	19		Informal economy	Improved informal with new partnerships	Popular economy Skills and competences, Entrepreneurship
7	20	Institutions	Top-down policies	participation: bottom- up	Rule of Law
	21		Competition	cooperation: PPP public–private partnership.	
			Polarization of income and regional disparities	Social equity and regio- nal development	
8	22	Environment	Over-exploitation of natural resources	Sustainable Development	Local awareness and participation International cooperation

*The Domains of Table 2 relate to Table 1 as follows: 1. Innovation (1); 2. Social innovation (3); 3. Innovation systems (1.4 regional; 7. Academia); 4. Sectors: Services (1.2 Sector); 5. Service innovation (as part of 1.2); 6. Economy (4); 7. Institutions (5. State; 6. Institutional rules); 8. Environment (2. Environment).

Source: the author, based on science, technology and innovation thinking and Challenge 3 "Service innovation and developing/emerging countries" (Djellal and Gallouj, 2016).

4. SCENARIOS FOR SERVICE INNOVATION CHALLENGES

The impact of the 22 challenges in innovation studies will depend both on the extent to which they are applied by decision-makers and on how the milieu evolves. If a desirable scenario for Mexico emerges, followed by “Regional development and inclusive growth” that is focused on a sustainable development model, then the challenges of innovation and service innovation studies will produce better results (Scenario A in Figure 1). This requires transparency in the use of public funds and mechanisms for evaluating social and public policies during the implementation process of the sustainable model²⁴.

The opposite scenario is “Social and Economic Polarization”, which prolongs the problems relating to income and regional concentration. Reflecting Mexico’s current reality, this situation is correlated with non-implementation of the anticorruption policies designed to avoid this undesirable situation (Scenario B). The COVID-19 crisis has accentuated existing structural problems in economies worldwide, including in Latin America. There is a need to link the short- to medium- and long-term measures designed to guarantee rights by strengthening the welfare state and providing universal social protections in such a way that it “counteracts the loss of sources of labour income and supports demand by safeguarding household income and consumption, while at the same time facilitating access to health” (ECLAC, 2020).

Inequality puts the poorest sectors of the population at a disadvantage when dealing with the health crisis, with the risk that their already precarious situation may worsen (García, 2020). To move from this Scenario to Scenario A, in the context of “The Great Lockdown”²⁵, the application of countercyclical policies aimed at abandoning the policy of fiscal discipline has been called for in order to allocate financial resources that promote economic growth (OXFAM, 2020).

24 Corruption in general is not good for society, yet rules have produced the opposite of their intended effects. One example of this is taxation that leads to ways of avoiding it; achieving zero tolerance then becomes very costly (North, 1990).

25 Name given to the COVID-19 crisis by the IMF.

The other two hybrid scenarios point to a positive objective, i.e. a mix of a desirable goal with an unattained axis, consisting of resolving regional disparities (scenario D) by building up communications, Internet infrastructure and widespread access to the Internet, without overcoming income concentration. Scenario C increases production policies and income distribution, without tackling regional disparities in Mexico and Latin America (Figure 1).

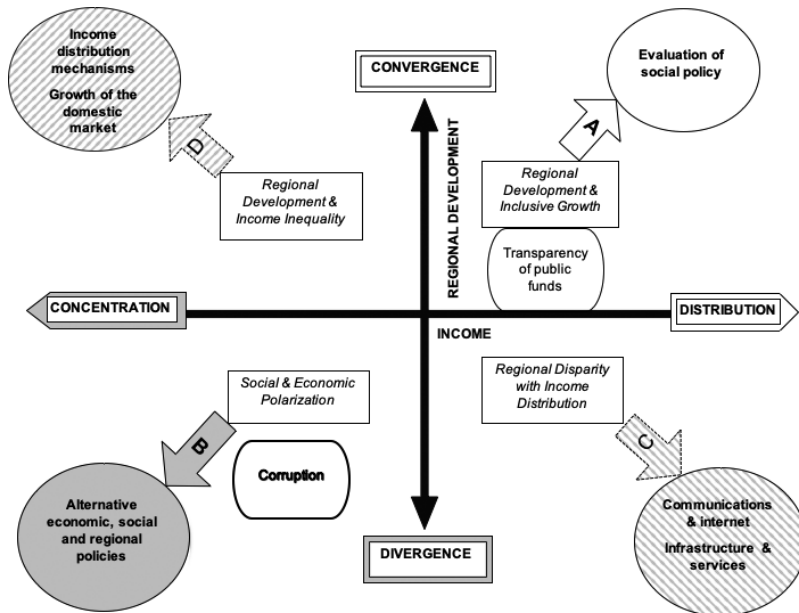


FIG. 1 – Mexico: Scenarios relating to income distribution and regional development (Source: the author).

CONCLUSION

The state of the art of innovation and service innovation can in part be explained by certain important commemorative events²⁶. The intersection of innovation and service innovation occurs on an initial level with the application of innovation to service – mainly rooted in technology. Yet thanks to contributions from service innovation, the original concept of innovation now has an additional dimension which generates an “integrating” concept for technology and services, at another level.

This article has analysed advances in innovation concepts for Latin America as a whole and Mexico in particular, beginning with a description of the evolution of Latin American economic thinking, based on ECLAC, through four phases: A) 1959-1979: Science policy analysis of technology; B) 1980-1989: Debt crisis and the preservation of some scientific and technological capabilities; C) 1990-2007: Neo-structuralism and openness to foreign technology; and D) 2008-present: Returning to structuralism: public policy’s attempt to boost innovation.

These phases were established in order to examine eight periods based on milestones in innovation thinking in Mexico. They also take into account the broad change in labelling, from “science policy research since the 1950s” to “innovation studies” in the 21st century.

One finding is that service innovation across Latin America and in Mexico is incipient, in comparison with Europe as well as – from a theoretical standpoint – even less tangible in respect of its economic and social awareness. This is despite the fact that both Latin American and Mexican economies are mostly service-oriented.

The 22 challenges for innovation and service innovation across Latin America and in Mexico could thus be compared with both Martin’s 20 innovation challenges and Djellal and Gallouj’s 15 service innovation challenges in similar domains and specific fields (Table 3). These were also drawn up with “the intention... not so much to come up with a

26 See note 1.

definitive list but rather to stimulate debate among innovation scholars about the future of our field” (Martin, 2016, p. 432).

In addition to applying what Martin and Djellal and Gallouj suggested were “key challenges for the field of IS (Innovation Studies) over the coming decades” (Martin, 2016, p. 433), the proposed challenges also include a framework of scenarios for the problems. This frames the challenges on the basis of one axis of income concentration-distribution and another relating to regional convergence-divergence. The desirable scenario is a sustainable development model featuring “regional development and inclusive growth” (to neutralize loss of labour while preserving income, consumption, and access to health during the COVID-19 crisis. The opposite scenario reflects the current situation of social and economic polarization caused by the concentration of both income and regions.

Results show that the main challenges listed by both Martin, and Djellal and Gallouj are generally valid for Latin America and Mexico. However, both the emphasis and the kind of social and economic angles vary, depending on the contextual scenarios of Mexico and Latin America. In such cases, domains and fields may or may not vary, whereas the challenges are, as a rule, different.

Consequently, given the structural economic and health crisis in Mexico and across Latin America, the forces of change must be reoriented towards the desirable scenario of institutions being able to improve the rule of law, increase participation for everyone (particularly indigenous people and their access to modern ICT services) and empower the local economy – in part by linking it to the dynamics of modernity, and using the “maquiladora” industry’s leverage. Furthermore, a policy that could mark a turning point on environmental issues and urbanization is needed. This policy should be capable of tackling the chaotic concentration of large cities in Mexico and across Latin America by means of reinforcing the welfare state and supporting universal social protections.

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TAB. 3 – 22 Challenges for innovation and service innovation studies across Latin America and in Mexico.

Field	22 Challenges for Latin America and Mexico
1. Innovation	Develop risk management capabilities to suit different types of innovation and its diffusion, such as:
	1. Technology management and technology transfer 2. Frugal and local innovation 3. Absorption innovation capacities 4. Incentives to innovation development
2. Social Innovation	Take advantage of multicultural context in Latin America and Mexico
	5. To build channels to spread social innovation locally 6. Increased participation of indigenous people through flexible institutionalization
3. Innovation Systems	Foster networking in innovation systems
	7. Improve the linking mechanisms for regional, national and local innovation systems 8. Linking academic with the Mexican diaspora for research and production problems
4. Services	Develop innovation service; Latin America and Mexico are service economies and there is a growing urbanization in big cities.
	9. Inputs to manufacturing servitization 10. Facilitate the location of international research centres, and other service (call centres, etc.) 11. Enable the niche service sectors: medical, cultural, ecology, research
5. Innovation Systems	Foster the trend of specific and complex application of TICs
	12. Automation must be carefully assessed as a major impact on service employment and people's qualifications 13. Facilitate the creation and sustainability of KIBS (Knowledge Intensive Business Service) 14. To make visible different kinds of "dark innovations" services
6. Economy and Industrial Sectors	Raise awareness and participation among people at local and national levels, and take advantage of international cooperation agreements
	15. Service innovation related to energy generation 16. The maquiladora industry could be a leverage to increase internal production 17. Implement large investment projects to develop internal resources: qualifications of personnel and local firms 18. The informal economy is an important part of the economy which needs special legislation for productive development

Field	22 Challenges for Latin America and Mexico
7. Institutional: State	Institutionally apply the rule of law, leading to:
	19. Facilitation of (non-corrupted) PPP (Private-Public Partnerships) to set up efficient organisations.
	20. Increased social participation in social and economic problems (bottom-up).
	21. Regional, national and local policies to diminish income polarization and regional disparities.
8. Environment	Both local participation and international cooperation are needed.
	22. Sustainable development with social and regional equity

Source: based on Table 2.

REFERENCES

- AFP (2020), “Pandemia de Covid-19 y América Latina, una ventana de oportunidad para el crimen organizado”, *El Economista*, 16 May 2020: <https://www.eleconomista.com.mx/internacionales/Pandemia-de-Covid-19-y-America-Latina-una-ventana-de-oportunidad-para-el-crimen-organizado-20200516-0011.html>, Accessed June 10, 2020.
- BÁRCENA A. (2019), *Cambio de época y nuevo modelo de desarrollo: la interpretación estructuralista*, Conferencia magistral en Facultad de Economía, UNAM, México, October 30.
- CARDOSO F. H. (2017), “The Future of Latin America in the Global Economy. An Interview with Fernando Henrique Cardoso”, in *Alternative pathways to sustainable development: lessons from Latin America*, International Development Policy series, nº 9, Geneva, Boston: Graduate Institute Publications, Brill-Nijhoff, p. 16-22.
- CALVO O. (2016), “¿Por qué la población indígena tiene mayor probabilidad de ser pobre?”, Banco Mundial Blogs, blogs.worldbank.org/es/opendata/por-qu-la-poblaci-n-ind-gena-tiene-mayor-probabilidad-de-ser-pobre, Accessed February 10, 2020.
- CEPAL (2014), “Population living in extreme poverty and poverty by ethnicity, sex and geographical area”, CEPALSTAT, <https://cepalstat-prod.cepal.org/cepalstat/tabulador/ConsultaIntegrada.asp?idIndicador=3342&idioma=e>, Accessed February 10, 2020.
- CEPAL (2016a), “Distrust in the political and state institutions by sex”, CEPALSTAT: <https://cepalstat-prod.cepal.org/cepalstat/tabulador/ConsultaIntegrada.asp?idIndicador=995&idioma=i>, Accessed February 10, 2020.
- CEPAL (2016b), “Victimization rate by sex”. CEPALSTAT: <https://cepalstat-prod.cepal.org/cepalstat/tabulador/ConsultaIntegrada.asp?idIndicador=1842&idioma=i>, Accessed February 10, 2020.
- CEPAL, (2017a), “Estadísticas e indicadores sociales”. CEPALSTAT. <https://cepalstat-prod.cepal.org/cepalstat/tabulador/ConsultaIntegrada.asp?idIndicador=252&idioma=e>, Accessed February 10, 2020.
- CEPAL (2017b), “Percentage of households with Internet access at home”. <https://cepalstat-prod.cepal.org/cepalstat/tabulador/ConsultaIntegrada.asp?idIndicador=1877&idioma=i>, Accessed February 10, 2020.
- CEPAL (2017c), “PIB anual por actividad económica a precios constantes en dólares. CEPALSTAT”. <https://cepalstat-prod.cepal.org/cepalstat/tabulador/ConsultaIntegrada.asp?idIndicador=2216&idioma=e>, Accessed February 10, 2020.

- CEPAL (2018a), “América Latina y El Caribe: Perfil regional económico”. CEPALSTAT. https://estadisticas.cepal.org/cepalstat/Perfil_Regional_Economico.html?idioma=spanish, Accessed February 10, 2020.
- CEPAL (2018b), “Distribution of national income of the households by income deciles, by geographical areas”. CEPALSTAT. <https://cepalstat-prod.cepal.org/cepalstat/tabulador/ConsultaIntegrada.asp?idIndicador=3390&idioma=i>, Accessed February 10, 2020.
- CEPAL (2019), “Crece la pobreza extrema en América Latina”. <https://news.un.org/es/story/2019/01/1449412>, Accessed February 10, 2020.
- COBO R., PAZ L. & BARTRA A. (2018), *¿Somos Tosepan! 40 años haciendo camino*, Mexico City: Union de cooperativas Tosepan, Circo Maya Fundación, Rosa Luxemburgo.
- CONEVAL (2018), *Social Development Policy Evaluation Report*. Mexico City.
- CORONA TREVIÑO, L. (1997), *Cien empresas innovadoras en México*, México: M.A. Porrúa, UNAM.
- CORONA L. & PAUNERO X. (2013), *Ante la crisis: estrategias empresariales de innovación en México y España*, México: UNAM Siglo XXI.
- CORONA L., DOUTRIAUX J., & MIAN S. (2006), *Building knowledge regions in North America: Emerging technology innovation poles*, Cheltenham, U.K, Northampton, MA, USA, Edward Elgar Publishers.
- CRUZ-SACO M. A. (2018), *Indigenous communities and social inclusion in Latin America*, New York: United Nations Expert Group Meeting on Families and Inclusive Societies.
- DELOITTE (2020), Barómetro de empresas. <https://www2.deloitte.com/content/dam/Deloitte/es/Documents/acerca-de-deloitte/Deloitte-ES-Barometro-de-empresas-COVID-19-20200329.pdf>, Accessed March 29, 2020.
- DJELLAL F. & GALLOUJ F. (2016), “Fifteen advances and fifteens challenges for service innovation studies”, 26th RESER Conference, *What's ahead in service research? New perspectives for business and society*, 8-10 September, Naples, Italy.
- DJELLAL F. & GALLOUJ F. (2018a), “Fifteen advances in service Innovation Studies”, in SCUPOLA A., FUGLSANG L. (eds), *Integrated Crossroads of Service, Innovation and Experience Research-Emerging and Established Trends*, Cheltenham, UK, Northampton, MA, USA, p. 39-65.
- DJELLAL F. & GALLOUJ F. (2018b), “Fifteen challenges for Service Innovation Studies”, in GALLOUJ F., DJELLAL F. (eds), *A Research Agenda for Service Innovation*, Cheltenham, UK, Northampton, MA, USA, Edward Elgar Publishers, p. 1-26.
- DOF (2019), *Plan Nacional de Desarrollo 2019-2024*. Diario Oficial de la Federación https://www.dof.gob.mx/nota_detalle.php?codigo=5565599&fecha=12/07/2019, Accessed May 11, 2020.

- ECLAC (2020), "The Social challenge in times of COVID-19", *Special Report COVID19 No 3*, Economic Commission for Latin America and the Caribbean, Santiago, Chile, 12 May 2020.
- FAYNZYLBER F. (1990), "Industrialización en América Latina: de la 'caja negra' al 'casillero vacío': comparación de patrones contemporáneos de industrialización", *Cuadernos de la CEPAL No.60* 176 p. Santiago de Chile: Naciones Unidas-CEPAL.
- FREEMAN C. E. (1984), *Long Waves and the International Diffusion of the Automated Labour Design Innovation and Long Cycles in Economic Development*, London, Royal College of Arts.
- GALLOUJ F. (2002), *Innovation in the Service Economy*, Cheltenham, UK and Northampton, MA, USA, Edward Elgar.
- GALLOUJ F. (2010), "Services innovation: assimilation, differentiation, inversion and integration", in BIDGOLI H. (Ed), *The Handbook of Technology Management*, Hoboken, New Jersey John Wiley and sons, p. 989-1000.
- GARCÍA A. (2020), "La crisis por Covid-19 profundizará la desigualdad y la pobreza en América Latina", *El Economista*, 21 April, 2020: <https://www.eleconomista.com.mx/politica/La-crisis-por-Covid-19-profundizara-la-desigualdad-y-la-pobreza-en-America-Latina-Cepal-20200421-0076.html>, Accessed May 11, 2020.
- HERRERA A. (1977), *Catastrofe o nueva sociedad?: modelo mundial latinoamericano*, IDRC, International Development Research Center, Ottawa, Canada.
- HERRERA A., CORONA L., DAGNINO R., GALLOPIN G., GUTMAN P. & VESSURI H. (1994), *Las nuevas tecnologías y el futuro de América Latina: riesgo y oportunidad*, Mexico: Universidad de las Naciones Unidas, Siglo XXI.
- HOSSAIN M., SIMULA H. & HALME S. (2016), "Can frugal go global? Diffusion patterns of frugal innovations", *Technology in Society*, vol. 46, n° 1, p. 132-139.
- INEGI (2018a), *National Occupation and Employment Survey*. https://www.inegi.org.mx/sistemas/Infoenoe/Default_15mas.aspx, Accessed May 11, 2020.
- INEGI (2018b), *National Survey of Victimization and Perception on Public Security*. <https://www.inegi.org.mx/temas/manufacturasexp/default.html#Tabulados>, Accessed May 11, 2020.
- INEGI (2019), Press release no. 384/19 (31 July 2019). https://www.inegi.org.mx/contenidos/saladeprensa/boletines/2019/EstSociodemo/enigh2019_07.pdf, Accessed May 11, 2020.
- JAMES P. (2015), *Urban Sustainability in Theory and Practice: Circles of Sustainability* (First ed.), New York, Routledge.
- KATO VIDAL E. L. (2015), "Violence in Mexico: An economic rationale of crime and its impacts", *EconoQuantum, Revista de Economía y Negocios*, vol. 12, n° 2, p. 93-108.

- KOERICH G. & PELLIZAARO DE LORENZI É. C., “Frugal Innovation: origins, evolution and future perspectives”, *Cuadernos EBAPE.BR*, n° 4, Rio de Janeiro, Oct./Dec. 2019.
- LUNDVALL B.-Å., CHAMINADE C. & HANEEF S. (2018), *Advanced Introduction to National Innovation Systems*, Cheltenham-Northampton: Edward Elgar.
- LÓPEZ-GATELL H. (2020), “Riesgo de que se presenten nuevas enfermedades como el virus SARS-CoV-2”, in MIRANDA F. (Ed), Conferencia de prensa de la Secretaría de Salud de México. México. <https://www.milenio.com/politica/lopez-gatell-enfermedades-emergentes-invasion-vida-silvestre>, Accessed May 11, 2020.
- MARTIN B. R. (2010), “Science policy research – having an impact on policy?” *OHE Seminar Briefing*, n° 7, Office of Health Economics, London.
- MARTIN B. R. (2016), “Twenty challenges for innovation studies”, *Science and Public Policy*, vol. 43, n° 3, p. 432-450.
- MEADOWS D., MEADOWS D. L., RANDERS J. & BEHRENS W. (1972), *The Limits to Growth*, New York, Universe Books, A Potomac Association Book.
- MULGAN G. (2019), *Social Innovation: How Societies Find the Power to Change*, London, UK, Policy Press.
- NORTH D. (1990), *Institutions, institutional change and economic performance*, Cambridge, Cambridge University Press.
- NOVELO F. (2014), *El desarrollo económico y social en América Latina: El doble atraso* (p. 21), Serie Estudios y perspectivas, México: ONU-CEPAL.
- OXFAM (2020), “Crisis de desigualdad en tiempos de Coronavirus”. OXFAM: <https://www.oxfamMexico.org/sites/default/files/Posicionamiento%20OMX%20ante%20emergencia%20COVID19.pdf>, Accessed May 11, 2020.
- RICHTA, R. (1969), *Civilization at the Crossroads: Social and Human Implications of the Scientific and Technological Revolution*, New York, Routledge International Arts and Sciences Press.
- SUNKEL O. (2006), “En busca del desarrollo perdido”, *Problemas del Desarrollo*, vol. 37, n° 147, 13-44.
- SUZÁN, G. (2020), Necesario monitorear si humanos transmiten SARS-CoV-2 a animales. (DGCS, Entrevistador), *Gaceta UNAM*: <https://www.gaceta.unam.mx/necesario-monitorear-si-humanos-transmiten-sars-cov-2-a-animales/>, Accessed May 11, 2020.
- TRANSPARENCY INTERNATIONAL (2019), “Corruption Perceptions Index”, Transparency International: <https://www.transparency.org/cpi2019>, Accessed February 19, 2020.
- WORLD BANK (2015), *Indicators*. <https://datos.bancomundial.org/indicador/>, Accessed February 19, 2020.

- WORLD BANK (2017), *Indicators*. <https://datos.bancomundial.org/indicador/>, Accessed February 19, 2020.
- WORLD BANK (2018a), *Exports of high-tech products (% of exports of manufactured goods)*. <https://datos.bancomundial.org/indicador/TX.VAL.TECH.MF.ZS?locations=MX-ZJ&view=chart>, Accessed February 19, 2020.
- WORLD BANK (2018b), *Indicators*. <https://datos.bancomundial.org/indicador/>, Accessed February 19, 2020.
- WORLD BANK (2020), *World Development Indicators (WDI)*. <https://databank.worldbank.org/source/world-development-indicators>, Accessed February 19, 2020.
- WORLD JUSTICE PROJECT (2020), *Rule of Law Index*. Washington: WJP.