


RESEARCH ARTICLE

State-business Relations and Industrial Upgrading in the Digital Era: The Cases of Software and Aerospace Sectors in Mexico (2000–2012)

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Abstract

Developing countries face the daunting challenge of stimulating innovation-intensive sectors to increase their participation in the knowledge economy. In this context, two pressing questions arise: What types of state-business relations foster the adoption of industrial upgrading policies? And, what are the mechanisms through which some state-business relations configurations shape the likelihood of policy adoption under more democratic and open conditions? Bridging developmental state and business politics literature, this paper presents a novel framework that posits that the levels of bureaucratic quality and business cohesion generate diverse industrial upgrading policymaking patterns, and thus outcomes. An in-depth case study of the software sector and a cross-case comparison of the aerospace sector in Mexico during the 2000s illustrate and refine the framework. This article makes three main contributions. First, it expands extant political economy theories of industrial upgrading in developing democracies. Second, it improves our understanding of the private sector by carefully analyzing sectoral business cohesion. And third, the paper specifies the mechanisms through which bureaucrats and firms in democratic developing countries collaborate to enact programs that spur high-tech industries in the twenty-first century.

Keywords: state-business relations, industrial policy, developing countries, Latin America, Mexico

Developing countries face the daunting challenge of increasing their participation in the global knowledge economy. Unfortunately, they are often caught in the “middle-income trap,” a situation in which they can no longer compete with low-wage countries producing standardized products, nor against economies with greater innovation capabilities.¹ Furthermore, during the 2000–2013 commodity boom, many of them experienced re-primarization.² In this context, policymakers look for ways to promote industrial upgrading.

While there is substantial literature suggesting that state-business collaboration is the most effective way to approach industrial upgrading,³ we still don’t have a clear understanding of the mechanisms through which state-business collaboration succeeds. Developmental state works revealed that meritocratic bureaucrats in East Asia were capable of stimulating the transition into higher value-added activities.⁴ Yet these studies largely focus on economic transformations that took place under authoritarian regimes prior to the digital era. More recent studies of developed democracies highlight the importance of inter-agency collaboration and close public-private interaction.⁵ Meanwhile, business

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¹Paus, 2014.

²Castillo and Martins, 2016.

³Fernández-Arias et al., 2016; Rodrik, 2007; Schneider, 2015.

⁴Johnson, 1982; Wade, 1990; Evans, 1995; Rauch and Evans, 1999; Amsden, 2001; Kohli, 2004.

⁵Block, 2008; Breznitz, 2007; Meckling and Nahm, 2018; O’Riain, 2004; Ornston, 2012; Weiss, 2010.

politics analyses have revealed how firms shape the outcomes of economic policymaking processes, such as structural adjustment, trade liberalization, and taxation in Latin America.⁶ Aside from Schneider's (2015) seminal work, industrial policy in democratic developing countries has received limited scholarly attention.

This article makes three important contributions. First, it presents a novel framework for analyzing the political economy of industrial upgrading policies in democratic developing countries that bridges developmental state and business politics literatures.⁷ The main argument is that state-business interactions, shaped by bureaucratic quality and business cohesion, generate four patterns in policymaking processes: synergistic, state-led, business-led, and quiescent. Each of these patterns leads to different policy outcomes.

Two case studies from twenty-first-century Mexico—software and aerospace—illustrate and refine the framework.⁸ These cases present varied business-government patterns thus providing an excellent opportunity to conduct intra- and cross-case comparisons. Information comes from semi-structured interviews with key actors, primary documents, and secondary literature. While this is a partial test because both cases occurred under relatively high bureaucratic quality, and only the business cohesion levels differed, this research design facilitates a second contribution of this paper: to improve our understanding of the private sector by dissecting business cohesion. The earlier scholarship on business organizations has mostly centered on “encompassing” (peak) organizations that brought together actors from across the economy.⁹ Instead, this paper conceptualizes and measures “sectoral” business cohesion.¹⁰

Thirdly, the analysis uncovers the causal mechanisms underlying successful state-business collaboration. Through process-tracing, the software case reveals how a meritocratic bureaucracy and a cohesive business sector generated a synergistic policymaking process. Firms and policymakers deployed: 1) professionalized information assessment; 2) formal collaboration; and 3) joint lobbying, to surmount the resistance of congressional veto players. The cross-case comparison of the aerospace sector shows a different business-government relations pattern. Bureaucratic quality was high, but the business sector was initially unorganized. Therefore, the mechanisms and policy outcomes differed. Only after business cohesion increased, did a more comprehensive policy emerge.

Overall, this article underscores the relevance of the political and institutional context. Mexico, like many developing countries, has undergone democratization that has transformed the structures and actors of economic policymaking.¹¹ Business associations, regional governments, and sometimes legislators, have thus become increasingly relevant. Their participation shapes the likelihood and the design of much-needed industrial upgrading programs.

Some scholars consider sectoral business organizations to be legacies of corporatism and authoritarianism. The prevailing view sees special-interest organizations as an obstacle for economic development, which leads to state capture.¹² Furthermore, the value of business cohesion appears counterintuitive in an era where flexibility is deemed crucial for innovation. But evidence shows that to succeed, high-tech firms require public-private and inter-firm cooperation to sponsor capital investment, R&D, training, and certification processes.¹³ This study finds that when directed toward productive goals, such as increasing firm participation in policymaking through more institutional channels, the effects of sectoral business organizations can be positive. Additionally, associations also temper distrust among firms. As trust increases, so too does the possibility of collaboration for innovation.

⁶Castaneda, 2016; Etchemendy, 2011; Fairfield, 2015; Özel, 2015.

⁷I use “democratic” although most developing countries are only electoral democracies, to distinguish those under authoritarian regimes.

⁸In 2000, Mexico's National Development Plan (2001–6) identified twelve strategic sectors: software, aerospace, textiles, leather, agro-industrial, trade, construction, chemicals, tourism, maquila, automotive/auto parts, and electronics.

⁹Schneider, 2004; Silva, 1996; Weyland, 1997.

¹⁰I thank the reviewer who highlighted this point.

¹¹Thacker, 2000; Shadlen, 2004.

¹²Olson, 1982.

¹³Ornston, 2012.

This paper also challenges assumptions about the potential adverse effects of foreign-owned multinational corporations (MNCs) and large domestic firms for industrial upgrading.¹⁴ Closer analysis reveals that when these firms are incorporated into business associations, high-tech small and medium enterprises (SMEs) access more resources and expertise to advocate for government support. Though bureaucratic quality must serve as a counterweight, ensuring funding reaches all types of firms.

The article is organized into five sections. Sections 1 and 2 lay out the analytical framework and the research design, respectively. Section 3 presents an in-depth case study of the software sector, while section 4 contains a comparative analysis of the aerospace sector. Section 5 assesses alternative explanations. The conclusion discusses the plausibility of the framework in other cross-national and sub-national settings alongside further research recommendations.

State-business relations and industrial upgrading in democratic developing countries

Developmental state literature demonstrated the importance of executive leadership and close firm-government collaboration on economic transformations through rich case studies of countries under authoritarian regimes and before the digital era. Quantitative studies confirm a positive and significant relationship between levels of bureaucratic quality and development outcomes around the world.¹⁵ But in general these studies have barely considered business cohesion and lobbying.¹⁶ Recent analyses of developed countries, i.e. the United States, Israel, Taiwan, and Ireland, have shown the fundamental role of inter-agency coordination and public-private partnerships in the advancement of high-tech industries like biotechnology, nanotechnology, electric vehicles, and IT.¹⁷ Still, researchers have paid less attention to these dynamics in emerging economies. Overall, the literature on the developmental state is insufficient to explain how innovation-intensive activities flourish in developing countries under more democratic conditions and the private sector's role.

Business politics analyses have traced private sector strategies to set the agenda and push for its preferred structural adjustment, trade, and fiscal policies in developing countries.¹⁸ Quantitative studies have found a positive and significant relationship between business cohesion and economic growth.¹⁹ Nonetheless, few scholars have examined industrial policy in detail. Schneider's (2015) book on state-business cooperation for industrial policy in Latin America represents a stepping stone, though a shortcoming exists in that most of the author's empirical evidence is derived from traditional manufacturing sectors with a brief mention of the software sector. Schneider concludes that there is still ample room to "systematically assess the ways in which existing political systems channel business influence and the particular preferences and capabilities that big business groups and MNCs bring to industrial policy."²⁰

Next, I present an analytical framework to study industrial upgrading in developing democracies that bridges developmental state and business politics literature. The case studies in the empirical section further refine the theory. My general argument is that firms and governments create different patterns of state-business interactions. These patterns shape the policymaking processes and the mechanisms through which bureaucrats and businesses convince (or do not) veto players. Therefore, the likelihood of policy adoption varies, as do the types of policies.

Industrial upgrading policies are strategies seeking the creation or consolidation of high-technology sectors in which knowledge is essential; for instance, software, biotechnology, and aerospace. The amount of value added in these sectors can vary widely. Nevertheless, middle-income countries embrace these sectors because they can combine low and high value-added activities for their unskilled and skilled workers.

¹⁴Schneider, 2013.

¹⁵Cingolani et al., 2015; Rauch and Evans, 1999.

¹⁶Haggard (2018) comprehensively reviews developmental state literature and new research avenues.

¹⁷Block, 2008; Breznitz, 2007; O'Riain, 2004; Meckling and Nahm, 2018; Ornston, 2012; Weiss, 2010.

¹⁸Castaneda, 2016; Etchemendy, 2011; Fairfield, 2015; Özel, 2015.

¹⁹Cali and Sen, 2011.

²⁰Schneider, 2015, 75–6.

Bureaucratic quality is the extent to which government agencies possess Weberian standards of meritocratic recruitment, predictable careers or ladders, technical expertise, and competitive wages. Earlier developmental state studies find that bureaucratic quality impacts economic development policies and their outcomes.²¹ Also, where there is meritocratic recruitment, bureaucrats will be less interested in bribes.²²

Sectoral business cohesion is the degree to which firms in the same sector coordinate their policy demands and their actions. When business cohesion is high, firms organize into sectoral associations that ideally: represent all types of firms; are well organized and staffed; and use their institutional strength for productive ends. The association may include domestic and foreign firms, though some developing countries' laws ban foreign-owned firms from participating in business organizations. Several advantages result from a cohesive business sector.²³ First, organized firms provide aggregate information that is useful for decision making. Also, the associations channel firm demands in a coordinated way, reducing conflict and limiting narrow interests. "Cooperation [with government] is further facilitated by intra-organizational cohesion. Cohesive organizations can make credible commitments because of their ability to control shirking among their members."²⁴

In contrast, when business cohesion is low, sectoral association is lacking, with each firm lobbying for its own interests. Big businesses are in an advantageous position because they have more resources to staff government-relations departments, pay for lobbying firms, or even fund electoral campaigns. Meanwhile, SMEs may have a hard time voicing their concerns unless they possess strategic ties to politicians or bureaucrats.

The combination of *business cohesion* and *bureaucratic quality* generates four broad patterns of business-government relations (see table 1). I hypothesize that these varied patterns generate different policy processes and policy outcomes. One caveat is that patterns are not static: cases may move toward other types. The model captures certain endogeneity because states can influence business cohesion overtime.

A *synergistic process* emerges with a cohesive business sector and high-quality bureaucrats. Business cohesion allows firms in a sector to better aggregate information, set clear goals, and negotiate with the government as a block.²⁵ Efforts to affect government indirectly through associations are likely to generate less distortion and narrow rent-seeking than those made directly by firms in the form of unofficial payments to officials.²⁶ Once a policy is approved, the government may even grant associations the task of distributing the benefits derived from programs.²⁷ Meanwhile, meritocratic bureaucrats possess technical expertise and negotiation skills. They can collect and assess information from several sources to generate long-term development plans and can work closely with businesses without being captured by firms' interests.²⁸

Theoretically, this is one of the best scenarios for industrial upgrading because both businesses and states work toward a common goal with relevant information available and management capabilities. Special interests are thus restrained. Adoption of programs is most likely because firms and bureaucrats collaborate to surmount opposition. Policies are likely to be comprehensive, that is, funding will be available to all firms, awarded under clear criteria.

In the *state-led process*, the quality of bureaucracy is high, but business cohesion is low. Therefore, the state imposes its will without much firm participation. Meritocratic bureaucrats have the skills to collect and assess information. Competitive wages and long-term positions in government prevent capture. Bureaucrats may generate consultation mechanisms with a group of firms they deem relevant. Prior studies revealed that voice is granted to firms with high profitability or holding considerable

²¹Johnson, 1982; Evans, 1995; Rauch and Evans, 1999; Amsden, 2001.

²²Dahlström et al., 2012.

²³Fairfield, 2015.

²⁴Weyland, 1997, 53.

²⁵Cammett, 2007; Doner and Schneider, 2000; Haggard et al., 1997.

²⁶Nugent and Sukiassyan, 2009, 425.

²⁷Doner and Schneider, 2000.

²⁸Evans, 1995; Etchemendy, 2011; Fairfield, 2015.

Table 1: Patterns of State-Business Relations and Their Outcomes

Key Variables		Outcomes		
Business Cohesion	Bureaucratic Quality	State-Business Patterns and Policy Processes	Likelihood of Policy Adoption	Policy Type
High	High	<i>Synergistic</i>	High	Comprehensive
Low	High	<i>State-led</i>	Medium	Selective
High	Low	<i>Business-led</i>	Medium	Particularistic
Low	Low	<i>Quiescent</i>	Low	None

Source: Author's elaboration.

market shares.²⁹ Furthermore, some governments first generate business associations to have official counterparts for policymaking.³⁰ Policy adoption is likely because meritocratic bureaucrats will collect relevant information to convince skeptical veto players. However, the policies will be selective because bureaucrats set allocation standards and determine recipients.³¹

The *business-led process* occurs when business is cohesive but bureaucratic quality is low. A lack of formal dialog provokes uncoordinated actions. Business associations lead efforts for industrial upgrading, but without the input of professional bureaucrats, their plans may be partial. There is a medium likelihood of policy adoption because business may fail to convince key veto players on its own. Capture is possible, given that firms are well organized and do not have a counterweight. Policies may be particularistic because dominant firms are in a better position to impose their policy proposals.

Finally, the *quiescent process* is characterized by low levels of business cohesion and low levels of bureaucratic quality. Significant asymmetries in a firm's access to policymakers prevail. Large firms have political affairs departments, hire lobbying firms, or fund elections. Thus, their access and influence over policymakers is larger than that of SMEs. On the government side, low-bureaucratic quality allows politicians to impose their will. They may push programs benefiting their interests rather than industrial upgrading. Without business associations, firms provide incomplete information to bureaucrats. Since bureaucrats have limited skills or lack incentives to assess the proposals, initiatives derail. In a quiescent pattern, the adoption of industrial upgrading programs is unlikely.

The following section presents the research design that illustrates the theory and further refines it.

State-business relations patterns and policy outcomes in Mexico

I claim there is room for further typological theory development about the role of business and its interactions with government in industrial policymaking. As George and Bennet (2005, 251) note: "Advanced research programs may offer opportunities for theory-testing case studies and studies of typologically similar cases with slightly different outcomes that might yield new subtypes or more finely-differentiated variables."

The research design comprises an in-depth case study and a cross-case comparison of two economic sectors with potentially high technological complexity: software and aerospace in Mexico. The in-depth analysis of the software sector (2000–2006) offers a general theory test. It also contributes to the literature by process-tracing the causal mechanisms through which firms and bureaucrats established a sectoral program. Information comes from semi-structured interviews with key actors, industry reports, and newspaper articles.³² A cross-case comparison with the aerospace sector provides a most similar design and develops category subtypes. Bureaucratic quality is kept constant because

²⁹Kang, 2002; Evans, 1995.

³⁰Martin and Swank, 2012; Schneider, 2004; Wade, 1990.

³¹Amsden, 2001.

³²Appendix 1 lists interviewees.

the Ministry of Economy (MoE) guided policy formulation in both sectors. Yet business cohesion varies. Sectoral policies for software were adopted by 2004. Meanwhile, the aerospace sector did not accomplish a comprehensive program until 2012. The aerospace case also facilitates an assessment of business cohesion overtime. Data for this case comes mostly from secondary sources.

Mexico is a compelling country to examine for several reasons. First, it is puzzling that initiatives to spur the software and aerospace sectors arose in 2000, in contrast with prevailing neoliberalism that had dismantled vertical industrial policies during the 1990s.³³ Secondly, despite being simultaneously targeted as strategic sectors, the ultimate results varied widely. While the software sectoral program was launched in 2003, the aerospace program stalled. Finally, Mexico hosts several MNCs thus it is possible to assess their role in industrial policymaking.

A limitation of this design is that it may be vulnerable to erroneous inference if relevant variables are omitted. But the combination of intra-case and comparative methods reduces the risk of mistaken inferences. The ideal test would include cases with low-bureaucratic quality, but given space constraints, this is not possible. The *quiescent* and *business-led* patterns are briefly explored in the conclusion section and examined elsewhere through subnational analysis.³⁴

The qualitative approach allows for a finer-grained measurement of the main variables: business cohesion and bureaucratic quality. Business cohesion assessment builds on Doner and Schneider (2000) considering the: 1) presence or absence of sectoral business organizations; 2) organizations' age; 3) membership, factoring in the coverage of organizations through total membership levels, market share, and members' size and nationality (Domestic/Foreign); and 4) organizational capacity: resources and services offered. This operationalization aligns with and refines recent analyses of firms' strategies to advance their policy preferences.³⁵ I collect these indicators for the software and aerospace sectors.

Bureaucratic quality appraisal follows Evans and Rauch (1999) and Dahlstrom et al. (2011). These authors underscore three dimensions related to Weberian bureaucracy: recruitment, career, and the reward system for public employees. Recruitment considers whether bureaucrat selection is based on merit and formal examinations as opposed to political criteria. The career criterion measures the extent to which promotion in the hierarchy is an internal affair and is based on lifelong career paths. The reward system measures the existence of competitive salaries and special protection from extraordinary labor laws.³⁶

To gauge the bureaucratic quality in Mexico, specifically inside the MoE, I collect information on the recruitment, career, and reward system. In recruitment, I document the education and prior jobs of bureaucrats, as well as whether they were hired through a civil service exam. Regarding career, I assess bureaucrats' trajectories through their entry year, exit year, and their last position at the MoE. I also trace the evolution of their responsibilities over time. Finally, I assess the reward system using official documents and OECD studies of bureaucrat salaries.

Synergistic pattern: The software sector (2000–2006)

The software sector in Mexico flourished in the 1980s due to international and economic transformations. Mexican firms offered tailored solutions for SMEs. Large domestic conglomerates created informatics departments to cover their needs. MNCs like IBM and HP, began offering IT services, and Microsoft and Oracle arrived in 1986. Overall, IT demand rose throughout the 1990s with yearly growth rates above 30 percent. About 60 percent of the software sold in Mexico was foreign.³⁷ Despite early business pressure, a process of adoption and design of a sectoral policy did not occur until 2000.

³³Moreno-Brid, 2013.

³⁴Rangel, 2017.

³⁵Palmer-Rubin (2019) study of agricultural associations in Mexico considered: 1) organization age; 2) membership: number of members and type (heterogeneous or homogeneous); and 3) organizational capacity: resources and services offered.

³⁶Dahlstrom et al., 2012, 15.

³⁷Mochi, 2006, 79.

High business cohesion

Software firms organized around two leading organizations from 1985 through the 2000s: AMITI (Mexican Association for Information Technology) and CANIETI (National Chamber for Electronics, Telecommunications and Information Technology). Their goal was to produce relevant input for policymakers and coordinate to secure a sector-specific policy. Other associations considered secondary because of their narrower focus included: AMECE (Mexican Association of Electronic Commerce), AMESOL (Mexican Association of Open-Sourced Software), and ANADIC (National Association of Computing Dealers).

AMITI (first named ANIPCO) is a voluntary sectoral association of software firms created in 1985. Among the founding members were: Red Uno, Digital Equipment, Hewlett-Packard, IBM, EDS, Epson, Agora International, and BMG Entertainment. By 1993 ANIPCO had 165 members out of a possible 500 firms.³⁸

Since its emergence, AMITI was proactive. An industry observer noted: "In Mexico, while the government has had a lukewarm attitude toward software export, ANIPCO has been actively negotiating support and developing export skills. . . . Among the instruments it promotes are: direct subsidies and loans for participation in software fairs, and financial and commercial advice."³⁹

ANIPCO became AMITI in 1996 to expand its coverage of IT firms from large MNCs to software developers. Its central goal was to shape industrial policy. AMITI's first president, Jesus de la Rosa, who was IBM's legal advisor, declared: "We do not aim at making politics for the sake of politics. We want to do industrial policy. To collaborate with all other existing chambers and spearhead the development of the software sector."⁴⁰ AMITI published a software-sector assessment in 1998 urging government support. However, its efforts failed.

Data on AMITI's membership evolution is scarce. Existing information suggests slow growth. By 2001, AMITI had 206 members out of 1,600 firms in the sector. Some government officials considered those figures a sign of industry fragmentation.⁴¹

However, AMITI's strength derived from its membership composition rather than its total affiliation level (table 2). Since its creation, AMITI has embraced two sets of firms. The first is a solid base of large, foreign, and domestic firms with long-term permanence. The second set comprises SMEs, usually enrolling temporarily to access services like training, certifications, or advice.

AMITI's board unites the CEOs of the twenty largest firms in the sector, comprising 70 percent of total IT sales in Mexico: Accenture, Alestra, Avantare, Aspel, Brainup Systems, Cisco, Compusoluciones, HP, Deloitte, Hitss, IBM, Indicum, Intel, Indra, Microsoft, Oracle, Prosisistemas, SAP, Softtek, and T-Systems. While these characteristics facilitate consensus-building, the concentration of high-profile firms also represents a risk of capture. The next section reveals how the MoE bureaucrats prevented capture.

AMITI's staff has remained small throughout the years, numbering just eight persons in total. Though it lacks a lobbying area, the executive director and board members personally interact with policymakers. For instance, in 1999, AMITI addressed legislators to highlight the need for policies to support the software sector, as India and Ireland had done.⁴² The association also published the "Scheme for Government Support for the Software Industry" report in 2000 and sent it to President Zedillo as well as presidential candidates, such as Vicente Fox.⁴³ The document acknowledged existing governmental support for exporting firms through Bancomext, but it claimed that industry development required a more comprehensive effort. The sector demanded: financial support; the creation of technology centers to enhance quality and training; and increased promotion in foreign markets. AMITI's scheme proposed conditionality based on two criteria: firm size and quality level.

³⁸INEGI, 1993, 8.

³⁹Noriega, 1993b, 5.

⁴⁰Reforma, 22 November 1996.

⁴¹Reforma, 1 March 2001.

⁴²Reforma, 9 September 1999.

⁴³BS2 Interview, 2016; BS4 Interview, 2016.

Table 2: Characteristics of AMITI's Members in 2001

Firm Type	Size (Employees)	Number of Firms
Micro	<15	63
Small	16 to 100	117
Medium	101 to 250	14
Large	251 to 1,000	11
Corporate	> 1,000	1
Total		206

Source: AMITI, (2001), 5

Some of the actions targeted firms large enough to export. Other actions aimed at improving the productivity of SMEs in the domestic market. This proposal became a building block for policymakers in 2002.⁴⁴

Overall, AMITI's features coincide with Tirado's analysis of industrial chambers power across economic sectors in Mexico, which concluded: "small and medium-sized associations provide better services and negotiation platforms than large chambers. . . chambers only deal reactively to the broad problems of firms in their sector, and they largely focus on providing services that are far from formulating public-policy initiatives to develop their industry."⁴⁵

The National Chamber for Electronics, Telecommunications and Information Technology (CANIETI) is an official sectoral organization, founded by state mandate in 1957. The government consults it in all industry-related matters. Until the late 1990s, CANIETI focused on telecom and electronics policies, neglecting the burgeoning software sector. Thus, ANIPCO emerged to voice the lacking representation of IT firms in official organizations. Though CANIETI has incorporated the informatics sector since 1997, telecom firms have continued to set the agenda. In fact until 2000, all of CANIETI's presidents came from the telecom sector.

Membership evolution data for CANIETI is also incomplete. In 1994, it had approximately 700 members and during the 2000s, affiliation stagnated. Around 2009, new firms joined, and by 2014, there were 1,300 members. Rather than total membership, CANIETI's weight is derived from its official consultation status. To policymakers, it has been a fundamental business-sector counterpart.

In 1997, AMITI and CANIETI were allied in their pursuit of government support. They signed a collaboration agreement to exploit the latter's status as an official consultation body.⁴⁶ Then, in 1998, they established the Executive Commission for the Promotion and Development of the IT industry to advocate for a sectoral program among the executive and legislative powers.⁴⁷

Although CANIETI and AMITI remained two separate organizations, their willingness to coordinate increased business cohesion. CANIETI had a more extensive SME membership base and a nationwide presence with five regional offices. This complemented and legitimized AMITI's power. In 2000 Jesus De la Rosa, former AMITI president, became president of CANIETI further facilitating cooperation. For the first time, an IT-sector representative led the chamber.⁴⁸ CANIETI strengthened its government-relations department by hiring former SECOFI bureaucrats, Rogelio Garza and Alfredo Pacheco, to lead lobbying efforts.⁴⁹ Firms were ready to participate and lobby whenever the government required their policy input. It would take some time, but AMITI and CANIETI's concerted effort finally paid off in 2003.

⁴⁴GVT2 Interview, 2016.

⁴⁵Tirado, 2006, 202.

⁴⁶Reforma, 29 December 1997.

⁴⁷Reforma, 12 January 1998

⁴⁸CANIETI's presidents traditionally come from large domestic and foreign firms. This is common across chambers in Mexico (Tirado, 2006). Yet in 2008 a medium-sized firm CEO, Víctor Gutiérrez, became CANIETI's president.

⁴⁹BS5 Interview, 2016.

High bureaucratic quality

In 2000, President Fox pledged to promote the software and aerospace sectors, delegating policymaking responsibilities to the MoE (formerly SECOFI).⁵⁰ Though Luis Derbez replaced Herminio Blanco as minister, second- and third-ranking bureaucrats were kept in place: “It was a great team . . . we trained high-quality people . . . top positions changed, but the lower ranks rose . . . thus, we had very skilled cadres.”⁵¹

A group of meritocratic bureaucrats gained technical knowledge about the IT industry. First, there was Rocio Ruiz, an economist with a long track record within the ministry. She entered SECOFI in 1965 and gradually climbed the organizational ladder. Ruiz understood and had close contact with the IT sector, having led business-government consultations on the Information Technology Agreement.⁵²

Ruiz became Industry and Commerce undersecretary in 2001, spearheading the sectoral policy processes. Two other bureaucrats, Sergio Carrera and Jesus Orta, also played a central role in the software sector. Both had prepared an e-commerce project, and realized the need for a more comprehensive program to support the IT industry.⁵³ They recruited Claudia Garcia, a former software engineer at Motorola-Mexico, who had public-sector experience creating IT-incubators during Fox’s governorship in Guanajuato. In the long run, Carrera and Garcia, would climb the organization’s ladder.

Table 3 presents the indicators of bureaucratic quality. All bureaucrats within the MoE in charge of developing IT and aerospace programs shared a similar educational background. They held economics degrees from top universities in Mexico and had pursued graduate studies at renowned international universities. It stands out that the MoE provided bureaucrats with medium-term growth opportunities, their average job tenure lasted nine years. Except one, none of the bureaucrats entered through civil service exams. These recruitment mechanisms do not seem to negatively impact bureaucratic quality.⁵⁴

The reward system covers compensation policies, such as salary ranges per position, insurance, vacations, and other benefits. No policymaker at the MoE earned less than MXN \$20,000, while only 1.7 percent of the total workforce in Mexico earned more than MXN \$20,000 in 2015.⁵⁵ Appendix 2 details salary ranges per position. Mexican bureaucrats of medium and high-level positions have the highest salaries among OECD member-countries: an undersecretary earned thirteen times Mexico’s GDP per capita.⁵⁶ In short, policymakers found it attractive to work for the government.

Synergistic policymaking process and the mechanisms underlying policy outcomes

This section examines the state-business relations patterns in industrial upgrading policymaking process and identifies three mechanisms that were fundamental in the adoption process: the professionalized collection and assessment of information; the establishment of formal collaboration forums; and joint lobbying to overcome opposition and lacking awareness among government actors responsible for budget allocation.

In 2001, an analyst remarked: “The Fox administration is strongly committed to the promotion of e-commerce and information technologies. This active involvement contrasts with the hands-off policy adopted by the two preceding administrations.”⁵⁷ For the first time, the government pledged to

⁵⁰When PAN took over the executive in 2000, SECOFI became the Ministry of Economy.

⁵¹GVT1 Interview, 2016.

⁵²Through this agreement twenty-nine countries eliminated tariffs on certain IT products in 1996. Mexico did not join but unilaterally liberalized the sector.

⁵³GVT3 Interview, 2016; GTV4 Interview, 2016.

⁵⁴This coincides with the conclusions of Dahlstrom et al. (2011, 664): “Whether civil servants need to pass a formal exam to join the civil service rather than the standard recruitment procedure in the private sector through CV screening and job interviews . . . is inconsequential. The only aspect that matters is whether civil servants are employed based on their skills and not depending on their political connections.”

⁵⁵*El Financiero*, 2018.

⁵⁶OECD, 2017.

⁵⁷Palacios, 2001, 15.

Table 3: Bureaucratic Quality Indicators. Mexican Ministry of Economy, 2000s.

	Formation				Recruitment		Career					
	Bachelor's Degree	University	Graduate Studies	University	Former Experience	Civil Service Exam	Entry Year	Exit Year	Last Position at MoE	Next Job	Position	Remained In Federal Govt.
<i>Top Level Bureaucrats</i>												
Herminio Blanco	Economics	ITESM	Ph.D. Economics	University of Chicago	Senior Advisor, MoF	No	1994	2000	Secretary	IQOM Strategy	CEO	No
Luis Derbez	Economics	San Luis University	Ph.D. Economics	Iowa State University	Consultant, World Bank	No	2000	2003	Secretary	Foreign Affairs Ministry	Secretary	Yes
Fernando Canales	Law	Escuela Libre de Derecho	MBA	ITESM	Governor, Nuevo Leon CEO, IMSA	No	2003	2005	Secretary	Energy Ministry	Secretary	Yes
Sergio Garcia	Accounting	ITESO	MBA	IPADE	Secretary, Economic Development Jalisco	No	2003	2006	Secretary (in 2005)	Director, Innovation Center ITESM	Director	No
Rocío Ruiz	Economics	UNAM	No		N.A.	No	1965	2008	Undersecretary, Industry and Trade	INEGI (National Statistics Institute)	Vice-president	Yes
<i>Software Sector Bureaucrats</i>												
Sergio Carrera	Economics	UNAM	MBA	ITESM	First job	No	1997	2009	Director, Domestic Trade and Digital Economy Unit (DTDEU)	INFOTEC	General Director	Yes
Jesús Orta	Economics	ITESM	MBA	UT Austin	First job	No	1998	2007	Adjunct Director, DTDEU	Mexico City's Finance Ministry	Undersecretary	No
Claudia García	Computing Engineer	UDLA	MBA	UDLA	Motorola/ Guanajuato State	No	2002	2014	Director, DTDEU	CFE (State-owned Electricity Company)	Board Advisor	Yes
Alfredo Pacheco	Economics	ITESM	N.A.	N.A.	Internal Revenue Service	No	1998	2002	Chief of Staff, Industry and Trade	CANIETI	Public Relations Director	No
Rogelio Garza	Economics	ITESM	No		First job	No	1995	2000	Minister Assistant	CANIETI	General Director	No
<i>Aerospace Sector Bureaucrats</i>												
Eduardo Solís	Economics	ITESM	Ph.D. Economics	Rochester University	First job	No	1990	2008	Director, FDI Unit	AMIA	Executive President	No
Veronica Orendain	Economics	UANL	MBA	UNIR	First job	No	1994	2008	Director, FDI Promotion	Promexico/GE/MoE	Institutional Relations Director	Yes

Source: Author's elaboration

support the software industry. Businesses and bureaucrats interested in stimulating the IT sector took advantage of this critical juncture. The MoE was responsible for industrial policy design, allowing for high-quality bureaucrats and a cohesive business sector to start collaboration. Despite President Fox's support, the initiative had to overcome several obstacles, including a skeptical finance minister and a lack of awareness on the part of congress. The mechanisms leading to policy design and adoption are analyzed below.

The first mechanism was professionalized information and collection assessment. Bureaucrats from the MoE led the design stage, carefully considering the private sector's input. As mentioned in section 3.1., industry associations had prepared several policy proposals and had been lobbying the government since the late 1990s.

The long-standing SECOFI/MoE bureaucrat Rocio Ruiz directed the team in charge of policy preparation. Sergio Carrera, Jesus Orta, and Claudia Garcia, all knowledgeable in IT-related topics, designed the program specifics. The two primary sources of ideas for developing Prosoft were an analysis of the Indian case, and the policy initiatives that AMITI sent to President Fox. A key policymaker affirmed:

AMITI and CANIETI proposed a sectoral program. So, we thought let's build on that. Bring them and start the talks. That is how we drafted Prosoft. First, I presented a *Program for Digital Economy Development*. But the minister of economy did not approve it. He thought it was too broad. It comprised actions to encourage e-commerce, the software industry, and the use of IT to increase firms' productivity. Instead, he suggested focusing only on the software industry.⁵⁸

A trip to India gave bureaucrats a clearer sense of the strategies followed by a successful case. Interviewees noted India offered relevant lessons to Mexico for various reasons. First, because IT services had created much-needed jobs with varying skill levels. This fit a Mexican reality wherein "some states like Nuevo Leon possessed top-notch bilingual engineers whereas others like Aguascalientes had a pool of workers with basic computing skills."⁵⁹ India exported services to the United States through offshoring. Mexican firms embracing the idea of "nearshoring" also targeted the American market. Despite the presence of IT-sector policies in Latin American countries like Brazil (1997), Uruguay (1999), and Costa Rica (1999), interviewees stated that these cases were not a reference in Prosoft's design.

The second mechanism was the establishment of formal collaboration. In 2001, the MoE established working groups with business, government, and academia to enrich an initial policy draft.⁶⁰ A formal dialog emerged. From 2001 until July 2002, nineteen meetings gathered 118 representatives of firms, universities, business organizations, state governments, and federal agencies.⁶¹ The process generated eight strategies. Each strategy had a leader responsible for summarizing the agreements and following-up. The final program carefully considered the input of businesses and academia.

Bureaucratic quality prevented capture. While industry organizations contributed to the definition of Prosoft's objectives, bureaucrats wrote the rules of operation.⁶² The goal was to offer equal opportunities to all firms, regardless of their size or nationality. The program was competitive and its results were subject to external review.

The third mechanism was joint lobbying. Support from executive powers was a necessary but insufficient condition for policy adoption. In order for the initiative to materialize, congressional approval and the consent of the Ministry of Finance (MoF) were needed. Even with the president having prioritized a software-sector program, policymakers and firms struggled to secure funding, needing two years to obtain the necessary budget to launch Prosoft. Consequently, a reluctant finance minister, and unawareness about the software sector among Mexican legislators, necessitated additional coordination between business and government silos.

⁵⁸GVT2 Interview, 2016.

⁵⁹GVT4 Interview, 2016.

⁶⁰Ibid.

⁶¹*Reforma*, 22 July 2003.

⁶²GVT2 Interview, 2016.

The allocation of funds for Prosoft depended on legislative, Chamber of Deputies approval. The formal partnership established between the MoE and software-sector organizations generated trust and shared goals. Together, they mounted a lobbying campaign to raise awareness and secure the money.⁶³ Some legislators supported them, though the majority had to be convinced. Interviewed policymakers admit the crucial role played by business organizations in this stage.⁶⁴ For this effort, the MoE relied on the resources of CANIETI and AMITI.⁶⁵

In Congress, few legislators were cognizant of the software-sector's relevance. Eloisa Talavera (PAN-BCN) was one of them. She held a bachelor's degree in informatics and represented Baja California, a state with a vibrant electronics industry. The proximity to innovation hubs in California also made her sympathetic to industry requests. Other legislators like Eloy Cantu from Nuevo Leon, home of the Monterrey IT cluster, supported the initiative as well. The Finance Committee chairs Juan Molinar (PAN-Chih) and Gustavo Madero (PAN-Chih) endorsed the process. "They understood what the project was about and opened us the door. They worked with the MoF until the fund was approved."⁶⁶

The clarity of the project was essential. So was the presence of business organizations. "We could team up," remarked a legislator closely involved in the process. The Science and Technology Committee organized a forum to inform legislators about the IT industry essentials. When some legislators introduced a bill in December 2003 to request funding for the program they warned: "Prosoft is a strategic program. However, its goals will be dead letter if the program does not receive enough financial resources to support the software industry in Mexico."⁶⁷

That year, USD \$12.8 million were finally secured to launch Prosoft. The following year, when firms lobbied the budget again, they had more allies. The local component was essential. Governors from states implementing Prosoft projects joined the efforts to increase the budget. By 2008, federal funds amounted to USD \$65 million, a figure which wound up accruing to USD \$180 million in resources, given the program's design.⁶⁸

The synergistic policy process outcome: A comprehensive program

The analysis of state-business relations underlying Prosoft reveals the existence of a synergistic process. A MoE top-level policymaker asserted:

Business actors joined decidedly to promote the program. Without them, we would not have been able to do anything . . . I have not seen a sectoral program starting from zero and achieving so much with a collaborative public-private sector strategy. Prosoft will be remembered as a success story because there has never been such coordination. And I know because I have been involved in sectoral development for a long time.⁶⁹

Policymakers considered the presence of MNC's at the negotiation table to be beneficial because "foreign firms pushed the IT agenda to the highest government levels and pulled along SMEs when lobbying was needed to materialize the policy."⁷⁰

Another interviewee claimed:

⁶³BS5 Interview, 2016; BS4 Interview, 2016.

⁶⁴The conditions were favorable for lobbying. When the PAN won the Presidency, the traditional party discipline of the PRI-era was relaxed. Several actors, like industry associations, increased their lobbying activities at the congress (Luna and Salas-Porras, 2012).

⁶⁵GVT2 Interview, 2016; GVT1 Interview, 2016.

⁶⁶GVT3 Interview, 2016.

⁶⁷Its members were: Eloisa Talavera (PAN-BC), Julio Córdova (PRI-SON), Víctor Alcérreca (PRI-QR), Omar Ortega (PRD-JAL).

⁶⁸Brown-Grossman and Domínguez-Villalobos, 2015.

⁶⁹GVT1 Interview, 2016.

⁷⁰Ibid.

Prosoft had great success and created an ecosystem. I do not think there is a sector, where all actors were aligned: CANIETI, AMITI, AMIPICI, AMESOL, public and private universities. . . . That allowed the program to grow and increase its budget and impact. The reason it did not grow more was that the MoF refused to increase funding.⁷¹

The policy outcome was a competitive program. Prosoft's target population encompasses firms of all sizes. Associations and regional governments support SMEs lacking the resources necessary to apply. Regarding the allocation criteria, during the call for proposals, firms present a project. A committee of business, government, and academia is responsible for evaluating the projects and awarding funding.

The neoliberal ideology deeply entrenched in the MoF decisively shaped Prosoft's design. Even when the MoE bureaucrats and sectoral organizations advocated for sector-wide fiscal exemptions, the MoF rejected them, hence the limited size of the program.⁷²

State-led pattern: The aerospace sector (2000–2012)

The aerospace case reveals how high bureaucratic quality but low business cohesion resulted in a state-led policy process, which, in turn, resulted in the adoption of selective policies in 2006. A more comprehensive program emerged until 2012.

Low business cohesion

From 1970 to the 1990s, domestic satellite production was a national goal for Mexico's aerospace sector. However, in 1997, the Mexican government privatized Satmex, halting these aims.

Business cohesion in aerospace was low in 2000, when efforts to design a sectoral policy began. The sector comprised sixty-five firms⁷³ scattered in northern states. Some were MNCs, like Bosch and Honeywell, produced low-tech parts for the North American market, while a few were Mexican firms like Frisa. Table 4 presents a comparison of business cohesion in the aerospace and software sectors in 2000.

By 2006 there were 109 firms. Nevertheless, firms did not undertake joint projects and still lacked a sectoral association. The Mexican Federal Aerospace Industry Association (FEMIA) later appeared in 2007.

High bureaucratic quality

The MoE spearheaded aerospace sector policymaking, possessing highly-skilled bureaucrats as shown above in the software case analysis (see table 3). Inside the MoE, the Foreign Direct Investment Office played a central role in the aerospace case. There, Eduardo Solís, an economist trained at the Universities of Chicago and Rochester, led efforts to attract top MNCs into Mexico. He worked closely with Veronica Orendain, an economist with a long career within SECOFI. Together they undertook the monumental project of building the aerospace sector.

The state-led policymaking process and the mechanisms underlying policy outcomes

The creation of an aerospace policy was preceded by a professionalized information collection mechanism. Bureaucrats generated sectoral analyses and hired consulting services to detect niche markets around the year 2000. Unlike the software sector, where business associations provided policy input, there is no evidence of aerospace firms providing blueprints. In fact, the absence of sectoral associations prevented this type of collective demand.

⁷¹GVT2 Interview, 2016.

⁷²GVT4 Interview, 2016; GVT2 Interview, 2016; GVT1 Interview, 2016; BS3 Interview, 2016.

⁷³FEMIA, 2012.

Table 4: Business Cohesion in the Software and Aerospace Sectors, 2000.

	Software	Aerospace	
Presence of Business Associations	Yes, several.	None	
Association's Name	AMITI	CANIETI	
Age			
Years	15	43	
Membership			
Total Members	206	700	
Total Firms in Sector	1,600	1,600	65
Members' Market Share	70%	N.A.	
Members' Size	MNCs, Large, SMEs	MNCs, Large, SMEs	
Members' Nationality	Foreign and domestic	Foreign and Domestic	
Organizational Capacity			
Resources	Membership fees	Membership fees	
Services offered	Multiple*	Multiple*	

*Multiple services offered: Training, certification, business trips, meetings with policymakers.
Source: Author's elaboration

The second mechanism, collaboration groups between government and businesses, lacked. From 2000 to 2008 there was no formal or open consultation process with firms and universities in designing a sectoral strategy. Finally, despite the fact that aerospace had been targeted as a strategic sector, the MoE did not push for a comprehensive sectoral program or lobby Congress for funding.

In June 2005, the Undersecretary of Economy, Rocio Ruiz, declared that the aerospace sectoral program had failed to materialize. She acknowledged: "Since we proposed it, we knew it would be complex. We barely convinced some firms to come to Mexico to produce airplane parts. Perhaps someday we will manufacture airplanes."⁷⁴ Newspaper reports reveal clashing views inside the MoE regarding the possibility of working alongside firms to generate a sectoral program. Some bureaucrats believed that the government lacked business interlocutors. Ruiz claimed: "There are few firms to negotiate with." Others dissented. Solís underscored that sixty-four companies produced parts and components, generating USD \$400 million of annual exports.⁷⁵

Interviewed policymakers confirmed that they pursued a different strategy. Bureaucrats at the MoE devised a plan to attract aerospace MNCs as flagship firms, thus altering the policy outcome. Instead of a comprehensive sectoral program, the strategy was selective.

The state-led policy process outcome: A selective program

The Fox Administration dropped its efforts to create a comprehensive program. Instead, it developed a targeted foreign investment strategy to bring aerospace parts and equipment firms to Mexico. Though bureaucrats never reached-out to Congress, they did have to overcome opposition from the MoF. Rather than allying with aerospace firms, which were unorganized and dispersed, they relied on the president's chief of advisors, Dr. Eduardo Sojo. He helped convince staunch neoliberals to allocate funds needed to secure FDI projects and buttress educational institutions.⁷⁶

⁷⁴*El Economista*, 25 May 2005.

⁷⁵*Reforma*, 24 June 2005.

⁷⁶GVT6 Interview, 2019.

Bombardier was the first and main target of the strategy to attract MNCs. A closely-involved bureaucrat noted: Bombardier would be an anchor, and other investments would follow.⁷⁷ President Fox was personally involved in the negotiation process, traveling to Canada in 2005 to persuade Bombardier's CEO to choose Mexico for its new plant. The firm agreed to settle in Queretaro under generous conditions: a concession of 80 hectares of land for fifty years, including an industrial park inside the international airport; fiscal exemptions on state taxes and licenses, like payroll tax and construction licenses; and the creation of a publicly-funded university specializing in aerospace to develop the necessary skilled-workforce.

This strategy was also deployed for other multinational firms that planned to settle or expand their facilities in Mexican border states. Like Bombardier, Honeywell and Safran were granted land and fiscal incentives.⁷⁸

Business cohesion increases overtime (2006–12)

Around 2007, policymakers stimulated the creation of FEMIA. An industry expert, Manuel Sandoval, affirmed:

Two organizations, FEMIA and COMEA⁷⁹, were founded by [the] initiative, and I would almost say effort, of the Ministry of Economy. . . . The [director of Investment at the MoE] always promoted the formation of a business organization to coordinate [the] firms' efforts.⁸⁰

FEMIA engaged domestic and foreign firms spread across Mexico, thus encompassing 90 percent of exporting firms. Bombardier, GE, Safran, Honeywell, Turbo Reactors, Frisa, MD Helicopters, Serna, Eurocopter, and Bodycote were founding members. Table 5 compares business cohesion in software and aerospace in 2008. Both sectors had high cohesion levels.

The federal administration under Felipe Calderón (2006–12) continued to foster the aerospace sector. Policymakers profited from FEMIA's creation. Bureaucrats worked closely with top-executives from MNCs and domestic firms. A synergistic process similar to Prosoft ensued.

A formal collaboration mechanism emerged. Firms and government bodies jointly designed strategic plans and created an industry committee.⁸¹ In 2010, the MoE, FEMIA, and the UNDP, funded quality certification processes for several Mexican and European firms. Collaborative planning and several actors' involvement resulted in the establishment of ProAereo in 2012.

Bureaucrats and firms lobbied together to overcome lacking awareness. The sector received the support of some legislators like Andres Moreno (PRD-Mor), leading the Science and Technology Congressional Commission. Together, they organized the Forum for Aerospace Infrastructure for Mexican Development. Subsequently, the MoE created the National Preparation Program for Aerospace to increase Mexican SME participation in the sector.⁸²

The aerospace policy process changed after 2007, when MoE bureaucrats encouraged the creation of FEMIA. Though initiatives with broader coverage were adopted in 2012, industry representatives claim that the sector is still in need of further inter-agency coordination and additional state support through offsets.⁸³

Alternative explanations

Valid alternative explanations considered in this section include: regime change, executive leadership, industry size, and international diffusion.

⁷⁷GVT1 Interview, 2016.

⁷⁸Expansion, 12 March 2008; BS6 Interview, 2020.

⁷⁹Mexican Council for Aerospace Education.

⁸⁰Sandoval cited in Dutrenit and Moreno-Brid, 2018.

⁸¹FEMIA, 2012.

⁸²Reforma, 3 December 2012.

⁸³BS6 Interview, 2020.

Table 5: Business Cohesion in the Software and Aerospace Sector, 2008

	Software		Aerospace
Presence of Business Associations	Yes, several		Yes, one
Association's Name	AMITI	CANIETI	FEMIA
Age			
Years	23	51	1
Membership			
Total Members	260	900	80
Total Firms in Sector	2,125	2,125	109
Members' Market Share	90%	N.A.	90%
Members' Size	MNCs, Large, SMEs	MNCs, Large, SMEs	MNCs, Large, SMEs
Nationality of Members	Foreign and domestic	Foreign and domestic	Foreign and domestic
Organizational capacity	Membership fees	Membership fees	Membership fees
Resources (Funding)			
Services	Multiple*	Multiple*	Multiple*

*Multiple services offered: Training, certification, business trips, meetings with policymakers

Source: Author's elaboration

The end of the authoritarian PRI-regime in Mexico with PAN's victory in the 2000 presidential election intensified competition and created new bargaining spaces. However, democracy and alternation are an institutional pre-condition rather than a causal factor. Process-tracing in the software case reveals that democratization is not sufficient to explain the emergence of synergistic processes and policy adoption. Despite President Fox's support, business and bureaucrats had to convince an adamant finance minister. An interviewee acknowledged that "the change in government from PRI to PAN facilitated the emergence of sectoral programs . . . Derbez met with the finance minister and negotiated the resources. Us [bureaucrats], backed by the private sector, convinced the congress."⁸⁴ The comparison between software and aerospace cases confirms the findings.

Executive leadership was essential in East Asian modernization according to developmental state studies. Nonetheless, the democratic scenario makes industrial policymaking more complex. Executive and legislative veto players play a critical role. Similarly, subnational interests also enter into the equation. Thus executive leadership is a necessary but not sufficient condition for synergistic policy processes and industrial policy adoption. Section 3 revealed how firms and bureaucrats had to lobby the congress intensively and convince the MoF to provide funding. The comparative case of aerospace reasserts this finding. Despite being among Fox's strategic sectors list, executive support was not sufficient for industrial policy adoption.

Another alternative explanation is industry size. In 2004, the Mexican software sector was larger than its aerospace counterpart, in terms of its contribution to the GDP (0.10 percent vs 0.06 percent) and firms (1,600 vs. 65). While the size of sector can shape state-business patterns, it is hardly the main explanatory factor. A small software sector displayed early attempts at policy adoption in the 1990s, but the executive powers were not receptive. In terms of sectoral business cohesion, sector size could potentially be a factor influencing the emergence of formal organizations. But subnational research on the evolution of the software sector in Mexican states shows that in many cases, like in Puebla, it only takes a few firms to start their own clusters/associations.

Finally, international diffusion is a robust alternative explanation. Yet interviewees for the software and aerospace case studies asserted that international organizations (IOs) did not impose a shift

⁸⁴GVT1 Interview, 2016.

toward vertical industrial policy in Mexico, nor did IOs provide a necessary footprint. As a result, diffusion is ruled out. Process-tracing reveals that the Mexican government approached the World Bank for support once the software industry program was in operation to expand it. “The Information-Technology Development Project took shape in response to the 2006 request from the Mexican government to help it develop the nation’s IT industry through its PROSOFT. . . . The project was one element of the government’s broader plan to invest roughly US\$250 million.”⁸⁵ On the contrary, Mexico-FIRST was recognized as good practices. Delegations from Jordan, Egypt, and Nicaragua visited Mexico for study tours.

Conclusions

This article presented a novel framework to study state-business relations patterns in industrial upgrading policy-processes in democratic developing countries. Theoretically it identified four patterns: synergistic, state-led, business-led, and quiescent leading to varied policy outcomes. Two case studies with relatively high bureaucratic quality and different levels of sectoral business cohesion in Mexico, software and aerospace, illustrated the theory and refined it.

The software case study revealed a synergistic process and uncovered three mechanisms leading to policy adoption. First, a professionalized information collection and assessment: In order to generate a policy proposal, bureaucrats considered business input and other sources of information. Second, the creation of a formal collaboration platform between business and government that facilitated negotiation. Third, a joint lobbying effort to convince other reluctant or ignorant government actors. The outcome was a comprehensive program, Prosoft, available to all firm sizes with matching private sector project funding, thus encouraging firm investment in a country where the rates of capital investment are low.

The aerospace case, with a state-led process exposed missing mechanisms. Although there was professionalized collection and assessment of information, bureaucrats did not collect their input from firms in the sector. The second mechanism, the creation of a formal collaboration platform between business and government to facilitate negotiation, was not established in the early phase (2000–2006). Instead bureaucrats took one step backward and pressed firms to create FEMIA in 2007. Joint lobbying efforts to convince other government actors were also missing in the first attempt. Bureaucrats had to negotiate on their own with the support of the President.

Future research could test the framework more extensively in several ways. First, it may assess state-business relations patterns in cases with low bureaucratic quality. A succinct analysis of Ecuador, where the software sector is organized but bureaucratic quality is low, points to a business-led pattern. Firms created an association in 1995 and have advocated for sectoral strategies. But analysts conclude that there is “no state-business coordination.”⁸⁶ Government incentives are indirect and lack structure, thus “sectoral promotion efforts are disperse and isolated.”⁸⁷ When asked about government programs for the sector, 86.6 percent of firms feel they have not received support.⁸⁸ Nicaragua is a case with low bureaucratic quality and low business cohesion. There is no IT sectoral association, no collaboration spaces, and no sectoral policy.⁸⁹ These characteristics fit the quiescent pattern.

Studies should also validate synergistic configuration in other high-state capacity developing countries. The framework seems to explain policy outcomes in the software industries of Argentina and Uruguay where business cohesion is high.⁹⁰ Meanwhile, in Brazil a state-led model with lower business cohesion levels seem to have spurred the emergence of a few Brazilian global champions, i.e., Totus in software⁹¹ and Embraer in aerospace.⁹²

⁸⁵World Bank, 2017.

⁸⁶Vela, 2012, 140.

⁸⁷Ibid., 144.

⁸⁸Ibid., 132.

⁸⁹CAMTIC, 2018.

⁹⁰CESSI, 2014; Vela, 2012.

⁹¹Sierra, 2018.

⁹²Limoeiro and Schneider, 2019.

Subnational analysis offers an attractive strategy to further test and build the theory. Preliminary assessment of Mexican states policies toward the software sector reveals that some regions have successfully developed this industry through synergistic state-business patterns (Nuevo Leon and Jalisco). Meanwhile, regions with lower levels of bureaucratic quality like Puebla exhibit business-led patterns and Oaxaca a quiescent one.⁹³

Alternatively, researchers could explore if the theory travels to other developing regions. African countries are interesting cases as authors have found varied state-business relations outcomes. Some concluded that sectoral business associations led to policy capture in contexts of weak bureaucracies.⁹⁴ Others found that technological upgrading in textile sectors in Tunisia and Morocco was possible because of state-business patterns fitting the state-led and synergistic categories respectively.⁹⁵

In sum, the political economy of industrial policy offers promising avenues for a pressing task: to study the ways through which state-business collaboration in developing countries can stimulate knowledge-intensive activities to escape the middle-income trap.

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⁹³Rangel, 2017.

⁹⁴Taylor, 2012.

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Appendix 1

List of Interviewees

November 2016

- GVT1: Undersecretary for Competitiveness. Ministry of Economy. (2000s). Undersecretary for Industry and Trade. (2000s). Ministry of Economy.
- GVT2: Ex-Director of Digital Economy Area. Ministry of Economy (2000s).
- Sub-director of Trade Promotion. SECOFI. (1990s)
- GVT3: Legislator. Mexican Chamber of Deputies. Science and Technology Committee. (2000s)
- GVT4: Ex-Director. Domestic Trade and Digital Economy. Ministry of Economy/SECOFI. (late 1990s–2000s)
- BS1: Director. AMITI. (2000s)
- BS2: Head of the Software Development Commission of AMITI. (1990s–2000s)
- BS3: Director. Government Relations. IBM Mexico. Ex-president. AMITI.(late 1990). Ex-president. CANIETI. (early 2000s)
- BS4: Vice-President. Corporate Affairs. Hewlett-Packard. (2000s).
Ex-President. CANIETI (2000s).
- BS5: Executive Director. CANIETI. (2000–2010)

May 2014

- GVT5: Sub-director. Domestic IT Market. Ministry of Economy. (2000s)
- Regional Research Director. ECLAC Mexico. (2000s)

October 2019.

- GVT6: Director. Foreign Investment Office. Ministry of Economy (2000s)

July 2020

- BS6: General Director. FEMIA. (2013–2020)

Appendix 2

Salaries in Mexican Federal Bureaucracy by Position, 2003.

Position (Lowest to Highest)	Monthly net ordinary income (Base salary + guaranteed compensation) in Mexican Pesos	
	Minimum	Maximum
Department Chair	14,200.05	25,989.40
Area Sub-director	20,211.78	43,541.30
Area Director	36,544.20	85,858.60
Adjunct General Director	60,421.90	112,864.70
General Director	81,695.85	139,834.50
Director of Unit	109,662.40	146,257.20
Undersecretary	138,999.09	151,893.63
Secretary (Minister)		149,327.27
President of the Republic		155,042.30

Source: Diario Oficial de la Federacion (2003)