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MEXICO SOUTHERN STATES STUDY

Executive Summary



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Abbreviations

FBT	food, beverages, and tobacco
FDI	foreign direct investment
GDP	gross domestic product
INEGI	<i>Instituto Nacional de Estadística y Geografía</i> (National Institute of Statistics and Geography)
ICT	information and communication technology
NAFTA	North American Free Trade Agreement
NDP	National Development Plan
R&D	research and development
USMCA	United States–Mexico–Canada Agreement

1

Introduction, Economic Structure, and Sector Selection

Mexico, a large upper-middle-income federal republic, is marked by deep regional disparities in socioeconomic development. In the country's industrialized northern¹ and Bajío regions,² the per capita gross domestic product (GDP) averaged approximately US\$13,400 and US\$12,300, respectively in 2022, compared to approximately US\$5,100 in the less developed southern region. Mexico City, the country's wealthiest jurisdiction, has a per capita GDP of more than US\$23,000, over six times that of Chiapas, the poorest, at US\$3,900. Moreover, the per capita GDP of Nuevo León, one of Mexico's richest states, is closer to that of Poland, a high-income country, while Chiapas' is below the average of the in Northern Triangle countries (El Salvador, Guatemala, and Honduras). In terms of poverty and other socioeconomic indicators, a similar pattern is observed: as of 2022, more than two-thirds of Mexicans living in extreme poverty are concentrated in just six out of the 32 states, namely Chiapas (17.7 percent), Veracruz (11.8 percent), State of México (11.3 percent), Oaxaca (9.4 percent), Guerrero (8.8 percent), and Puebla (8.4 percent).

Since the inception of the North American Free Trade Agreement (NAFTA) in 1994, the process of regional economic convergence has been stagnant. Despite the overall benefits of free trade for Mexico, the more developed northern and northern-central regions were better positioned to leverage the opportunities provided by NAFTA, which was succeeded by the United States–Mexico–Canada Agreement in 2020. These opportunities were primarily in sectors such as automotive manufacturing, machinery and electronics, and export-oriented agriculture. On the other hand, most of the southern states have continued to struggle with challenges such as sluggish productivity growth and limited structural transformation. Contrary to converging, some of Mexico's richest and poorest states have seen their economic gaps widen: for example, the per capita GDP of Querétaro, located in the Bajío region and among the fastest-growing and richest states, experienced an average annual growth rate of 1.4 percent between 1995 and 2021. Meanwhile, Chiapas saw its per capita GDP decrease by 1.1 percent per year during the same period. The recent nearshoring trend could further increase regional economic disparities between the northern and central regions and the southern states if the latter cannot integrate into the global and regional value chains.³

Regional economic disparities can also be traced back to differences in factor endowments, sectoral output compositions, and economic efficiency across states. The states that have experienced the fastest overall GDP growth rates in recent decades have also experienced the largest improvements in labor productivity. For example, labor productivity in the Bajío region rose at an average annual rate above 1 percent between 2003 and 2018, while in Chiapas, Guerrero, and Oaxaca it declined close to 1 percent annually. The labor productivity in Mexico City is around 3.5 times that of Chiapas.⁴

Even within industries that are highly successful elsewhere in Mexico, low productivity prevails across the economies of the south. Low human capital levels and high informality rates reduce labor productivity and inhibit the emergence of new, more productive industries. Deficient economic and social infrastructure further reduces total factor productivity and discourages investment in the southern states, while limited access to large consumer markets and weaker integration into the global economy undermine their competitiveness. Further-

more, a market structure dominated by a large number of small firms and few large ones contributes to the prevalence of firm-level performance issues such as limited management capabilities, absence of standardized corporate practices, low-skilled labor force, inadequate access to finance, slow adoption of new technologies, minimal innovation, and low survival rate. The lack of a critical mass of companies in highly productive sectors inhibits the formation of clusters where economies of scale and scope as well as cutting-edge support services could emerge. Insufficient business-support and logistics services exacerbate these challenges.

Economies in southern Mexico tend to focus on industries and sectors in which they have relatively lower productivity. The productivity gap between the northern and southern states primarily reflects differences in firm-level performance and industries performing below the national average. Moreover, the economic output composition of these states further exacerbates the disparity. Their inability to redirect labor and capital towards more productive activities suggests potential distortions that might be undermining their allocation efficiency. These economies are marked by low levels of sophistication and diversity, with productive factors concentrated in less productive sectors and limited capacity for evolving into more complex sectors.

On the policy front, the weak rule of law and insecurity pose major obstacles to private-sector development across much of the region. Except for Yucatán, the majority of southern states suffer from serious security issues, social conflicts, and/or weak regulatory and law enforcement capabilities. Issues such as land fragmentation and untenured communal land create uncertainty about property rights, further limiting economies of scale. Restrictive business regulations complicate investment planning and create uncertainty about potential returns. Finally, regulatory barriers to competition or weak enforcement of pro-competition laws in markets for key goods and services undermine the growth potential of strategic sectors.

Reducing regional disparities has been a core objective of several National Development Plans (NDP), as well as federal government's regional initiatives and various state-level programs. The federal and state governments have designed and implemented development programs aimed at fostering socioeconomic convergence among lagging regions. In 2017–18, the federal government established seven special economic zones in less developed states to encourage domestic and foreign investment, though this initiative was subsequently cancelled by the current federal administration.⁵ The 2019–24 NDP includes among its flagship programs the *Corredor Interoceánico del Istmo de Tehuantepec* (Interoceanic Corridor of the Isthmus of Tehuantepec),⁶ which aims to modernize the railway, roads, and ports along the corridor between Coatzacoalcos in Veracruz and Salina Cruz in Oaxaca. It also seeks to consolidate up to ten industrial parks in the region.⁷ The NDP also includes the so-called Mayan Train. This infrastructure project will span approximately 1,500 kilometers and pass through the states of Campeche, Chiapas, Tabasco, Quintana Roo, and Yucatán.

This study aims to contribute to the ongoing efforts in Mexico to reduce regional disparities by identifying opportunities for private sector development in selected states within the South-Southeast region. This region of Mexico covers nine states: Campeche, Chiapas, Guerrero, Oaxaca, Puebla, Quintana

Roo, Tabasco, Veracruz, and Yucatán. However, given the differences in economic structure, social development, and institutional capacities among these states, adopting a “one-size-fits-all” approach may not be optimal. Therefore, *this analysis focuses on the three poorest states in Mexico—Chiapas, Guerrero, and Oaxaca—located in the southern region, as well as Yucatán, a relatively more dynamic and developed state in the region located in the southeastern region* (“the selected states” from here on). These states represent two different stages of development and capacities within these two subregions.

This study highlights opportunities for private sector-led growth in agro-industry, forestry, automotive manufacturing, and the information and communication technology (ICT) sectors. These industries offer substantial potential for accelerating and diversifying sources of economic growth in the selected states. The choice of these industries was based on a comprehensive review of the economic literature on these states, an assessment of the development strategies adopted by the federal and state governments, and an analysis of GDP and employment sectoral composition, recent growth patterns, and export profiles of the four states.

The study finds that enhancing value addition in the large yet low-productivity agricultural sector could play a pivotal role in transforming the economic landscape of Mexico’s southern states. By raising the quality of agricultural outputs to meet the import standards of major markets in North America, Asia, and Europe, it is possible to not only diversify the economy but also accelerate income growth among the country’s poorest households.

Developing a sustainable forestry industry is another avenue for change. This industry can support economic diversification by embracing the use of recycled materials to supply some subsectors and fostering a reforestation and conservation strategy for the sustainable production of virgin raw materials. Moreover, introducing higher value-added manufacturing products could uplift local communities by raising the income levels of the population.

Furthermore, the emerging auto-parts industry in the southern states holds substantial potential. Supporting its development and promoting deeper integration of the south into the domestic value chains in the north and center-north regions could be a catalyst for job creation. This would foster a globally competitive manufacturing sector that is dynamic and robust.

Finally, consolidating Yucatán as a regional ICT hub stands as a promising strategy. It is expected to contribute to the enhancement of the overall productivity of the southern economies, marking a significant stride in economic development.

A forthcoming Country Private Sector Diagnostic (CPSD) will provide a broader view on the main challenges and opportunities for private sector development in Mexico, complementing the findings of these Deep Dives at the regional level. The CPSD and the Deep Dives will be mutually reinforcing, as the national coverage of the former will offer a more comprehensive view of the economic structure, constraints and opportunities for private sector investment in the country while the latter offers more granular analytics on the state of the economy and the private sector in Mexico’s poorest region.

2

Sector Assessments

AGRO-INDUSTRY

Mexico enjoys a significant standing in the global agrifood market, ranking among leading exporters of various key products. It holds the first position for avocados, tomatoes, mangoes, and cookies, the second for berries and lemons, the third for candies and orange juice, the ninth for beef, and the tenth for pork meat. Regionally, it is the third-largest agro-industry exporter in Latin America, trailing only Argentina and Brazil. However, despite this relative success, the story does not resonate uniformly across the country. The southern states of Mexico, for instance, are largely unable to access global agro-industry value chains. In these states, agriculture is dominated by small-scale, traditional, self-subsistence farming, and has struggled to enhance its competitiveness and strengthen its international linkages. Despite these hurdles, these states are important players in the domestic agrifood arena. Among selected states, Chiapas excels as a top producer of coffee beans and cocoa; Guerrero and Oaxaca are known for coconuts, lemons, and mangoes; Oaxaca is a leading producer of papayas, and Yucatán is prominent for its cucumbers, among other agricultural products.⁸ These states are also recognized for beef production, with Chiapas ranking as the seventh-largest beef producer in Mexico in 2021. Furthermore, in terms of seafood, Chiapas holds the top position in the country for mojarra production and the third-largest for tuna production. Yucatán, on the other hand, is the largest producer of octopus, second-largest producer of lobster, and fourth-largest producer of carcass pork meat.

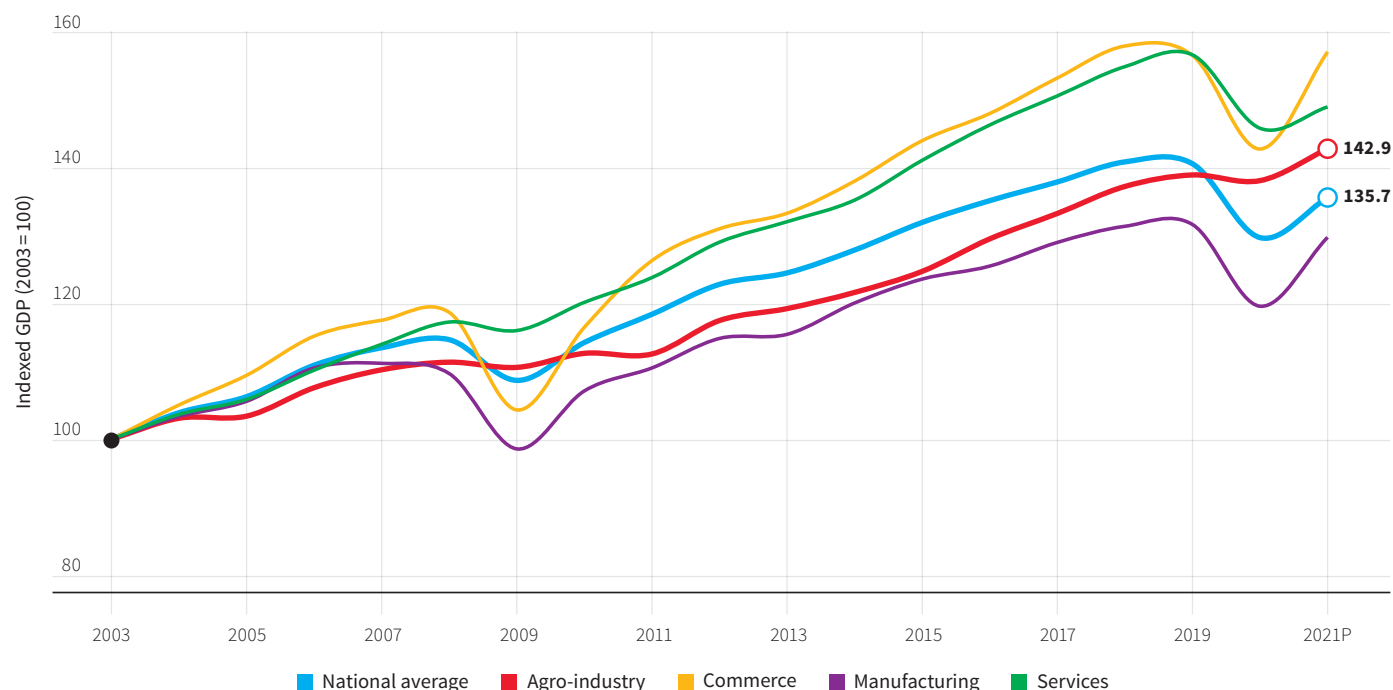
MARKET ANALYSIS

Mexico's agro-industry—including agriculture, food, beverage, and tobacco manufacturing—which accounts for 8 percent of total gross domestic product (GDP) and 16.6 percent of total employment in established firms, grew more than the country's GDP and increased its presence in external markets.⁹ At the forefront of this progress are the central and northern states of Chihuahua, Guanajuato, Jalisco, Michoacán, Nuevo León, Sinaloa, and Sonora, producing more than half of the country's agro-industry exports. Between 2003 and 2021, the growth in the agro-industry's value added rose by 42.9 percent, above the overall GDP growth rate (figure 2.1). Since 2003, the agro-industry has received 10.5 percent of Mexico's total foreign direct investment (FDI) inflows. Furthermore, it plays a critical role in the country's export landscape, with agricultural products representing 8.9 percent of Mexico's total exports. Between 1995 and 2021, agricultural exports grew at an average rate of 7.8 percent per year, raising Mexico's share in global agricultural exports from 1.4 percent (US\$6.3 billion) to 2.4 percent (US\$43.9 billion).

The domestic market for agricultural and food products is growing. Mexico's agro-industry imports have risen substantially in recent decades. Between 1995 and 2021, agro-industry imports rose from 6.7 percent to 7.1 percent of Mexico's total imports, while Mexican agro-industry imports rose from 1.1 percent to 1.9 percent of global agro-industry imports. This pattern underscores the rapid expansion of Mexico's domestic market and highlights the opportunity to boost domestic output of agrifood goods that are not yet produced competitively within the country. An analysis of imports in the selected states and their neighbors reveals four products with high import values and substantial growth potential: corn (maize), oilcake and other solid residues, crustaceans,

FIGURE 2.1

The Mexican Agro-Industry Sector's Output Performance



Source: Based on data from INEGI's National Accounts (various years).

Note: GDP = gross domestic product; P = preliminary. Agro-industry includes activities in the primary sector (excluding forestry) and the food, beverages, and tobacco industry.

and coffee. In addition, agro-industry's contribution to other economic activities represents 6 percent of the total value added in the Mexican economy. The sub-sectors that contribute most to other economic activities are oilseed and grain farming (20.3 percent), cattle ranching and farming (12.6 percent), and grain and oilseed milling (10.7 percent).

Agro-industry is a key sector in Mexico's southern states. As of 2021, agro-industry represented 12 percent of the selected states' GDP. Moreover, the food, beverages, and tobacco (FBT) industries jointly account for over 65.3 percent of their manufacturing activities, up from 39 percent in 2003. In 2018, agro-industry firms represented 8.1 percent of all firms in the selected states, and agro-industry contributed 9.4 percent to their overall gross value added, well above the national average of 7.4 percent. Between 2003 and 2021, agro-industry accounted for 25.5 percent of the region's total FDI inflows, driven by food and beverage manufacturing. In 2021, agro-industry provided jobs for 32.3 percent of the employed formal and informal workforce in the selected states.¹⁰

The selected states are well positioned to exploit the growing international and domestic agrifood markets. These states are home to 7.6 percent of the country's export-oriented agro-industry plants and produce a combined 9.1 percent of Mexico's agro-industry exports. Out of 69 agro-industry activities, Chiapas has a comparative advantage¹¹ in value added terms in 17, while Yucatán and Oaxaca in 14 each and Guerrero in nine. In terms of exports, out of 201 products, Chiapas has a comparative advantage in 26, while Oaxaca and Yucatán in 20 each, and Guerrero in 18.

Maps 2.1 and 2.2 show that the selected states have the potential to host major agro-industry production sites. Based on the location of primary activities and availability of required infrastructure, the following areas are suitable for agro-industry investment: in Chiapas, the coastal areas, the central region extending from Arriaga to Tuxtla Gutiérrez and further to Comitán de Domínguez, and the northern region around Palenque; in Guerrero, the southeast region, the area around Acapulco, and the west coast; in Oaxaca, the Valles Centrales and Istmo regions, the north region centered around Tuxtepec, and the southern region around Villa de Tututepec; and in Yucatán, the central and northern regions, including the Mérida-Progreso-Tizimín triangle.

ECONOMIC POTENTIAL

Agro-industry can help the selected states leverage their natural resources to diversify their economies and access higher-value-added segments of the value chain. In all the states, productivity of the FBT subsector is higher than the primary sector, which is expected. However, the subsector also has higher productivity than the average of the manufacturing sector. Indeed, in Chiapas and Yucatán, productivity of the FBT is higher than the average productivity of the overall economy. Production in the FBT subsector is an important engine of job creation. In the selected states, the average agro-industry firm employs 6.8 workers, versus an average of just 2.8 in the manufacturing sector. In Chiapas and Yucatán, agriculture, forestry, fishing, and hunting are more labor intensive than the primary sector at the national level.

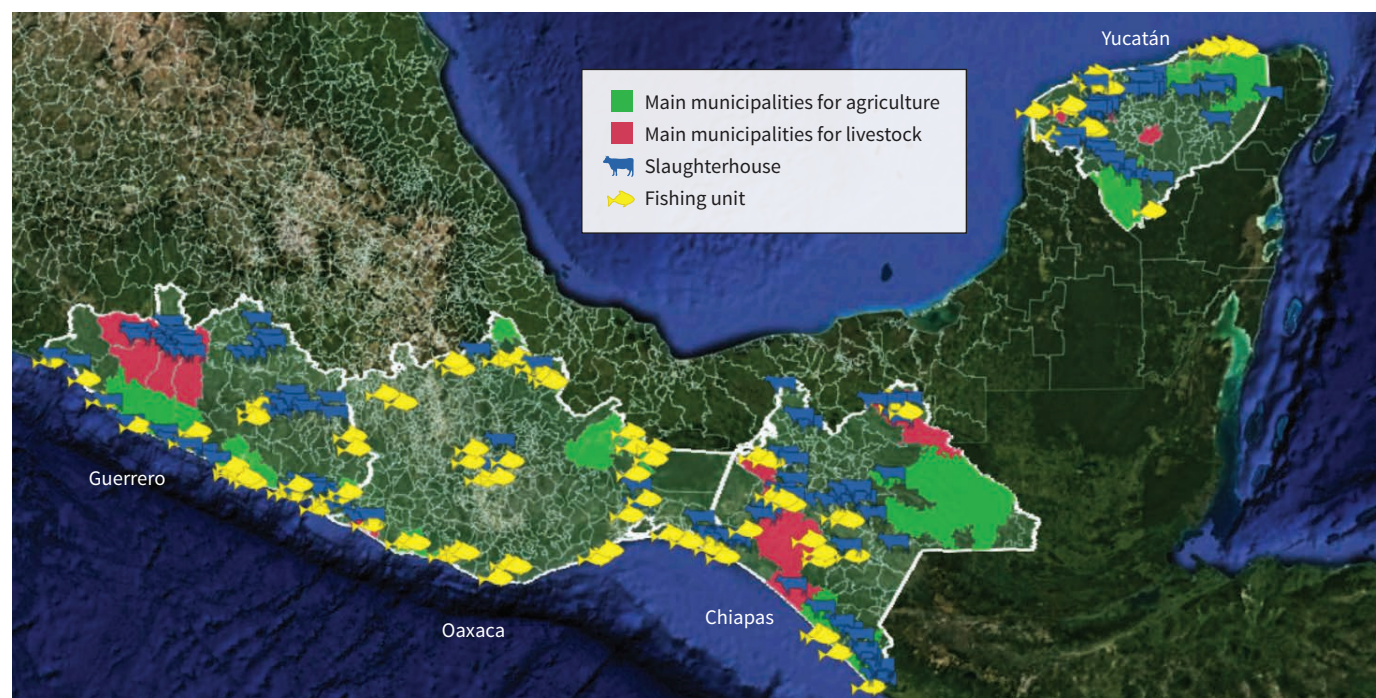
Moreover, in the selected states, the number of workers per Mex\$1 million of value added is 5.8, which is more than twice the national average of 2.3. Given the forward and backward links in FBT activities, the subsector has one of the economy's highest employment multipliers, which makes investment in agro-industry an effective way to alleviate poverty and generate inclusive growth. The value of agro-industry purchases represents about 18.7 percent of economywide purchases, while the value of agro-industry sales represents 8 percent of total sales.¹² Agro-industry has a strong potential of generating sizeable backward links, which could benefit suppliers of inputs in the selected states and the broader South-Southeast region.

BINDING CONSTRAINTS FACED BY THE SECTOR¹³

Infrastructure gaps inhibit the development of the agro-industry sector in the selected states, particularly in Guerrero. Weak logistics systems and poor transportation infrastructure are a major obstacle to the growth of agro-industry in southern Mexico, largely because of the lack of paved roads in remote production regions. Water access and irrigation infrastructure are also a major constraint on agro-industry in some parts of Guerrero, where water costs are high and quality of service provision is low; in Oaxaca, given its higher production costs and cost-fare ratio; and in Yucatán, where there is only one irrigation district for agricultural production (while the rest of selected states have two or more). The lack of sector-specific infrastructure such as grain-storage facilities, farms, and slaughterhouses, also constrain the agro-industry in these states. For example, in Oaxaca, there are no *Tipo Inspección Federal* slaughterhouses in operation.¹⁴ Furthermore, although there is no shortage of fuel availability, the lack of connections to Mexico's natural gas system in the selected states could limit the future growth of agro-industrial development.

MAP 2.1

Primary Agricultural Production Areas in the Selected States



Source: Elaborated using Google Earth with information from SIAP 2019a, 2019b, 2019c, 2019d, and 2019e.

Note: The symbols are only indicative and are not meant to reflect exact locations.

MAP 2.2

Priority Areas for Agro-Industrial Development in the Selected States



Source: Elaborated using Google Earth with information from SIAP 2019a, 2019b, 2019c, 2019d, 2019e, SCT 2019, SENER 2018, and CONABIO 2015.

Note: The symbols are only indicative and are not meant to reflect exact locations. A qualitative analysis was made for potential agro-industry locations, but additional studies are required to determine definitive areas with potential.

High levels of market concentration, communal land tenure, and distortive government interventions also undermine the sector's development. The concentration of market power, particularly in markets for seed, fertilizer, and other inputs, as well as in the retail sector, distorts prices, which has a disproportionately negative effect on asset-poor farmers and smaller agritrade entrepreneurs. Restrictions on private land ownership, a high degree of land fragmentation, and an unclear definition of property rights for communal land¹⁵ deter investment, limit access to finance, and slow the development of economies of scale in the selected states.

Limited access to finance is another constraint for the development of agriculture in the selected states. Firms in the selected states are unlikely to seek external financing to purchase inputs, which either indicates that there is excessive leverage from local suppliers or constraints on the scale of production to what the cyclical budget of producers allows, limiting their capacity to access more competitive inputs. In contrast, the heavy reliance on external financing to purchase equipment or expand business operations, combined with low levels of financial penetration, may explain the slow pace of technical upgrading across the primary sector in the region. Access to finance is notably a binding constraint on the development of the FBT subsector in Oaxaca.

Although human capital seems sufficient for primary agricultural products, it may become a barrier in the more advanced stages of the value chain. The size and quality of the labor force in the selected states can be considered as broadly adequate for the development of primary agricultural activities. But human capital is a constraint at the advanced stages of the agro-industry value chain in Guerrero and, to a lesser extent, in Oaxaca. In Yucatán, human capital is not a binding constraint on the development of more advanced segments of the agro-industry sector, and in Chiapas it does not seem to be the main constraint.

Figure 2.2 summarizes the binding constraints for developing the agro-industry sector in the selected states.

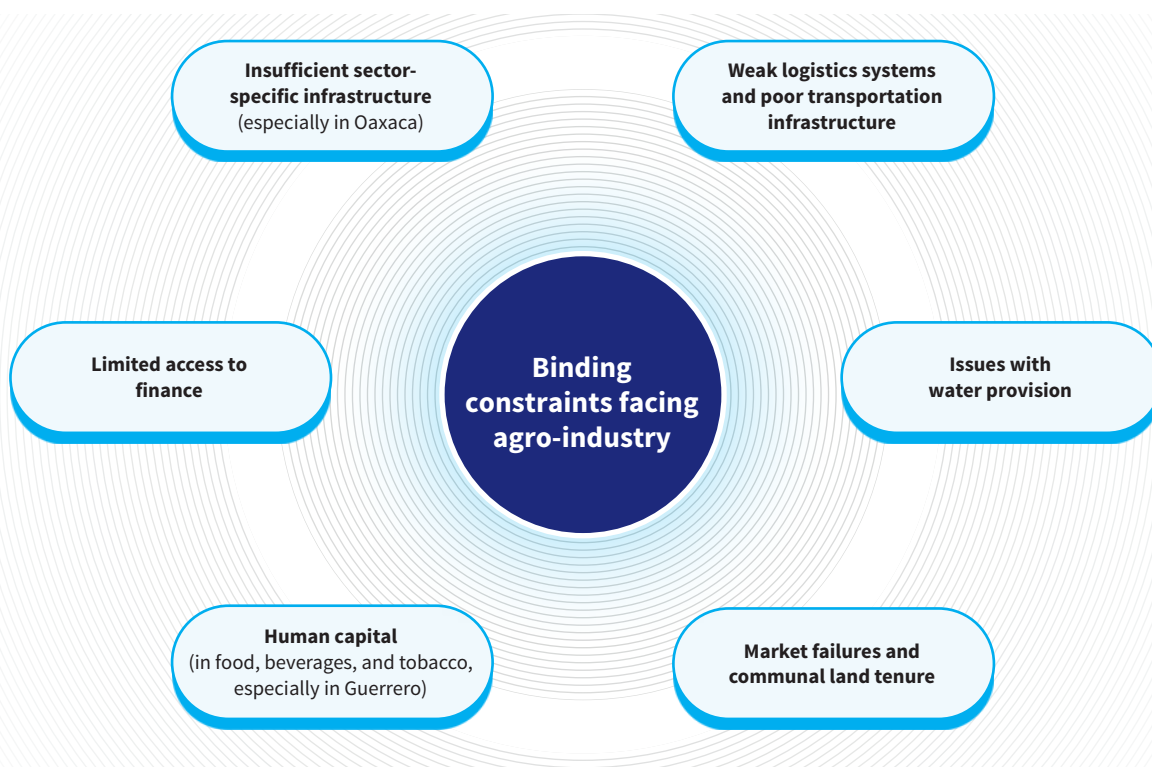
OPPORTUNITIES FOR GROWTH: WHAT WOULD IT TAKE TO DEVELOP THE SECTOR?

Greater investment in infrastructure would help connect farmers, industries, and final consumer markets. Upgrading major roads and logistics nodes will be necessary to reduce transportation costs and delays. In addition, ensuring a reliable and continuous energy supply, expanding irrigation systems, building new storage facilities, phytosanitary centers, and certified slaughterhouses (in Oaxaca) would greatly increase opportunities for value addition.

Establishing or fostering existing agro-industry clusters could further reduce transaction costs and address information asymmetries, leverage economies of scale, increase specialization, and facilitate innovation and knowledge dissemination. More support is required to consolidate ongoing public-private initiatives like the agro-industry parks identified in Chiapas, Guerrero, and Oaxaca. For large private facilities with significant economic and social benefits, granting land contingent on last-mile infrastructure, investment, or job-creation goals could help overcome restrictions on private-land ownership. The state and federal governments could also consider using nondistortionary incentives to attract and retain anchor firms, promote links with local small and medium enterprises (SMEs), facilitate technology transfer, encourage onsite industrialization, and promote environmentally sustainable practices. Supporting small-scale producers to establish

FIGURE 2.2

High-Level Overview of Binding Constraints Facing Agro-Industry in the Selected States



cooperatives could enhance horizontal integration, facilitate the growth of economies of scale, improve production systems, foster the development of management and marketing skills, expand access to finance, and enhance bargaining power.

Improving occupational skills and labor competencies along the agro-industry value chain would help ease human capital constraints in advanced stages in the agro-industry value chain. These efforts should focus on (1) bolstering the capacity of farmers to scale-up production and comply with export standards and certification requirements, (2) increasing the supply of skilled workers for FBT and supporting industries, and (3) developing human capital of SMEs supplying intermediary goods and services along the value chain. Generating and adapting research and development and agro-industrial extension centers in partnership with the private sector and academia could improve the quality of agricultural inputs, raw production, and industrialization stages, with a specialization on the agriproducts to be developed in each state.

Addressing market power issues and improving government programs would enhance the efficiency of agro-industry production. Actively enforcing the *Ley Federal de Competencia Económica* (Federal Law on Economic Competition), supporting the entry of new firms into the input and intermediary markets, and improving the design, targeting, and transparency of government programs and subsidies would help level the playing field. Government interventions should address gaps around resources, infrastructure, skills, and technology faced by small-scale agricultural producers, and the government should incentivize the production of agricultural products with the greatest market potential and social ben-

efits. Establishing an interstate collaboration program among the governments of the selected states could help disseminate best practices for attracting investment related to the main agriproducts they share and developing strong value chains.

Broadening access to financial services by providing affordable products tailored to the needs of primary producers would help overcome constraints on investment and working capital. Financial assistance programs should focus on the procurement of inputs, equipment, and machinery. The private sector will require support to establish guarantee funds and specialized agricultural insurance. The priority should be on financial products that facilitate technology adoption, especially those targeting the production of primary inputs. In addition, evaluation and, if necessary, modification of existing financing instruments offered by development banks is required to ensure their alignment with the requirements.

Consolidating an agro-industry knowledge and information system would support the dissemination of practical knowledge along sectoral value chains, with especially significant benefits for small farmers and SMEs providing manufacturing and support services. An upgraded and more comprehensive *Servicio de Información Agroalimentaria y Pesquera* (Agrifood and Fishing Information Service) platform could provide a starting point for a more robust knowledge-management system, which could also provide information on market trends and prospects, as well as weather reports, soil analyses, estimated training needs, and advisory services on regulations, standards and certification requirements, export potential, and expansion into more sophisticated value chains. Facilitating the adoption of information and communication technology (ICT) for controlling and monitoring production would help ensure safer growing conditions and foster more efficient agro-industry production methods with less environmental impact.

Table 2.1. summarizes the main policy recommendations for developing the agro-industry sector in the selected states.

TABLE 2.1

Policy Recommendations Matrix: Agro-Industry

	Infrastructure
	<ul style="list-style-type: none"> ➔ Develop and implement an infrastructure plan, featuring prioritized projects (and potential sources of public and private financing sources) aimed at improving critical transportation infrastructure that would connect the main productive regions with logistics nodes and target markets. ➔ Explore potential synergies with key federal government projects, such as the Interoceanic Corridor of the Isthmus of Tehuantepec by developing a coastal road corridor that connects Salina Cruz, Oaxaca to Chiapas and Guerrero. ➔ Consolidate the <i>Sistemas Intermodales Portuarios Costeros</i> (Intermodal Port and Coasts Systems) in the main ports of the selected states, including the development of logistics platforms systems in the <i>Sureste</i> (Chiapas, Oaxaca, Tabasco, and Veracruz), <i>Central</i> (Colima, Guerrero, Mexico City, Michoacán, Morelos, and the State of México), and <i>Peninsular</i> (Quintana Roo and Yucatán) regions. ➔ Ensure reliable energy supply for manufacturing activities. In the medium-term, develop infrastructure to access natural gas in Guerrero (potential connection at the coastal region from the pipeline in Michoacán), and Chiapas (potential connection from the pipeline in the Isthmus of Tehuantepec in Oaxaca to Tapachula, and potentially to Central America). ➔ Improve the provision of agro-industry sector-specific infrastructure, including: <ol style="list-style-type: none"> 1. Development of facilities for phytosanitary services. 2. Expansion of coverage of irrigation districts.

(Table continues next page)

TABLE 2.1

Policy Recommendations Matrix: Agro-Industry (continued)

	<ol style="list-style-type: none"> 3. Improvement and development of grain and cold storage facilities, especially in Chiapas and Oaxaca. 4. Construction of at least one <i>Tipo Inspección Federal</i> (Federal Inspection Type) slaughterhouse in Oaxaca, and increase the capacity of <i>Tipo Inspección de la Secretaría de Salud</i> (municipal) slaughterhouses in Yucatán. 5. Development of logistics facilities to expand storage capacities in ports. 6. Supply of support and last-mile infrastructure for the development of agro-industry clusters.
	Support to producers
	<ul style="list-style-type: none"> → Foster the establishment of agro-industry clusters and support existing private initiatives such as the agro-industrial park projects identified in Chiapas, Guerrero, and Oaxaca, to increase (1) the capacity of farmers to scale-up production and meet standards and certification requirements, (2) the capacity of smaller- and medium-firms to provide intermediate goods and services along the value chain, and (3) the workforce's skills demanded by food and beverage manufacturers. → Create supplier-development programs in coordination with large firms and potential investors. → Provide support for small-scale producers to establish cooperatives and link them with large agro-industrial firms or final markets. → Establish or adapt research and development and agro-industrial extension centers in partnership with the private sector and academia, to improve agricultural inputs (including seeds, fertilizers, and pesticides), raw production, and industrialization stages, with a specialization on the agriproducts developed in each state. → Invest in digital infrastructure in productive (rural) areas that are underserved or lack coverage, and promote information and communication technologies to optimize and monitor production processes. → Strengthen existing efforts to consolidate an agro-industry knowledge and information system, capable of generating, integrating, disseminating, and supporting the application of practical knowledge along the sector's value chains, particularly for small farmers and small and medium enterprises providing manufacturing and support services. Use "train-the-trainer" schemes for greater reach in areas with low connectivity. → Create an interstate program for collaborative participation among governments of southern states to attract investments of anchor industries and firms for processing common agriproducts where a robust business case can be made.
	Investment climate, competition, and government interventions
	<ul style="list-style-type: none"> → Make requirements and tax administration procedures less complex to encourage firms to formalize and/or grow their businesses. → Actively enforce the <i>Ley Federal de Competencia Económica</i> (Federal Law on Economic Competition) and support the entry of new firms into the input and intermediary markets to address issues related to competition and market power issues. → Improve the design, targeting, and transparency of subsidies given to some inputs, such as seeds and fertilizers, as well as government-guaranteed prices, to incentivize the production of agricultural products with the greatest market potential and social benefits. → Explore options for adopting an incentive system to attract private investment, with the aim of accelerating the consolidation of agro-industry clusters. These incentives could focus on new investments (including expansions and reinvestments), projects to increase storage and processing capacities, as well as the adoption of sustainable practices. The system could target anchor firms willing to establish links with local producers and share their knowledge. The incentives should be gradually reduced over a defined timeline and phased out when external agglomeration benefits have been achieved.
	Access to finance
	<ul style="list-style-type: none"> → Strengthen access to financial services with products tailored to the needs of small and medium primary producers, particularly for securing necessary inputs, equipment, machinery, and fulfilling certification requirements to reach high-end and export markets. → Assess the impact of existing financing programs (direct and through intermediaries) provided by development banks and other specialized-financial institutions, such as FIRA and FOCIR. → Promote microfinance, nonbanking financial initiatives, and public and private investment funds as instruments to access finance from multilateral agencies (harder to reach small and disperse pools of primary producers).

Note: FIRA = *Fideicomisos Instituidos en Relación con la Agricultura* (Trust Funds for Rural Development); FOCIR = *Fondo de Capitalización e Inversión del Sector Rural* (Capitalization and Investment Fund for the Rural Sector).

FORESTRY SECTOR

Mexico has important opportunities to develop its forestry sector. Although the global market for forestry products is relatively small, Mexico has started to position itself as a significant player, and its share of global forestry exports is now the third largest in Latin America behind Brazil and Chile. Mexico stands out among the 10 largest exporters of chairs and wooden seats, furniture, and wooden parts and pieces for furniture. The country also has enormous potential for substituting paper and paperboard imports—goods whose commercial deficit has almost quadrupled in recent decades—with domestic production. States like Chiapas, Guerrero, Oaxaca, and Yucatán have considerable scope to develop their local forestry industries, promoting the sustainable production of wood materials, and progressively upgrading to higher stages of the furniture value chain. These states have untapped industrial potential in the furniture, pulp, and paper and paperboard subsectors, with the greatest potential concentrated in the areas of Comitán and Palenque in Chiapas; along the Federal Highway (Fed.) 95D corridor that connects Acapulco with Mexico City, Tierra Caliente, and the coastal region in Guerrero; the areas along the Fed. 185 (*Transístmica*) and along the Fed. 190 (from Juchitán to Arriaga) in Oaxaca; and around the city of Mérida, the Mérida-Progreso corridor, and the Mérida-Valladolid corridor in Yucatán. However, to reverse the loss of thousands of hectares of forest because of illegal logging and burning and restore damaged and degraded forest areas, expansion of the forestry sector must be complemented by the adoption and enforcement of sustainable forestry practices and regulations as well as reforestation and preservation programs.

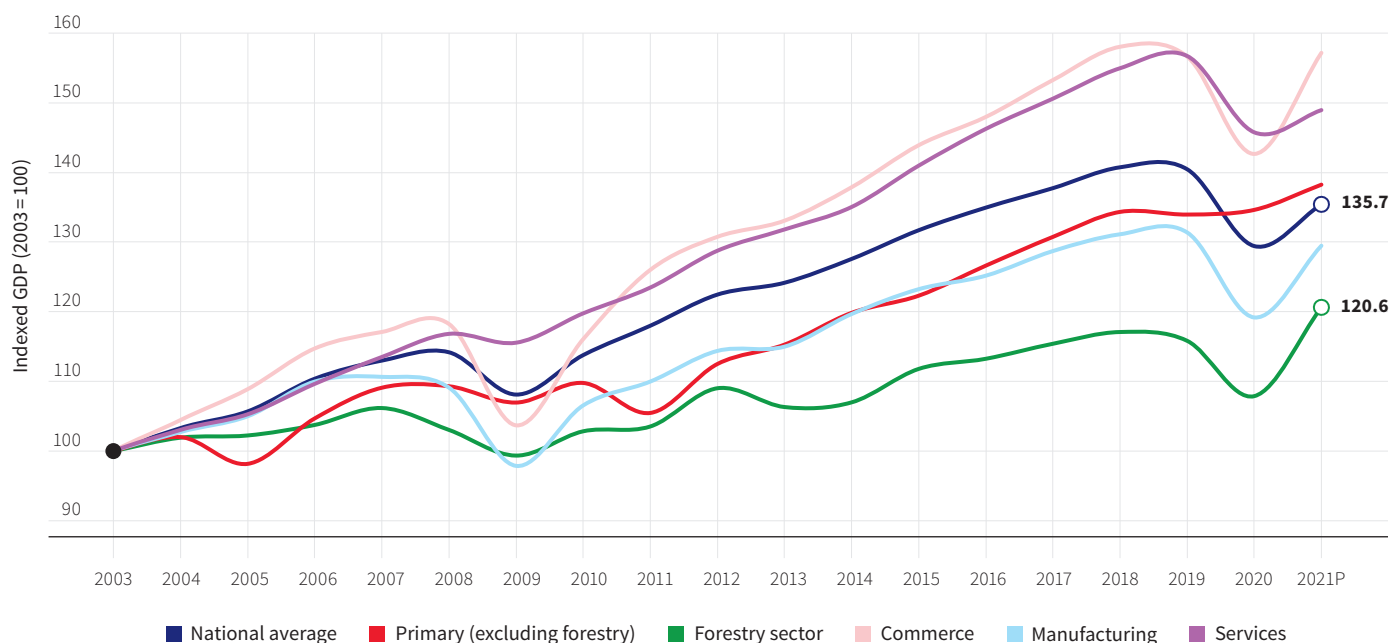
MARKET ANALYSIS

The forest sector makes up a small share of Mexico's GDP, characterized by poor growth performance. The share of value added by the forest sector in Mexico expanded at an average annual rate of 1.1 percent from 2003 to 2021, yet it reached just 0.8 percent of the country's GDP. The growth of the forest sector was also more volatile than those observed in other sectors during the period (figure 2.3). The forest sector accounts for 1.5 percent of total employment and 1.4 percent of all firms in the country, with an average of six workers per firm.

Although forestry products form a relatively small global market, they open up significant opportunities for Mexico. In 2021, the forestry sector accounted for just 2.2 percent of global merchandise exports, but in absolute terms that represented a global market valued at US\$482.2 billion. Between 1995 and 2021, global forestry exports grew at an average rate of 3.4 percent per year. The growth of Mexican forestry exports significantly exceeded the global average, expanding at an average rate of 4.4 percent per year over the period, and the country's global market share increased from 0.6 to 0.8 percent, or US\$3.8 billion in nominal terms. However, over 60 percent of those exports and exporting firms were concentrated in just five states in northern and central Mexico: Baja California, Chihuahua, Querétaro, the State of México, and Tamaulipas. Moreover, three products represent more than 85 percent of Mexico's forestry exports: paper, paperboard, and by-products (48.8 percent), wood and articles of wood (22.8 percent), and other wooden furniture¹⁶ (14.7 percent).

FIGURE 2.3

Growth of the Mexican Forestry Sector



Source: Based on data from INEGI's National Accounts (various years).

Note: GDP = gross domestic product; P = preliminary. Forestry sector includes forestry and logging (North American Industry Classification System [NAICS] code 113), support activities for forestry (NAICS 1153), wood product manufacturing (NAICS 321), paper manufacturing (NAICS 322), household and institutional furniture and kitchen cabinet manufacturing (NAICS 3371), and office furniture (including fixtures) manufacturing (NAICS 3372).

Despite the growth of forestry exports, imports continue to satisfy much of Mexico's demand for forestry products. Although the forestry sector's share in Mexico's total imports fell from 4.3 percent in 1995 to 2 percent in 2021, the country's share in global forestry imports increased from 1.4 to 1.9 percent. In 2021, Mexico's forestry sector imports totaled US\$10.6 billion, highlighting the country's potential to develop domestic sources of production that can compete with imports. The Mexican furniture market is estimated at US\$2.5 billion, and high domestic furniture prices reflect an important market opportunity that has been identified by key players such as Ikea, which recently launched operations in Mexico.

ECONOMIC POTENTIAL

The selected states can significantly increase their participation in local and international forestry markets and value chains, especially as suppliers of intermediate goods. Together, the selected states accounted for 13.2 percent of Mexico's timber production in 2018, and Oaxaca was the country's third-largest producer of timber after Chihuahua and Durango. Oaxaca also has the third-largest area certified by the Forest Stewardship Council. Timber production in Chiapas occupies a middle position in the national range, but the state has suffered vast deforestation over the last decade, while Yucatán has experienced a shortage of raw materials combined with deforestation. Both states could acquire raw materials from other states while they address deforestation and boost sustainable local timber supplies. Baja California, which is a leader in furniture production despite having the second-lowest timber production in the country, highlights

the feasibility of this approach. Between 2000 and 2018, overall production of nontimber products increased by 553 percent in the selected states. Guerrero accounts for more than 40 percent of Mexico's fiber production.

The pulp, paper, and paperboard industries have the greatest potential for import substitution. Mexico imported US\$6.21 billion in paper and paperboard and exported US\$1.87 billion in 2021. This trade deficit has nearly quadrupled since 1995. Globally, efforts to develop this industry tend to focus on recycled raw materials rather than on virgin tree fiber. If Mexico continues to increase its recycling rate, it could significantly reduce the environmental impact of this industry while generating efficiency gains and economies of scale required for further expansion.

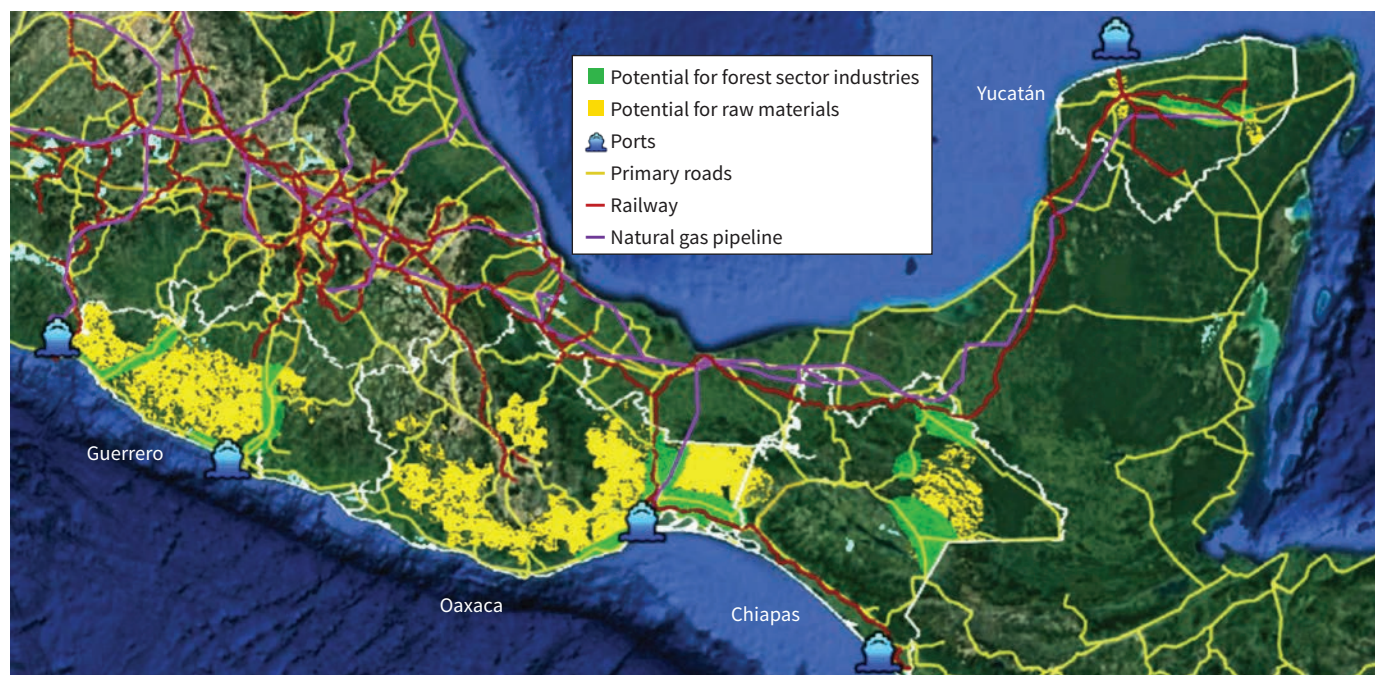
The forestry sector's employment-to-output ratio is about three times the national average and forestry is an important engine of job creation in rural areas. Subsectors like furniture, pulp, and paper production have a strong potential to generate employment because they are reliant on labor-intensive processes. Additionally, many of the jobs within these industries only require technical training. The forestry sector accounts for about 2.4 percent of total sales but just 1.8 percent of total purchases, indicating a strong potential for forward links.¹⁷ Adopting sustainable forestry production practices and regulations backed by appropriate enforcement mechanisms can mitigate and reverse the damage caused by illegal logging and burning while also improving air and water quality, enabling greater carbon storage, supporting biodiversity, and creating opportunities for renewable energy.

Out of 23 individual forestry activities, Oaxaca has three with productivity levels higher than the national average, Yucatán has two, and Chiapas and Guerrero have none. In terms of value added, Guerrero, Oaxaca, and Yucatán each have a comparative advantage in five forestry activities, while Chiapas in only three. Oaxaca and Yucatán each have two activities with higher-than-average productivity levels and a comparative advantage. For Oaxaca, these activities are related to sawn boards and planks, and wood containers and pallets. For Yucatán, these activities are wood containers and pallets and fitted kitchen and modular bathroom furniture. Of 57 forestry exports, Yucatán has a comparative advantage in four products, Guerrero in two, Oaxaca in one, and Chiapas in none. Further developing these products could have multiplier effects because of the upstream and downstream links in their value chains. Key forestry products in each state include pine and scantling in Chiapas, Guerrero, and Oaxaca, and tropical comuna and charcoal, posts, piles, and andirons in Yucatán. Nontimber raw materials include resins in Chiapas and Oaxaca and fibers in Guerrero.

Multiple locations could support the sustainable production of raw materials from the forestry sector (map 2.3). These include the areas surrounding the Selva Lacandona and Meseta Comiteca–Tojolabal in eastern Chiapas; the Costa Grande, Tierra Caliente, and Centro regions in western and southern Guerrero; Istmo, Sierra Sur, and Valles Centrales in Oaxaca; and Centro, Noreste, and parts of Oriente close to Mérida and Valladolid in Yucatán. These locations have active and potential producers with the capacity for raw materials production and manufacturing, and they exclude protected areas. The distribution of utilities and transportation infrastructure indicates that the areas with the greatest manufacturing potential are the regions near Comitán and Palenque in Chiapas;

MAP 2.3

Potential Regions for Developing Forestry Sector Activities Based on Products and Inputs Availability and Existing Transportation and Logistics Infrastructure in the Selected States



Source: Elaborated using Google Earth with information from INEGI 2017; CONANP 2019; CONAFOR 2019; SCT 2019; SENER 2018.

Note: The symbols are only indicative and are not meant to reflect exact locations, except for potential for raw materials.

the corridor along the Fed. 95D, which connects Acapulco with Mexico City, Tierra Caliente, and the coastal region in Guerrero; the areas along the Fed. 185 (or *Transístmica*) and Fed. 190 (from Juchitán to Arriaga) in Oaxaca; and the area around the city of Mérida and along the Mérida-Progreso and Mérida-Valadolid corridors in Yucatán.

BINDING CONSTRAINTS FACED BY THE SECTOR

In Mexico and the selected states, the forestry sector is performing well below its potential. In 2021, the wood, paper, pulp, and furniture industries represented only 0.3 percent of the combined GDP of the selected states and 3.9 percent of their manufacturing output. Moreover, the value added of the forestry industry shrank by 21 percent between 2003 and 2021. At the same time, the forestry sector received a mere 0.01 percent of the combined total FDI of the selected states, which represented 0.02 percent of the FDI in Mexico's forestry sector. Furthermore, the combined share of the selected states in the national forestry exports is estimated at 1.2 percent, which is similar to their share of exporting firms (1.1 percent).

Limited human capital constrains the development of paper, furniture, and related products manufacturing in Guerrero and Oaxaca. However, for Chiapas and especially Yucatán human capital does not appear to be a binding constraint to support increased wood-product manufacturing.

Inadequate infrastructure is a key constraint for the development of the forestry sector in the selected states. Logistics and transportation infrastructure are deficient in all selected states, especially Guerrero. Energy is a key constraint

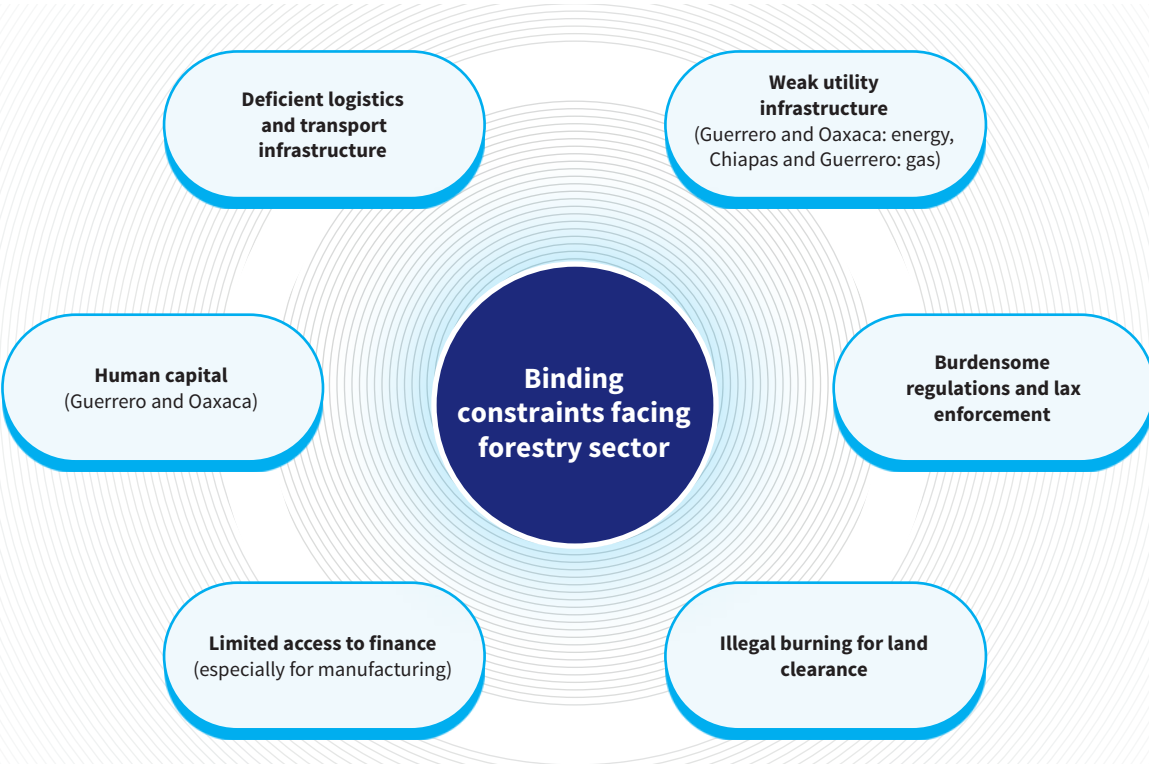
mainly in Guerrero and Oaxaca, as is the absence of natural-gas distribution infrastructure in Chiapas and Guerrero. Water availability (superficial and underground) is broadly adequate in the selected states, except for some parts of northern Guerrero, but all four states are at high or very high risk of forest fires. Pulp, paper, and paperboard mills are most affected by infrastructure constraints, as they are intensive users of energy, water, and fuel.

Burdensome regulations, loose enforcement, and inadequate government support programs undermine the development of the forestry sector. The difficulty of obtaining the necessary permits for forest harvesting and transportation is a major obstacle. For a local community, acquiring a forest-harvesting permit requires about 44 steps and can take up to 195 days.¹⁸ This long and burdensome process, together with loose oversight, has resulted in a thriving illegal market that accounts for an estimated 70 percent of all wood sales. The prevalence of illegal burning for land clearance, particularly in Chiapas and Oaxaca, is another issue that constrains the development of the industry.

Limited access to finance further inhibits the development of forestry-related manufacturing. The evidence is insufficient to determine whether financing is a constraint for the production of primary forestry products. However, a small number of actors who seek financing for primary production indicate that financial incentives or dedicated credit lines could encourage new entrants to participate or grow small producers into larger firms or cooperatives.

Figure 2.4 summarizes the binding constraints for developing the forestry sector in the selected states.

FIGURE 2.4
High-Level Overview of Binding Constraints Facing the Forestry Sector in the Selected States



OPPORTUNITIES FOR GROWTH: WHAT WOULD IT TAKE TO DEVELOP THE SECTOR?

Supporting the development of sustainable forestry in the selected states will involve a mix of investments and policy reforms. Improving road and railroad infrastructure is necessary to connect forestry manufacturers with primary producers and final markets, reducing logistics costs and increasing productivity. Establishing and strengthening forestry clusters in strategic areas close to the required inputs would further reduce costs, increase productivity, and create synergies. Offering well-designed incentives could attract anchor firms to the clusters and encourage links, technology transfer, and investment in sustainable forestry practices.

Strengthening regulations and enforcement mechanisms at the federal and local levels is crucial to stopping illegal logging and burning. To effectively protect forest resources will require strengthening the government's monitoring capacity, increasing penalties, and simplifying agrarian and environmental regulations without weakening them. Expanding and enhancing federal and state programs dedicated to reforestation and the preservation of forest health is also vital. These programs should incentivize producers and local communities to plant endemic species, identify arboreal diseases and other risks to forest health, and actively participate in forest protection. Furthermore, expanding government recycling programs for paper and paperboard could provide a sustainable way to increase fiber supply, thereby easing pressure on forest resources. Consolidation of collection systems could make recycling more feasible, even in remote or rural areas.

The authorities could help increase the productivity of communal forests. Supporting the development and training of community forestry enterprises could improve forest management, production systems, and business practices. Establishing joint ventures, long-term production-sharing contracts, or unified negotiations could facilitate collaboration with manufacturers and investors, and the strict enforcement of these agreements is crucial to their success.

Table 2.2 summarizes the policy recommendations for developing the forestry sector in the selected states.

TABLE 2.2

Policy Recommendations Matrix: Forestry Sector

	Infrastructure
	<ul style="list-style-type: none"> → Improve road and railroad infrastructures to connect forest industries to the main sources of primary production (which tend to be in remote regions) and final markets to reduce logistics costs and increase productivity. → Develop infrastructure to access natural gas in Guerrero at the coastal region by connecting from the pipeline in Michoacán, and Chiapas at the coastal region to potentially connect and provide natural gas to Central America by connecting from the pipeline in the Isthmus of Tehuantepec in Oaxaca. → Increase investments in infrastructure for the production and storage of germplasm and seed banks for native timber plants and new plants that can be produced in the selected states.
	Support for producers
	<ul style="list-style-type: none"> → Foster community production systems in regions where land is mainly social property and explore arrangement mechanisms to reach production with adequate volume and quality levels (joint-ventures, long-term production sharing contracts, unified negotiations, among others). → Establish training programs for community forestry enterprises and other primary producers to improve their forest management, harvesting and production systems, and business management practices, and connect them with potential manufacturing investors. → Expand public programs dedicated to reforestation, recovering, and preserving the health of forests, partnering with local communities and existing producers of the sector. → Create research and development centers to encourage innovation in the design of affordable and multifunctional (home and office) products in partnership with academic institutions and the private sector. → Create a platform or generate partnerships with financial technology (fintech) and delivery firms to promote online selling of furniture products from local producers, leveraging existing logistics routes and the option of getting credit for these purchases. → Create a financing and technical support program, with support from organizations with the know-how for innovating and improving practices along the forest sector's value chain while observing social and environmental best practices.
	Investment climate, competition, and government interventions
	<ul style="list-style-type: none"> → Improve the legal frameworks and enforceability mechanisms at the federal and state levels to increase the costs for illegal producers, increase economic returns from authorized activities, and protect the environment. Some actions in this direction include: <ul style="list-style-type: none"> • Enhance the government's capacities for monitoring the conservation of forests and protected areas • Increase penalties (and enforcement) for illegal logging and arson of forest lands • Create an awareness campaign for consumers to increase their knowledge of the environmental damages from consuming wood products from illegal logging • Streamline agrarian and environmental regulations (number of procedures, time, and costs) • Implement a program to support and enforce the use of the Chain of Custody Certification of the Forest Stewardship Council for forest products • Sign a Voluntary Partnership Agreement with the European Union to reduce illegal logging while incentivizing legal timber exports into Europe, the leading wood importing continent • Establish a platform similar to those used by the Open Timber Portal and the Forest Transparency Initiative to incentivize legal timber production • Launch public-private collection programs to boost paper and paperboard recycling → Support the establishment or strengthening of forest clusters to reduce transportation costs, increase productivity, facilitate the dissemination of knowledge, and create synergies.
	Access to finance
	<ul style="list-style-type: none"> → Consolidate financial resources from development banking institutions (including Bancomext when imports and exports are considered) to design tailor-made products to support the development of the forest sector in the selected states. → Assess the impact of existing financing instruments aimed at developing the forest sector, to determine whether these instruments should be modified, replaced, or continue as they are.

AUTOMOTIVE INDUSTRY IN CHIAPAS

Mexico is a significant player in the global automotive industry, ranking seventh in production and fourth in exports. Globally, the country is responsible for almost 4 percent of vehicle production and 8 percent of automotive exports. Between 2000 and 2021, Mexico's vehicle production grew by 3.1 percent annually, the third highest among top vehicle producing countries (behind China and India). However, the automotive industry in Mexico is concentrated in the North and Bajío regions, with very little presence in southern states. A combination of revised trade agreements, new regional content requirements, the global reshoring and nearshoring trends, and the diversification of existing automotive clusters into more knowledge-intensive segments of the value chain present an opportunity for the southern states of Mexico—particularly in Chiapas—to enter the industry. The initial focus for these states should be to engage in the most labor-intensive activities of the automotive value chain.

To harness this opportunity, a targeted, proactive, and consistent strategy should be implemented. Chiapas can leverage its incipient presence in motor vehicle parts manufacturing to produce related products and substitute imports. The manufacturing of electric and electronic components presents an especially valuable opportunity, given its synergies with the automotive and ICT industries. Although labor-intensive activities are vulnerable to offshoring and automation, consolidating a tightly integrated mass of Tiers 2 and 3 firms¹⁹ specializing in different segments of the value chain could anchor the long-term development of more knowledge-intensive activities. A strategic transition towards complex products should be implemented gradually, driven by demand and through collaboration between the public and private sectors over a timeframe of 10–15 years.

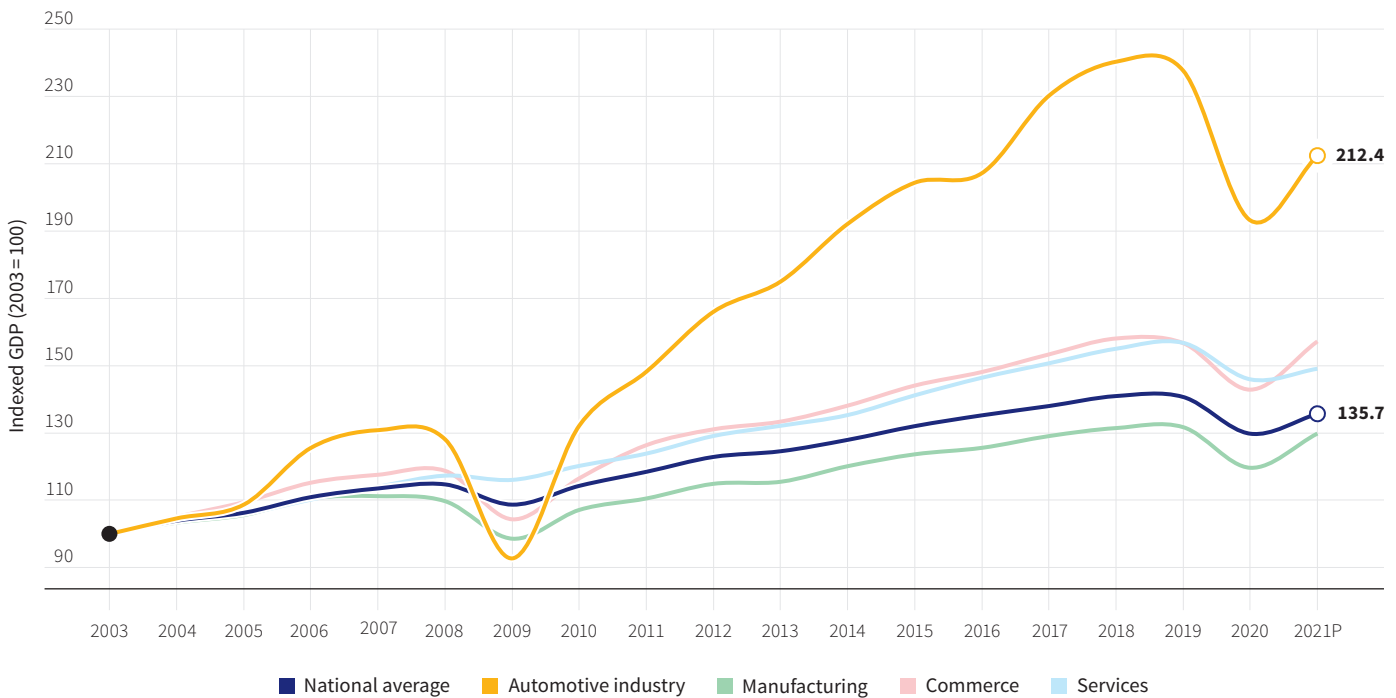
MARKET ANALYSIS

In recent decades, the automotive industry has been an engine for growth and development in Mexico. Between 2003 and 2021, the value added by the country's automotive industry more than doubled, growing at an average year-on-year rate of 6.2 percent (figure 2.5). Historically, the industry has represented around 20 percent of Mexico's manufacturing output and 3 to 4 percent of GDP. After 2009, growth of the sector saw a rapid acceleration, outperforming all other economic activities. Between 2003 and 2021, the automotive industry received 13.7 percent of Mexico's FDI inflows, or US\$75.8 billion, with auto parts accounting for almost 60 percent.

Following the signing of the North American Free Trade Agreement (NAFTA), Mexican automotive exports grew by 8.6 percent per year, from US\$11.9 billion in 1995 to US\$101.3 billion in 2021, outpacing the global automotive average growth rate of 4.7 percent per year. Meanwhile, the sector's contribution to Mexico's merchandise exports rose from 14.9 to 20.5 percent. Prior to the pandemic in 2019, the sector's commercial balance was almost twice the value of inbound remittances and almost five times the commercial balance of tourism. The country's automotive exports are concentrated in three subsectors: passenger cars and other motor vehicles (39.4 percent), motor vehicles for transporting goods (30.3 percent), and motor vehicle parts (30.1 percent). More than three-fourths of the sector's exports originate in eight states in the North and Bajío

FIGURE 2.5

Value Addition in the Mexican Automotive Industry



Source: Based on data from INEGI's National Accounts (various years).

Note: GDP = gross domestic product; P = preliminary.

regions: State of México (16.1 percent), Coahuila (13.9 percent), Puebla (11.5 percent), Guanajuato (9.4 percent), Aguascalientes (8.1 percent), Chihuahua (5.9 percent), Sonora (5.6 percent), and Mexico City (5.1 percent).

Between 1995 and 2021, automotive imports increased from 5.0 to 6.9 percent of total imports in Mexico, while its share in global automotive imports increased from 1.0 to 2.7 percent. Almost 60 percent of inputs utilized by the Mexican automotive industry are imported, indicating substantial scope for southern states to supply the existing automotive industry with intermediate goods that they could produce competitively. Automotive firms in the North and Bajío regions primarily import parts and accessories for cars and other passenger vehicles. The strategic imperative for manufacturers in these regions to diversify into more knowledge-intensive segments, combined with high rates of staff turnover, intense competition for skilled labor, and increasing labor costs, underscores the opportunity for the southern states to integrate into the automotive industry.

The new United States-Mexico-Canada Agreement (USMCA) establishes a regional minimum content value of 75 percent for the automotive industry, up from 62.5 percent established under the NAFTA. This requirement could foster import substitution of components from non-USMCA countries (mainly China), which before the pandemic supplied more than 80 percent of the global auto industry, and could even prompt the reshoring or nearshoring of upstream manufacturing activities. Imports account for 75–90 percent of all components used in the production of auto parts, a subsector that represents about 40 per-

cent of Mexico's total automotive industry. Building a highly reliable and integrated base of Tiers 2 and 3 suppliers would reduce the need for Tier 1 firms to import. Although the North and Bajío regions are expected to provide a significant portion of the additional content required by the USMCA, there is also an opportunity for the southern states, especially Chiapas, to participate. This can be achieved by implementing the right incentives and policies that encourage a deeper development of the automotive industry in these states.

As of 2018, among the selected states, Chiapas has the greatest number of firms in the auto parts segment, one of the most promising for import substitution and nearshoring investments. Moreover, promoting the labor-intensive production of auto parts could generate jobs and productive opportunities with spillovers in the Northern Triangle of Central America, with the opportunity to consolidate a cross-border auto-part cluster. Since 2003, automotive production²⁰ in Chiapas has increased by 136 percent in terms of value added, reflecting an average year-on-year growth rate of 15.8 percent. The state has a comparative advantage in motor vehicle parts exports that could be leveraged to further boost production. It is estimated that Chiapas has the third lowest cost index nationwide among a set of main cities analyzed, 0.9 percent lower than the baseline (Mexico City).²¹ Chiapas also has the lowest labor and facilities costs. However, transportation costs are relatively high in the state. Table 2.3 lists the automotive products with high growth potential in Chiapas.

Two locations are especially well positioned to support the development of the automotive industry in Chiapas (map 2.4). The first is the southwestern coastal region from Ciudad Hidalgo on the Guatemalan border to Arriaga, close to Salina Cruz, which is one of the poles of the Inter-oceanic Corridor of the Isthmus of Tehuantepec. The second is the corridor from Arriaga to Tuxtla Gutiérrez (the state capital), which includes the cities of Cintalapa and Ocozocoautla de Espinosa. These locations fulfill four main criteria: (1) labor force availability, (2) sufficient availability of private land, (3) access to electricity and trans-

TABLE 2.3

Main Automotive Products with Growth Potential in Chiapas

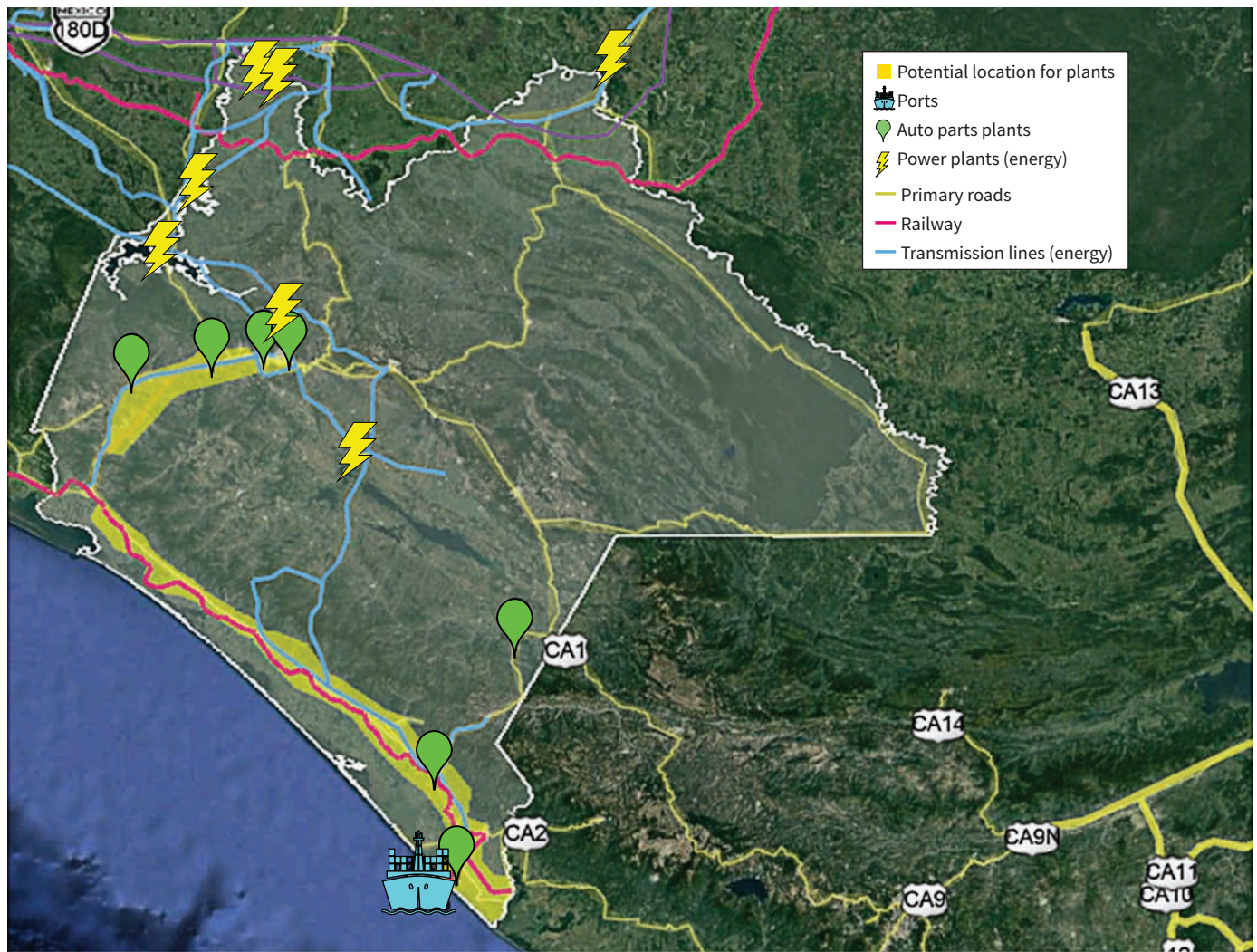
Electric and electronic components
→ Batteries, door locks, security systems (for example, airbag sensors), dashboard accessories, wire harnesses, capacitors and solenoids
→ Electrical ignition or starting equipment used for spark-ignition or compression-ignition internal combustion engines*
→ Electrical lighting or signaling equipment, windshield wipers, defrosters, and demisters*
→ Revolution counters, taximeters, odometers, speedometers, and tachometers*
Interiors
Seats, airbags, seat belt components (retractors, reel, covers), instrument panels, arm rests, headliners, and related accessories
Other labor-intensive components
Radiator hoses, plates and supports, brakes and driveshaft components, and motor pulleys

Source: Based on Criscuolo 2015; MGI 2015; Mexico Atlas of Economic Complexity.

*Products were identified using a Harmonized System of four-digit codes.

MAP 2.4

Potential Regions to Develop the Automotive Industry in Chiapas



Source: Base map for primary roads, railways, ports, and transmission lines was elaborated using ArgGIS with shapefiles from INEGI's *Biblioteca Digital de Mapas* 2019 edition.
 Note: The symbols are only indicative and are not meant to reflect exact locations.

portation infrastructure, and (4) the presence of existing auto parts production plants, demonstrating the local viability of the automotive industry.

ECONOMIC POTENTIAL

The expansion of the automotive industry in Chiapas would extend the benefits of a more diversified and globally integrated economy into the southern states. According to estimates, a 10 percent increase in automotive exports would lead to a 0.3 percent increase in Mexico's GDP and the creation of over 83,000 additional jobs, with over half of which in motor vehicle parts manufacturing.²² Moreover, every additional US\$1 million dollar in revenue generated by the automotive industry is linked to the creation of approximately 10 direct and indirect jobs.²³ The average hourly wage in the automotive industry is around 20 percent higher than the average for the manufacturing sector.²⁴ The average automotive firm has more capital and employs more workers compared to the average man-

ufacturing firm in other sectors. Each additional US\$100 of production value in the automotive industry generates US\$61.2 in spillovers to the national economy, as the industry affects 165 out of the 259 branches of economic activity.²⁵

BINDING CONSTRAINTS FACED BY THE SECTOR

The automotive industry in Chiapas is in its early stages. In 2021, it contributed about 0.1 percent to the state's GDP and 1.5 percent to its manufacturing activities. The industry employs 1.3 percent of all workers in Chiapas and accounts for only 0.02 percent of all firms in the state. Chiapas accounts for just 0.1 percent of Mexico's automotive exports and is home to 0.4 percent of all automotive exporters. Investment levels in the automotive industry are low, even when considering the overall investment levels in Chiapas, which are already low. Between 2003 and 2021, the automotive industry received only 2.1 percent of total FDI inflows in the state. Productivity levels in Chiapas fall below the national average for the automotive industry and have shown a decline in recent years. The average labor productivity in the Mexican automotive industry is up to 37 times higher than that for Chiapas.

Human capital appears to be a constraint on the development of the automotive industry in Chiapas. Although statistical evidence is inconclusive, empirical evidence points to a lack of qualified workers as a significant obstacle to developing more sophisticated stages of production. It is documented that the “*usos y costumbres*”²⁶ system inhibits labor mobility, while population dispersion and high transportation costs undermine the advantage of low labor costs in the state. To overcome these challenges, Yazaki, the leading auto parts firm in Chiapas, adopted a decentralized approach. It initially started operations in Tuxtla Gutiérrez and then expanded to other smaller communities within the state. Because of the lack of affordable public or private transportation options, Yazaki had to provide transportation to its workers.²⁷

Infrastructure gaps also pose serious challenges. Auto parts manufacturing is often the starting point for establishing a large and diverse automotive industry. However, the subsector is energy-intensive, and despite being a significant power producer in Mexico, Chiapas faces challenges in electricity transmission and distribution. Furthermore, poor logistics and communications systems further compound the infrastructure challenges. The automotive industry relies on a highly integrated, time- and cost-sensitive value chain that typically operates under “just-in-time” systems. Inadequate road networks and port infrastructure create additional challenges for the industry, as it requires efficient transportation and timely delivery of components. Moreover, underdeveloped communications systems could also inhibit the expansion of the auto parts subsector, which requires good communications for its operations.

Expanding the automotive industry in Chiapas requires better public-private coordination. Government support has played a key role in attracting investment to the automotive industry in the North and Bajío regions. In Chiapas, the establishment of Yazaki was made possible through deliberate public-private efforts focused on the state after the wake of the Zapatista uprising in 1994, but no subsequent efforts to consolidate the state's automotive industry have been implemented. The automotive industry is not considered in the latest state development plans, and there is a lack of state support programs aimed at fos-

tering its growth. Several institutional constraints further hinder the development of the automotive industry. Firstly, communal land covers 59 percent of the state's territory, limiting the ability of investors to purchase the land necessary to establish manufacturing plants or industrial parks. Secondly, social conflicts and road blockades negatively impact logistics in the state. Lastly, the lack of public transportation and affordable housing near potential manufacturing centers contributes to low labor mobilization.

In the medium-term, developing a design and engineering center in Chiapas will be critical to consolidate the automotive industry in the region. Research and development (R&D) centers have played a vital role in the growth of the automotive industry in the North and Bajío and regions, enabling local producers to continually enhance the quality and complexity of their products. Conversely, there are no R&D centers in any of the selected states, with the closest one located in the state of Puebla. Establishing an R&D center in Chiapas is essential to enable producers to access more sophisticated segments of the value chain.

Although financing may not appear to be a binding constraint for the development of the automotive industry in the short-term, it could restrict the expansion of local Tiers 2 and 3 suppliers. Interest rates charged to automotive firms are among the lowest nationwide. However, 24 out of the 124 municipalities in Chiapas lack financial access points,²⁸ and inadequate access to credit combined with a low portfolio balance relative to GDP could inhibit the expansion of small and medium firms in the sector.

Figure 2.6 summarizes the binding constraints for developing the automotive industry in Chiapas.

OPPORTUNITIES FOR GROWTH: WHAT WOULD IT TAKE TO DEVELOP THE SECTOR?

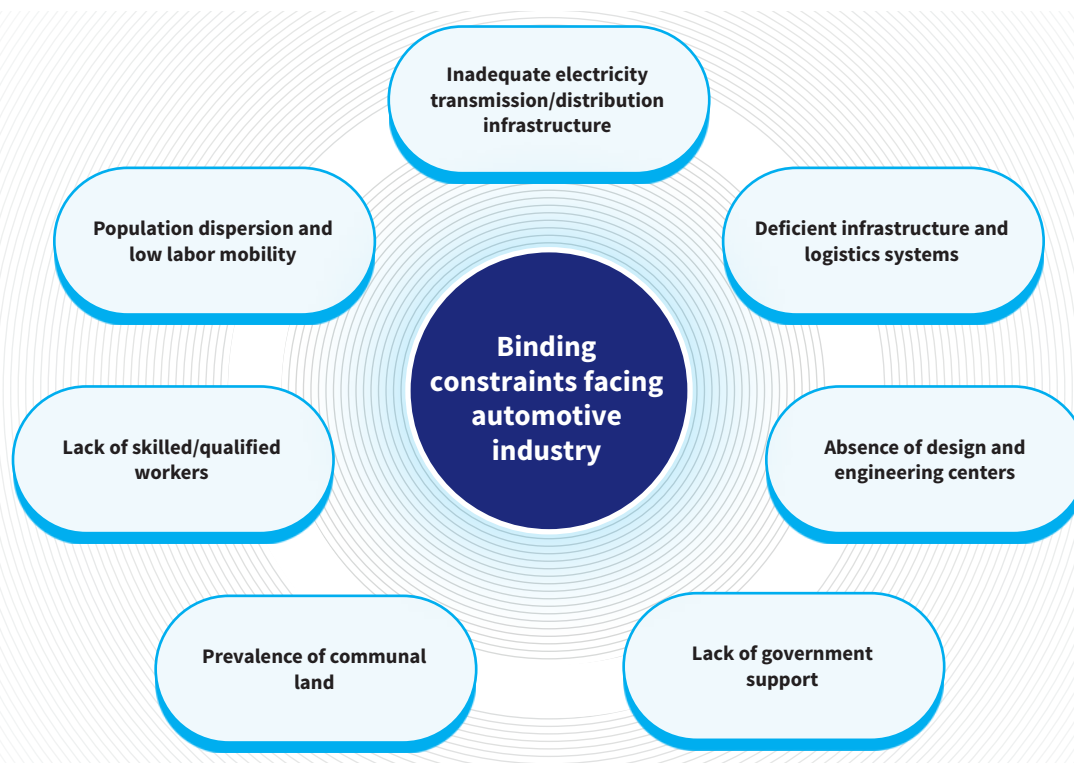
Fostering the development of the automotive industry in Chiapas will require **incentivizing the formation of an auto parts manufacturing cluster to maximize economies of scale and scope, increase productivity, and facilitate the dissemination of knowledge.** Creating a public trust to acquire and manage the land necessary for industrial parks or anchor firms in feasible locations (identified in coordination with the private sector) would help overcome challenges around land ownership. The over 500 hectares previously secured land for the cancelled special economic zone close to Puerto Chiapas and within the zone eligible for temporary tax breaks, could serve as the initial land for industrial development. Once adequate land has been acquired and prepared for economic activities (including the provision of last-mile infrastructure), private operators could gradually develop, manage, and upgrade industrial areas.

To accelerate the formation of an industry cluster, a public-private partnership could be created and tasked with identifying, attracting, retaining, and expanding investment in auto parts manufacturing. The government could support this effort by creating a one-stop shop for permits and licensing. These efforts could be complemented by nondistortionary incentives and outreach efforts to attract key industry players.

Implementing demand-driven programs for suppliers would improve their production capacity, strengthening backward linkages while alleviating supply constraints. The government could provide financial support for working capital and equipment investments, as well as assistance in obtaining required certi-

FIGURE 2.6

High-Level Overview of Binding Constraints Facing the Automotive Industry in Chiapas



fications and implementing the standardization processes necessary to integrate into the automotive supply chain. These programs should be targeted towards segments where key North and Bajío firms are engaged, as coordination with established firms and potential investors would guarantee sufficient demand for products. Creating a directory of automotive enterprises in Chiapas could form the basis for a marketplace that matches these firms with local input suppliers and service providers. Supporting informal firms to transition into the formal economy could further accelerate the growth of local suppliers.

Investments in inter and intraregional transportation infrastructure is necessary to connect firms in Chiapas with established automotive clusters in the North and Bajío regions and international markets via Port Chiapas. Efficient public transportation systems would also help overcome constraints on labor availability.

Modernizing the curricula of local universities and establishing technical institutes to serve industry-specific workforce skill requirements would increase the competitiveness of the state to gradually attract firms of more sophisticated segments of the value chain.

Finally, the government can foster innovation and technological upgrading in the automotive industry by promoting the establishment of a dedicated R&D center in Chiapas. This center could be founded in collaboration with local universities, the *Consejo Nacional de Humanidades, Ciencias y Tecnologías* (National Council of Humanities, Science, and Technology), and major industry firms, and it could be complemented by an R&D support program. Chiapas could be the second state within the South-Southeast region with such facili-

ties (after Puebla). This would improve the productive capacities and quality of manufactured products in the state.

Table 2.4. summarizes the main policy recommendations for developing the automotive industry in Chiapas.

TABLE 2.4

Policy Recommendations Matrix: Automotive Industry in Chiapas

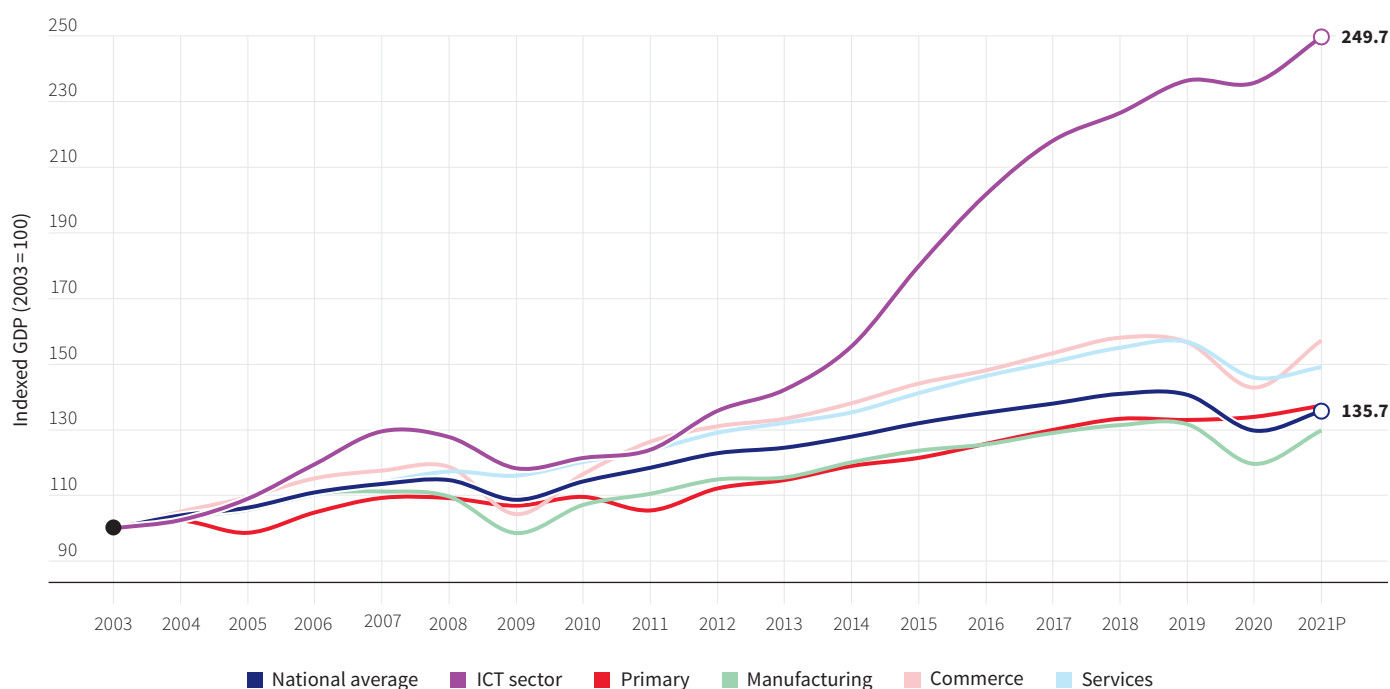
	Infrastructure
	<ul style="list-style-type: none"> → Define an infrastructure plan identifying a pipeline of regional infrastructure projects and potential financing sources (public and private) and conduct individual projects feasibility studies. Improve interregional infrastructure outside of Chiapas to connect the state with the North and Bajío regions (road corridors, highways, and railways) and international markets (Port Chiapas). → Facilitate access to natural gas through public and/or private investments in pipelines connecting to the state, potentially enabling the supply to Central America as well. → Design and implement housing programs benefitting the workers of industrial parks or anchor firms installed in the state and enhance public transportation to connect rural and urban areas.
	Sector-specific support
	<ul style="list-style-type: none"> → Support land acquisition and preparation for automotive clusters to maximize economies of scale, increase productivity, and facilitate the dissemination of knowledge. <ul style="list-style-type: none"> • Create a public trust to acquire and manage the land in consultation with the private sector through business chambers such as the <i>Asociación Mexicana de Parques Industriales Privados</i> (Mexican Association of Industrial Parks) → Create a public-private agency responsible for identifying and attracting potential investments from Tiers 2 and 3 segments linked to the industry requirements in the North and Bajío regions. → Implement demand-driven supplier development programs for local firms to improve their production capacity for inputs required by the industry. → Collaborate with the responsible sectorial agencies (central and subnational) to modernize curricula and academic programs of local universities and establish automotive technical institutes. → Establish a research and development center for the automotive industry in the state, in collaboration with universities, the <i>Consejo Nacional de Humanidades, Ciencias y Tecnologías</i> (National Council of Humanities, Science, and Technology), and major industry firms.
	Investment climate, competition, and government interventions
	<ul style="list-style-type: none"> → Create a single window or one-stop shop for the automotive industry, in coordination with all government levels to integrate, minimize and facilitate regulations compliance for new investments or expanding existing firms. → Level the playing field for foreign direct investment (FDI) attraction by expanding federal government efforts beyond the typically targeted North and Bajío regions to include all states, and enhance the state's capacities to attract investment. → Explore the adoption of incentives to promote FDI joint ventures or alliances with Mexican Tiers 1, 2, and 3 companies enabling productive knowledge and technology sharing between foreign and domestic firms. Eventually, the incentives can be phased out once the agents benefit from the agglomeration externalities.

ICT SECTOR IN YUCATÁN

In 2019, the global information technology sector registered a market value of US\$4 trillion, representing 4.4 percent of global GDP. During 2007–19, the sector grew 1.5 times faster than the global GDP. Moreover, it stands at the center of the digital economy, which was already worth more than 15 percent of global GDP in 2016 and is projected to exceed more than 25 percent by 2025. In line with these global trends, the ICT sector in Mexico has seen rapid expansion in recent decades. Between 2003 and 2021, the sector concentrated approximately 8 percent of total FDI received by the country. During the same period, the total value added generated by the sector increased by 150 percent (figure 2.7), fueled by a 537 percent expansion in the telecommunications industry that contributed to 91.1 percent of this growth (figure 2.8).

Yucatán holds the potential to become a key player in the domestic and global ICT markets. When analyzing the ICT sector, two large segments are considered: ICT manufacturing and ICT services. Between 2003 and 2021, the value added generated by the ICT sector in Yucatán grew by 143.4 percent, with the majority corresponding to ICT services. However, on a national level, Yucatán's ICT sector remains relatively modest, contributing only 2.3 percent to the sector's value added generated in Mexico. Although the state's ICT-related manufacturing industry is still in its early stages of development, Yucatán's emerging “knowledge economy” ecosystem fosters a robust ICT sector growth. The state boasts sector-enabling infrastructure, including a dozen of public academic and

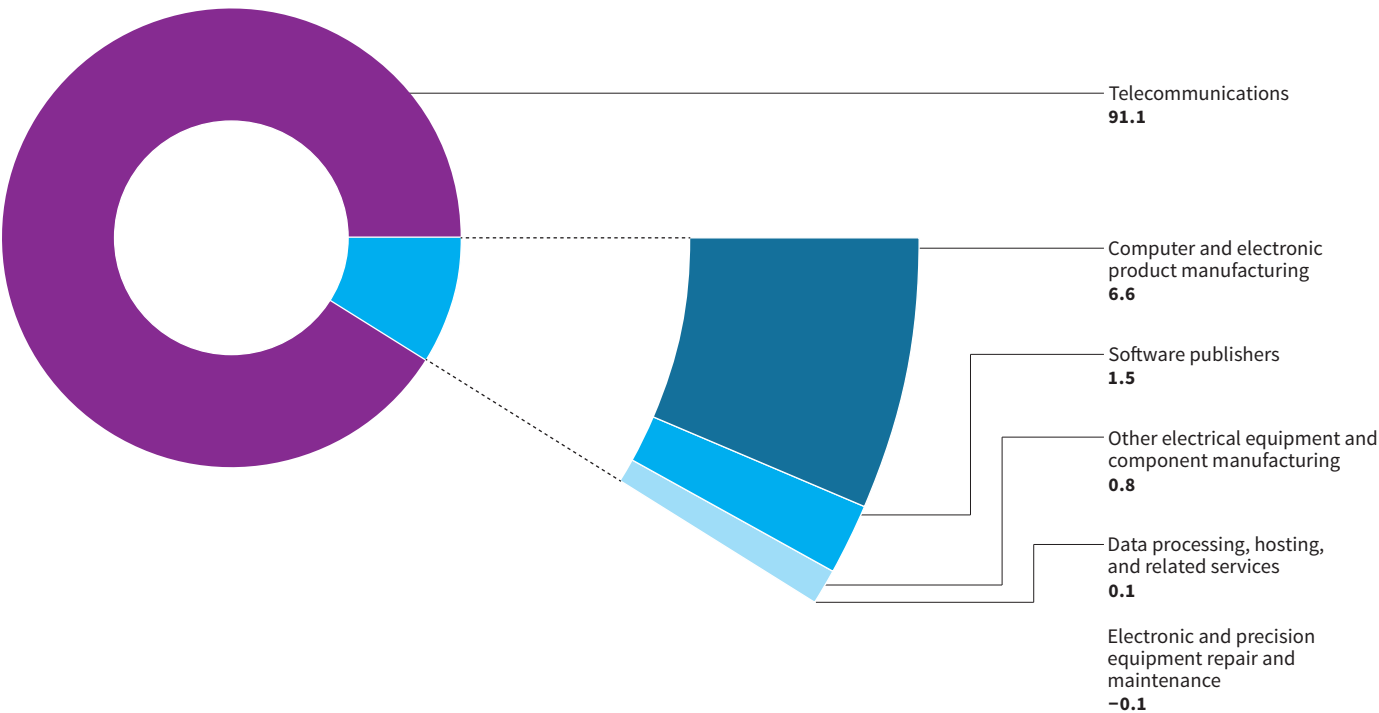
FIGURE 2.7
Growth of the Mexican ICT Sector



Source: Based on data from INEGI's National Accounts (various years).

Note: GDP = gross domestic product; ICT = information and communication technology; P = preliminary.

FIGURE 2.8
Decomposition of the ICT Sector's Growth, 2003–21



Source: INEGI's National Accounts (various years).
Note: ICT = information and communication technology.

research institutions, two industrial innovation centers, two ICT-related industrial parks, and 25 higher education institutions with ICT-compatible curriculum. The latter include the *Universidad Politécnica de Yucatán*, a bilingual university created in 2016 to meet the labor demand in ICT industries through a curriculum defined in collaboration with the private sector.

MARKET ANALYSIS

In 2021, ICT goods exports represented 13.1 percent of global merchandise trade, while ICT service exports accounted for 14 percent of total trade in services. Between 2000 and 2021, global ICT goods exports grew by 4.1 percent per year, while global ICT service exports grew annually by 10.7 percent since 2005. The highly modular nature of the ICT manufacturing value chain and the high value-to-weight ratio of intermediate and final ICT products have enabled the rapid expansion of ICT value chains on a global scale. Mexico ranks among the top ten global ICT goods exporters, accounting for 3.1 percent of the global market. Three products account for more than 90 percent of Mexico's ICT exports: computers and peripheral equipment (49.9 percent), consumer electronics (25.9 percent), and communications equipment (17 percent). By contrast, Mexico accounts for just 0.01 percent of the global ICT service exports, and its market share declined between 2005 and 2021.

When compared to other leading countries in the global ICT industry such as France, Germany, the Netherlands, and the United States, Mexico has a cost advantage of 14.8 percent in manufacturing ICT goods and 34.4 percent in pro-

viding ICT services. The 2013 Telecommunications Reform in Mexico helped create a more competitive market, strengthened the institutional framework of the sector, introduced a shared broadband network (the *Red Compartida*), and played a key role in laying the foundation for a knowledge-based economy. Yucatán, especially in Mérida, hosts several research and academic institutions available to support the development of the ICT sector.

ICT goods make up 15.2 percent of Mexico’s total goods imports, indicating that there is considerable scope to expand the domestic production of these inputs. Three goods—electronic components, computers and peripheral equipment, and communications equipment—have been identified as immediate opportunities for import substitution based on their import value and existing production capabilities in the state. Yucatán’s labor productivity in manufacturing computers and peripheral equipment already exceeds the national average, ranking ninth among Mexico’s 32 states. Furthermore, Yucatán’s proximity to the Caribbean and Central America, as well as its connectivity to key markets in the eastern United States, can be leveraged to position itself as a regional ICT hub.

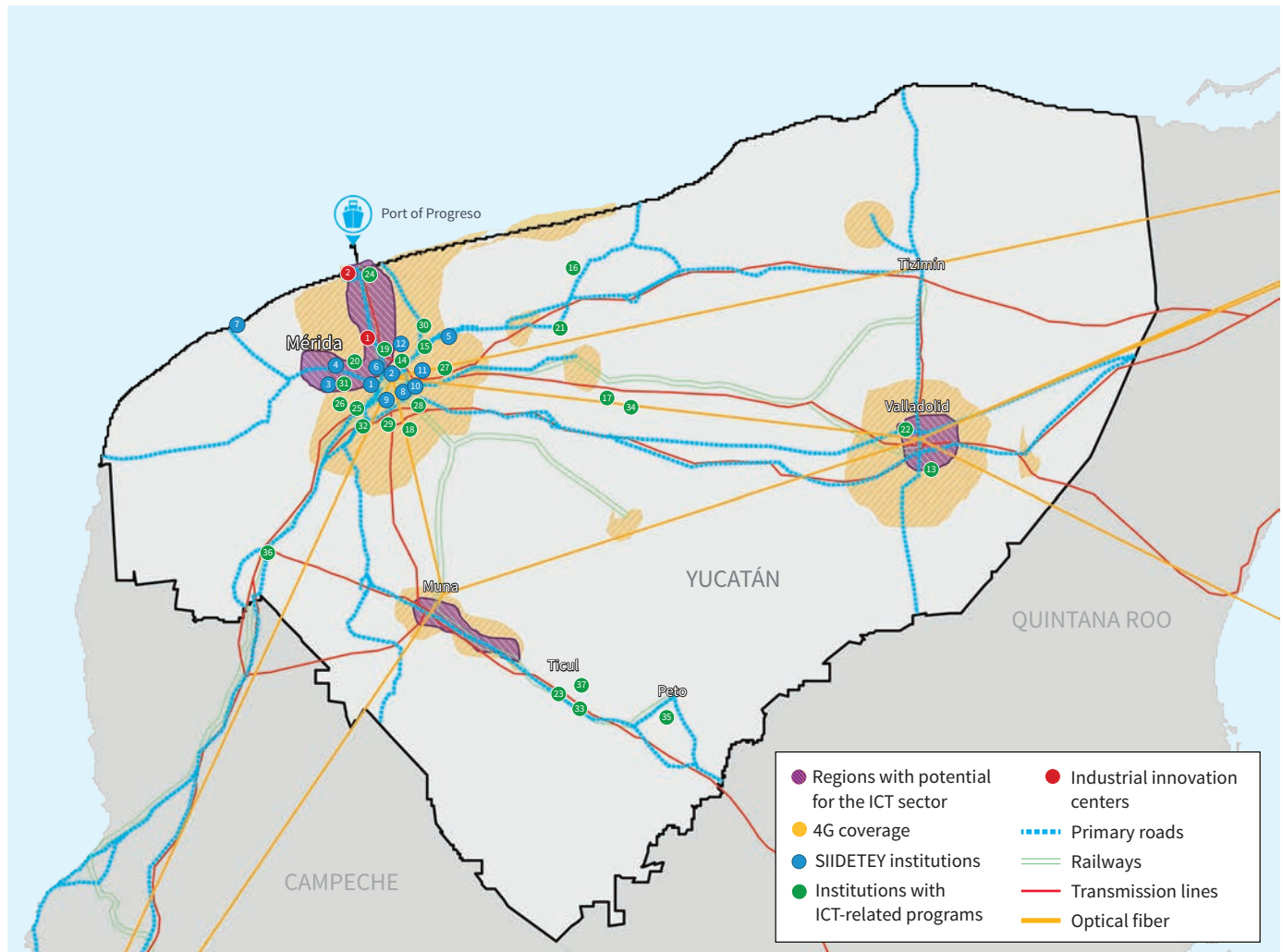
Yucatán is strategically positioned to capitalize on the growing domestic and global ICT market. The state has developed an environment conducive for a knowledge-based economy, which is supported by strong coordination between industry and academia, as well as active engagement from the state government. The presence of leading firms in the state demonstrates the viability of the industry. Moreover, large local firms have shown interest in implementing large-scale projects with ICT components in Yucatán. A forward-looking analysis conducted prior to the pandemic identified several potential investors in Yucatán’s ICT sector, mostly in the services component, provided some conditions were met. Several international firms, mainly from China, and startups from economies with advanced technologies, have also shown interest in establishing operations in Mexico. Yucatán is well-positioned to attract a portion of this investment, with the nearshoring trend potentially serving to catalyze these opportunities.

Yucatán performs relatively well in state-level indicators of ICT competitiveness. Despite its location in a less developed region of the country, Yucatán is in the middle position in terms of economic innovation, internet access, and scientific and innovation capabilities, ranking 17th overall, and stands in third place for e-government procedures. The recent installation of the country’s second internet exchange point node in Yucatán has increased data center efficiency, potentially attracting new related investments. Finally, the inclusion of the ICT sector in the state’s 2018–24 Development Plan reinforces ongoing efforts of the government to transform Yucatán into a strategic ICT hub.

Within Yucatán, Mérida and its surrounding regions, along with the Mérida-Progreso corridor, present the most potential for ICT industry development (map 2.5). The Mérida-Progreso corridor shows especially strong potential for ICT industry components manufacturing. These locations fulfill three key criteria: (1) adequate population density to ensure strong local demand and ample labor supply; (2) access to necessary transportation, energy, and telecommunications infrastructure; and (3) proximity to education and innovation centers.

MAP 2.5

Potential Areas for ICT Development in Yucatán



Source: Base map for primary roads, railways, ports and transmission lines was elaborated using ArgGIS with shapefiles from the INEGI's *Biblioteca digital de Mapas* 2019 edition and optical fiber location was according to Bestel n.d.

Note: 4G = fourth generation; ICT = information and communication technology; SIIDETEX = *Sistema de Investigación, Innovación y Desarrollo Tecnológico del Estado de Yucatán*. The industrial innovation centers in Progreso have approximate locations because of limited specific information. The symbols used are for representation purposes only. A qualitative estimate was made for potential ICT locations, but additional studies are required to determine definitive areas with potential. For the corresponding SIIDETEX institutions, institutions with ICT-related programs, and industrial innovation centers, see table F.1 in appendix F of the Mexico Southern States Study, Sector Assessment: ICT in Yucatán.

ECONOMIC POTENTIAL

Advancing the ICT industry in Yucatán can stimulate economic diversification and increase private sector competitiveness by enhancing the efficiency of existing economic activities. Evidence shows that a 20 percent increase in ICT investment is associated with a 1 percentage-point rise in GDP growth.²⁹ For emerging markets, a 10 percent increase in broadband penetration is associated with a 1.4 percentage-point surge in GDP growth.³⁰ Investing in ICT boosts the capital available for workers, increases efficiency, spurs innovation, facilitates knowledge transfer and commercial collaboration, and expands access to new markets. As the Mexican economy continues to evolve, its demand for ICT goods and services such as computers, network access, cloud storage, open-source software, data analytics and other ICT goods and services will continue to grow. Further-

more, the COVID-19 pandemic highlighted the importance of having adequate ICT infrastructure and equipment. These resources enabled individuals, firms, and governments to adapt swiftly and continue their activities seamlessly through technology-enabled tools during this episode. The pandemic has accelerated the pace of digital adoption by several years in several sectors, further emphasizing the need to invest in and embrace ICTs to ensure long-term resilience and growth.

ICT firms are generally larger and more capital-intensive than the average firm at both the national and state levels. Nationally, within the ICT sector, telecommunications firms have the largest capital-to-firm ratio, while in Yucatán, computer and electronics manufacturers hold this distinction. Telecommunications firms also have the highest ratio of capital per worker at the national and state levels. Almost all major ICT-related activities could potentially contribute to job creation in Yucatán. The most labor-intensive ICT subsector appears to be computer and electronics manufacturing, with the highest workers-to-firm ratios both nationally (431.6) and in Yucatán (128.3). Hourly wages for formal providers of ICT-related services, including internet access, web search, information processing, and other telecommunications, exceed the state average.

BINDING CONSTRAINTS FACED BY THE SECTOR

The ICT sector in Yucatán is still in its early stages. According to the latest available state-level detailed export data from 2014, Yucatán accounted for just 0.002 percent of national ICT exports and 0.02 percent of ICT exporters.³¹ Almost all of Mexico's ICT exports (95 percent) and ICT exporters (80 percent) were concentrated in the states of Baja California, Chihuahua, Jalisco, Nuevo León, and Tamaulipas. In 2018, the ICT sector in Yucatán composed only 0.5 percent of all firms and employed 0.4 percent of all workers in the state. Between 2003 and 2021, the state's ICT sector received 0.5 percent of Mexico's total FDI inflows in the ICT sector.

Human capital does not seem to pose a binding constraint to the ICT sector, but the continuous capacity building of the labor force will be crucial to maintain competitiveness internationally. The rapid pace of technological change demands consistent worker upskilling and retraining. Continued investment in ICT capabilities of the workforce in Yucatán will be vital to ensure they are prepared to perform new tasks in a constantly evolving industry and market.

Insufficient electricity generation, transmission and distribution, and limited communications infrastructure are significant barriers to the growth of the ICT sector, particularly in areas outside Mérida. Yucatán has limited energy generation capacity. The state only has one major high-tension transmission line and few low-tension transmission lines. This inadequate power supply deters energy-intensive firms, including ICT companies, from setting up. Although the state has good access to telephone and mobile internet services, the availability of fixed broadband internet is relatively low. Fiber-optic infrastructure in Yucatán, crucial for ICT firms, is limited and controlled by a small number of operators and extends only through the main corridors of the state (Mérida-Valladolid, Mérida-Progreso, Calkiní in Campeche-Mérida, and Mérida-Tizimín). This lack of broadband infrastructure deters the establishment of ICT companies and constrains the growth of the sector by limiting service usage and demand. However, recent projects such as the *Red Compartida* and Gignet's subsea cable system,

as well as other private sector–driven initiatives in Yucatán, are enhancing the state’s connectivity.

A strong legal and institutional framework, along with consistent state government support and improvements of the business climate, suggests that policy failures are not hindering ICT development. Around the world, governments have been instrumental in cultivating successful ICT sectors. Between 2007 and 2012, Yucatán saw a withdrawal of state government support that led to an existing ICT cluster being dismantled. This caused a sharp contraction in sectoral output and weakened trust in the state government’s commitment to ICT.³² However, since 2012, the state has implemented significant legal and institutional reforms designed to promote the development of the industry.

Inadequate access to finance is a binding constraint on the development of the ICT sector, especially ICT manufacturing activities and local firms. The low levels of financial penetration in Yucatán pose a challenge as 27 out of the state’s 106 municipalities lack financial access points. Nationwide, interest rates for ICT-related firms are at the upper end of the spectrum both for commercial and development banks, which could reflect a higher risk or risk-aversion towards the sector. Some components of the ICT sector, particularly services, have an intangible nature, which further complicates access to finance by preventing assets from being used as collateral. In addition, venture capital, which has been critical to the industry’s development in other countries, has low activity in the state. Early-stage funding, such as preseed and seed capital, may be required during the initial stages of promising projects.

Other challenges are deterring the expansion of the ICT industry, especially the services segment. These challenges include (a) weak ICT readiness at the national and state levels that reduces the domestic demand, (b) higher barriers for Mexican firms entering international markets because of the absence of a strong international reputation, and (c) growing concerns around consumer and firm data security and protection.

Figure 2.9 summarizes the binding constraints for developing the ICT sector in Yucatán.

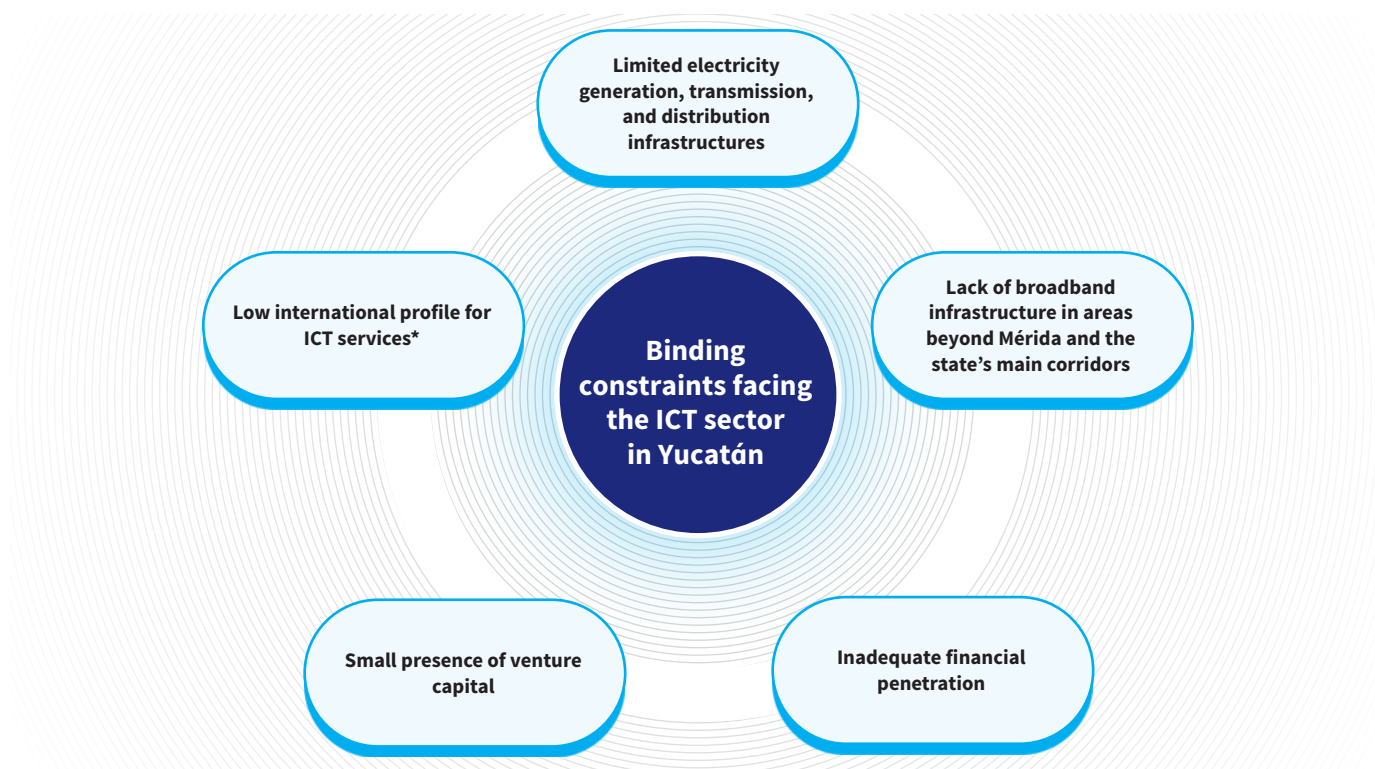
OPPORTUNITIES FOR GROWTH: WHAT WOULD IT TAKE TO DEVELOP THE SECTOR?

To keep the telecommunications and broadcasting sectors open to competition, promote innovation, and encourage the entry of new suppliers, active government oversight will be needed. Robust competition will hinge on the efficient allocation and management of spectrum frequencies, as well as maintaining a regulatory framework that provides certainty to investors and promotes infrastructure-sharing. Authorities must also ensure that the deployment of the *Red Compartida* project continues, lay fiber-optic cables alongside feasible segments of the Mayan Train, and promote the development of a certified data center to host ICT firms that utilize data storage and cybersecurity services. In addition, promoting the development of 5G-enabling projects in the state and in the region could significantly boost Yucatán’s competitiveness in ICT.

Regular collaboration between the private sector, the government, and academia will be key to identifying and developing the workforce skills necessary for the development of the ICT industry and consolidation of Yucatán’s two industrial innovation centers. This collaboration could also increase the state’s

FIGURE 2.9

High-Level Overview of Binding Constraints Facing the ICT Sector in Yucatán



Note: ICT = information and communication technology.

*Affects firms at the national and state levels.

access to federal government financing, helping to level the playing field across states. Establishing a public-private agency responsible for identifying and attracting ICT projects, consolidating existing industry clusters, and coordinating the creation of a one-stop shop for regulations and permits could accelerate the development of the ICT sector. Efforts to simplify regulatory compliance could be complemented by offering “smart incentives” to attract anchor firms and promote technology transfer to small and medium enterprises (SMEs).

Developing a network of incubators and accelerators could encourage the growth of new ventures in Yucatán’s ICT sector. Under the guidance of the public-private agency for the ICT sector, this network could nurture early-stage ventures and provide them with necessary administrative, legal, and technical support. The network could also connect projects with potential investors, and train teams in delivering an effective financing pitch. These incubators and accelerators could also provide valuable real-world experience for local students in ICT-related fields such as engineering, computer science, and mathematics, enabling them to gain exposure to the various stages of project development.

Enhancing ICT uptake and usage to increase the demand for ICT services and generate enough revenues and returns for ICT investments. To initiate this, pilot programs could be launched to promote digitalization and support the use of connected devices, artificial intelligence, machine learning, and virtual reality services in key economic sectors such as transportation, agriculture, manu-

facturing, health care, education, energy, and urban services. Incentivizing ICT demand can also be achieved by offering subsidized computer equipment, public internet access, and training courses for students and SMEs. Launching periodic hackathons can also address challenges faced by the public and private sectors using ICTs. Furthermore, efforts to transform Mérida as southern Mexico's first "smart city" could accelerate the adoption of 5G technology.

Facilitating access to finance through sector-specific programs that reflect the unique requirements of the ICT industry can promote competition and enable the growth of efficient firms. Prosoft³³ (currently unfunded) could be revived, enhanced and linked to financial programs offered by development banks. The government could facilitate access to this and similar programs by improving the information and guidance provided to companies. To address information asymmetries and lower search costs, a special advisory and support window, linked to the proposed one-stop shop for regulatory compliance, could be established specifically for Yucatán and other southern states with potential for ICT development. Finally, complementing public financial instruments with measures to attract venture capital to Yucatán will be crucial to the development of the ICT sector.

Table 2.5 summarizes the policy recommendations for developing the ICT sector in Yucatán.

TABLE 2.5

Policy Recommendations Matrix: ICT Sector in Yucatán

	Infrastructure
	<ul style="list-style-type: none"> → Expand the broadband coverage in Mexico and in Yucatán by ensuring that the “Red Compartida” project remains uninterrupted and financially viable. → Consider laying fiber-optic cables alongside feasible segments of the Mayan Train, taking advantage of this infrastructure, to connect more regions in Yucatán. → Consolidate maritime routes to coastal cities in the Gulf of Mexico (both Mexico and U.S. ports) and Latin America to ensure access to raw materials and other intermediate goods for ICT products. → Promote public-private infrastructure investments to enable 5G connectivity. These investments should not only focus on dedicated 5G networks but also include the necessary complementary ICT infrastructure that can be shared with them.
	Sector-specific support
	<ul style="list-style-type: none"> → Establish a public-private agency tasked with identifying and attracting potential ICT projects (manufacturing and services) from different regions of the country and abroad. The agency would focus on consolidating ongoing and new projects in Yucatán, supporting investment promotion, and facilitating links between those projects and support programs in the state. → Promote the development of a certified data center in Yucatán. This initiative aligns with Yucatán’s internet exchange point, making it a natural progression, and would position the state as an ICT industry leader not only in southern Mexico but also in Central America. → Collaborate with key stakeholders, such as technological parks, research and academic institutions, and local government authorities, to develop a network of incubators and accelerators aimed at encouraging new ventures in the ICT sector in Yucatán. → Continue strengthening the collaboration between industry, government, and academia (triple helix model) to redesign the academic curricula and create education programs that provide students and professionals with the skills and readiness for the ICT sector. → Support digitalization pilot programs and initiatives aimed at accelerating and deepening the adoption of Internet-of-Things devices, artificial intelligence, machine-type services, and augmented or virtual-reality services in key sectors of the economy.
	Investment climate, competition, and government interventions
	<ul style="list-style-type: none"> → Foster open competition, actively promoting innovation and the participation of new providers in the telecommunications and broadcasting sectors. → Create a single window or one-stop shop dedicated to the ICT Industry, in coordination with all levels of government to integrate, minimize, and facilitate regulatory compliance for new investments or the expansion of existing firms. → Promote digital inclusion by providing subsidized computer equipment and establishing public internet access points to students and SMEs. Consider complementing this initiative with training courses for students tailored to different levels of education, and SMEs in utilizing relevant business software. → Consider providing land grants for major private investment projects, contingent upon the development of last-mile infrastructure or fulfillment of investment and job generation goals. Complement the establishment of ICT clusters by designing nondistortionary incentives to attract anchor firms and promote technology transfer to SMEs.

Notes

1. The northern region includes the states of Chihuahua, Coahuila, Baja California Norte, Nuevo León, Sonora, and Tamaulipas.

2. The Bajío includes the states of Aguascalientes, Guanajuato, Jalisco, Querétaro, and San Luis Potosí.

3. Nearshoring is the practice of shifting outsourced manufacturing closer to a product's end market. Currently, Mexico is benefiting from nearshoring investments resulting from the relocation of production from Asia to get closer to the main markets of the United States and Canada. Several factors account for this shift, including (i) supply chain disruptions aggravated by the COVID-19 pandemic and the Russian Federation's invasion of Ukraine, (ii) rising labor costs in offshoring destinations, (iii) higher shipping and other logistics costs with increasing delays, (iv) increasing pressure to reduce transport carbon emissions, (v) geopolitical tensions between the United States and China, (vi) need for closer proximity between design and manufacturing, and (vii) capacity for flexible production, allowing for late-stage adjustments on products for final customers.

4. Based on INEGI's Economic Censuses. The estimation excludes economic activities related to oil and gas, central, commercial and development banks, brokerage houses, and other centralized activities.

5. Given some special agreements and conditions offered by the federal or local governments, some firms that had decided to invest in a special economic zone maintained their investment plans. In Chiapas, the case of a Guatemalan firm stands out. The firm built an industrial complex in Tapachula, near Mexico's border with Guatemala, to produce noncarbonated beverages, flavored milks and oils. The estimated US\$100 million investment has generated more than 2,000 jobs, with around 600 direct jobs.

6. The isthmus represents the shortest distance between the Pacific and Atlantic Oceans in Mexico, approximately 300 kilometers at its narrowest point.

7. In June 2019, the Interoceanic Corridor of the Isthmus of Tehuantepec (CIIT) Authority was established to coordinate the program. The CIIT was a decentralized public body with corporate legal status and rights to asset ownership. It absorbed the lands secured by the special economic zone project in the region and, initially, the shares of the state-owned companies administering the ports of Coatzacoalcos and Salina Cruz, as well as the Tehuantepec Isthmus Railway (these infrastructures passed to the control of the Ministry of the Navy in 2022). The CIIT acquired more land along the corridor for industrial parks, carried out consultations with indigenous groups, and promoted public investment projects in ports, oil pipelines, and refineries in the region and local railway. Since 2023, the Ministry of the Navy absorbed the CIIT and it is in charge of the project.

8. The South-Southeast region of Mexico covers nine states: Campeche, Chiapas, Guerrero, Oaxaca, Puebla, Quintana Roo, Tabasco, Veracruz, and Yucatán. Given the differences in economic structure, social development, and institutional capacities of each state, and potential flaws of having a "one-size-fits-all" approach, this Deep Dive by the International Finance Corporation focused on the three poorest states in Mexico: Chiapas, Guerrero, and Oaxaca—all located in the southern part of the country, and Yucatan, one of the more dynamic and developed states in the southeast.

9. GDP data is from INEGI's National Accounts; firm data is from INEGI's 2019 Economic Census.

10. Employment data is from INEGI's National Employment Survey for the first quarter of 2021. There are differences in the employment registered in the INEGI's Economic Census and this survey, notably in the agricultural sector, given that the former is an exhaustive census but only applied to established economic units (firms), whereas the latter is based on a survey applied to a representative sample of households considering three domains: 39 "self-represented" cities (according to political, economic development, average annual growth rate, urban development and classification on the national urban system), a high-density urban complement, and a rural domain. Hence, the employment survey includes concepts of people that are not considered in the census, such as the population employed in the agricultural field.

11. A product is said to have a comparative advantage if its revealed comparative advantage (RCA) is greater than one. The RCA is determined by calculating the ratio of the value added or export of an industry or product to the total value added or export in a state, over the average contribution of that industry or product in Mexico's total value added or exports. This indicator of a location's competitive strengths is based on Ricardian trade theory, which claims that patterns of production or trade among regions are defined by their relative differences in productivity.

12. INEGI's Input-Output Matrix, <https://en.www.inegi.org.mx/programas/mip/2013/>.

13. This section draws from the growth diagnostics decision tree developed by Hausmann, Klinger, and Wagner (2008) to a sectoral level.

14. A *Tipo Inspección Federal* (Federal Inspection Type) certification ensures that the facility where the livestock product was slaughtered, stored, or processed undergoes permanent sanitary inspections to fulfill all requirements from the *Secretaría de Salud* (Secretariat of Health) and the *Secretaría de Agricultura y Desarrollo Rural* (Secretariat of Agriculture and Rural Development), achieving the highest quality standard for trading livestock products domestically and internationally.

15. In Oaxaca and Guerrero, communal land represents 81 and 78 percent of all land, respectively, while in Chiapas and Yucatán, 59 and 55 percent of land is communal, respectively.

16. Wooden furniture includes kitchen, bed, office furniture, and other wooden furniture.

17. INEGI's Input-Output Matrix, <https://en.www.inegi.org.mx/programas/mip/2013/>.

18. García Aguirre (2014).

19. In the automotive industry, Tier 1 firms supply original equipment manufacturers, Tier 2 firms supply Tier 1 firms with moderate-complexity parts, and Tier 3 firms supply Tier 2 firms with less-sophisticated components.

20. Data for the automotive industry in Chiapas is grouped with other sectors in INEGI's National Accounts. NAICS three-digit codes 333 to 336 include the automotive industry and the manufacturing of machinery, computers and electronics, electrical equipment, appliances, components, and transportation equipment. However, the automotive industry concentrates all medium and large firms under these categories in the state, while the rest of manufacturing sectors is 90 percent composed of micro firms, so it is reasonable to assume that most of the value added reported comes from automotive.

21. World Bank and MMK Consulting (2016).

22. AMIA and INEGI (2018).

23. Kallstrom (2015).
24. Based on estimations using INEGI's Monthly Survey of the Manufacturing Industry during 2013–21.
25. AMIA and INEGI (2018).
26. Customary law or “*usos y costumbres*” is used by indigenous population and communities. The Inter-American Court of Human Rights describes it as legal norms and rules that arise from repeated events over time in a specific territory. They have binding force as long as they respect human rights and basic legal frameworks. This means that conditions, practices, traditions, and customs are accepted as obligatory rules of conduct by a community. In many indigenous communities authorities are selected through assemblies, which can vary in terms of inclusiveness. Political parties may not play a role in this process. See the *Corte Interamericana de Derechos Humanos* and the World Intellectual Property Organization's websites for more details.
27. SHCP (2016); Hausmann, Cheston, and Santos (2015).
28. Financial access points refer to banks, *sociedades cooperativas de ahorro y crédito popular* (savings and credit cooperative societies) and *sociedades financieras populares* (popular financial companies) branches, as well as bank agents, and automated teller machines.
29. Huawei (2015).
30. Kvochko (2013).
31. Based on Mexico Atlas of Economic Complexity.
32. Flores, Ceballos, and Bojórquez (2016).
33. *Programa para el Desarrollo de la Industria de Software y la Innovación* (Software Industry and Innovation Development Program).

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