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THE IMPACT OF NEARSHORING ON MEXICO'S NORTHERN BORDER REGION: A CASE STUDY OF CIUDAD JUÁREZ, CHIHUAHUA

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Abstract— Nearshoring has established itself as a business relocation strategy aimed at improving supply chains by reducing the geographic distance between production centers and consumer markets. In this regard, Mexico's northern border region takes on particular importance due to its proximity to the United States, its industrial infrastructure, and its integration into global value chains. The purpose of this article is to examine the impact of nearshoring on Mexico's northern border region by analyzing its effects on foreign direct investment, industrial development, employment, infrastructure, and regional competitiveness. The research is descriptive and documentary in nature: it combines a literature review guided by the stages of the PRISMA methodology—without constituting a systematic review—with an analysis of statistical time series from INEGI. A total of 49 documents were reviewed from a total of 300 identified records, including scientific articles, books, technical reports, government documents, and publications from both national and international organizations. The results show that in Ciudad Juárez, the consumption of inputs by IMMEX manufacturing establishments grew by 13.4% annually between 2008 and 2022 and decreased by 41.2
% between 2022 and 2025, while the number of employees fell by 17.0% between 2023 and 2025. Domestic inputs accounted for only 3.6% of consumption in 2025, compared to 31.1% nationwide. Challenges related to industrial space, energy supply, and logistics infrastructure were also identified. Nearshoring is estimated to be a strategic opportunity for the growth and competitiveness of the northern border region, but its long-term consolidation depends on Mexico's ability to improve its infrastructure, maintain an investment-friendly environment, and formulate policies that allow for the sustainable exploitation of opportunities arising from corporate relocation.

***Keywords*—**International trade; Economic competition; Border; Manufacturing industry; Foreign investment; Industrial location; Mexico.

Abstract: Nearshoring has established itself as a business relocation strategy aimed at improving supply chains by reducing the geographic distance between production centers and consumer markets. In this context, Mexico's northern border region holds particular importance due to its proximity to the United States, its industrial infrastructure, and its integration into global value chains. This article aims to examine the impact of nearshoring on Mexico's northern border region by analyzing its effects on foreign direct investment, industrial development, employment, infrastructure, and regional competitiveness. The study is descriptive and documentary: it combines a literature review guided by the stages of the PRISMA methodology—without constituting a systematic review—with the analysis of INEGI statistical series.

The results show that in Ciudad Juárez, the consumption of inputs by IMMEX manufacturing establishments grew 13.4% per year between 2008 and 2022 and fell 41.2% between 2022 and 2025, while employment decreased 17.0% between 2023 and 2025. Domestic inputs accounted for only 3.6% of consumption in 2025, compared with 31.1% nationwide. Challenges were also identified regarding industrial space, energy supply, and logistics infrastructure. Nearshoring is considered a strategic opportunity for the growth and competitiveness of the northern border region; however, its long-term consolidation depends on Mexico's ability to improve infrastructure, maintain an investment-friendly environment, and formulate policies that enable the country to sustainably capitalize on the opportunities arising from business relocation.

Keywords—Boundaries; Economic competition; Foreign investment; Industrial location; International trade; Manufacturing industry; Mexico.

INTRODUCTION

Nearshoring refers to the business strategy that brings manufacturing and service companies closer to their target consumer markets by utilizing shorter supply chains, which results in logistical and transportation benefits that enable rapid and flexible responses to customer needs. In other words, nearshoring is a global phenomenon that is reshaping value chains not only in manufacturing but also in the provision of services (Carbajal Suárez and Murillo Villanueva, 2025). The purpose of nearshoring is to reduce exposure to risk from potential supply chain disruptions and to minimize operating costs. Unlike the traditional model, which prioritized only low labor costs in distant locations, nearshoring emphasizes resilience, security, and agility in responding to market changes (Lawrence, 2025).

In this regard, the current study draws on the article "The Nearshoring Trend and Its Impact on Mexico" by Monreal Ávila (2023), which helps illustrate the significance of corporate relocation in terms of its impact on the country's economy. Smith (2025), using case studies of retail and manufacturing companies, analyzes how nearshoring can reduce risk exposure and streamline supply chain operations. These are some of the factors that make this perspective so relevant to Mexico's northern border region: as part of North America, it possesses excellent industrial infrastructure and participates in global value chains, positioning it as a priority area for redirecting productive activities.

Mexico is well-positioned to take advantage of nearshoring, thanks to its geographic location, skilled workforce, and a trade framework established through the USMCA. These advantages have made it possible to expand manufacturing activities and attract foreign investment, primarily in the northern border states. (Blecker et al., 2025; Ponce et al., 2025). Likewise, this region has become a key area for production and trade with the United States, concentrating a significant portion of industrial activity and the benefits associated with corporate relocation.

However, the expansion of nearshoring also poses significant challenges regarding the availability of infrastructure, energy, industrial space, logistics, and a skilled workforce. Therefore, it is important not only to study the opportunities presented by this phenomenon but also the

constraints that may hinder its establishment and sustainability in the region.

Problem Statement

Although the literature documents the increase in investment and manufacturing activity associated with nearshoring in Mexico, evidence at the local level is limited. In the case of Ciudad Juárez, Chihuahua, it has not been determined whether the relocation of companies has led to sustained growth in manufacturing employment and greater integration of domestic suppliers, or whether its effects have been temporary and constrained by limitations in infrastructure, energy, and industrial space. This raises the research question: How have manufacturing employment, the consumption of inputs by IMMEX firms, and investment associated with nearshoring in Ciudad Juárez evolved between 2007 and 2025, and what factors limit the consolidation of this phenomenon?

General Objective

To analyze the economic and industrial impact of nearshoring in Mexico's northern border region, using Ciudad Juárez, Chihuahua, as a case study, based on foreign investment, manufacturing employment, and the consumption of inputs by IMMEX companies, and to identify the factors that influence its consolidation.

Specific Objectives

1. To synthesize recent literature on nearshoring in Mexico and along the northern border.
2. Describe the evolution of manufacturing employment in Chihuahua and of the workforce employed under the IMMEX program.

3. Quantify changes in the consumption of domestic and imported inputs by IMMEX companies in Ciudad Juárez during the 2007–2025 period.
4. Compare the results with previous studies and identify constraints related to infrastructure, energy, and industrial space.

Rationale

Nearshoring responds to pressure from companies to have faster, more efficient, and safer production and distribution processes, which has led to the relocation of operations to countries close to their main markets. Mexico's northern border region is one of the areas that has benefited most from its proximity to the United States, which facilitates the integration of supply chains and the movement of goods, and because it concentrates a large portion of the country's manufacturing and export activity. This growth has driven the expansion of industrial parks, job creation, and the strengthening of sectors such as the automotive, electronics, and medical device industries.

However, this same growth has revealed structural limitations. Rising industrial demand is straining the national power grid (Chiatchoua and Neme Castillo, 2025), and in the northern manufacturing hubs, demand often exceeds generation capacity, leading to power outages that disrupt production and erode investor confidence (Ponce et al., 2025). The availability of industrial warehouses fell from 7% in 2022 to virtually 0% in 2023 in several sectors in the north, which drove up rental costs and limited the influx of new projects (Cuevas, 2025). Added to this is congestion at border crossings, with wait times exceeding five hours at certain points (Delgado Ramos and Pohlenz De Tavira, 2025).

Therefore, the success of nearshoring depends not only on attracting investment but also on the ability of host regions to meet industrial demand with adequate infrastructure, services, and public policies. Analyzing the case of Ciudad Juárez using data on employment, inputs, and investment allows us to assess whether the region can sustain its growth and capitalize on the relocation of industries.

DEVELOPMENT

Theoretical Framework

During the 1980s and 1990s, offshoring predominated: companies from developed countries moved their production to distant regions with cheap labor, primarily China and Southeast Asia (Chiatchoua and Neme Castillo, 2025). By the mid-2000s, the model revealed its

limitations: problems arose with quality control and intellectual property protection, along with high coordination and transportation costs (Akinbolajo, 2022). The trade war between the United States and China that began in 2018 led companies to seek alternatives outside of Asia to avoid tariffs and geopolitical risks (Nedumpara, 2024), and the COVID-19 pandemic highlighted the vulnerability of long supply chains, as the closure of ports and factories in China caused global shortages (Van Hassel et al., 2022).

Relocation strategies are distinguished by geographic distance, cost strategy, and the level of resilience they seek (Lawrence, 2025). Inshoring or onshoring relocates production to the company's country of origin; nearshoring moves it to nearby countries; and offshoring moves it to distant countries with lower costs (Pietrobelli and Seri, 2023). These decisions have gained importance because governments and companies seek to improve supply chain security and ensure the production of strategic goods (Taylor, 2026). Global trade is thus shifting toward shorter, regional, and more resilient supply chains (Nedumpara, 2024).

According to Michael Porter's theory of competitive advantages, the prosperity of a company or a nation does not depend solely on natural resources or cheap labor, but on its ability to innovate and develop high-value-added processes (Castillo Rodríguez and Castañeda Martínez, 2026). Within this framework, nearshoring relies on geographic proximity, operational agility, and resilience (Hirsiger, 2025): proximity to the end market reduces the need for large inventories and allows for rapid responses to fluctuations in demand (Chiquiar and Tobal, 2024).

For more than six decades, maquiladoras have been one of the pillars of the northern border region's economy and a driver of regional employment (Rangel et al., 2025). From assembly lines focused on cost reduction, they have evolved into the industrial infrastructure that today enables the region to capitalize on nearshoring opportunities (Maya Martínez and Sosa Juarico, 2024). They operate primarily under the IMMEX program, which allows for the duty-free import of raw materials, machinery, and parts to be processed and exported, primarily to the United States (Cuevas, 2025). The model has been criticized for functioning as an enclave economy: many plants export large volumes but import nearly all of their inputs, without significant productive ties to local or national suppliers (Blecker et al., 2025).

The automotive industry leads the manufacturing sectors driven by nearshoring: following the NAFTA agreement, Mexico became an industrial cluster specializing in this sector (Monreal Ávila, 2023); the sector accounts for 40.2% of Mexico's total exports, and in 2024 its exports reached 193,900 million dollars (Carbajal Suárez and Murillo Villanueva, 2025). Its geographic location fosters this competitiveness, logistical efficiency, and integration into global value chains (Castro Valencia and Otero Ramos, 2026).

Methodology

This is a descriptive and documentary study that combines two components: a literature review and an analysis of official statistical time series. The literature review is not a systematic review; it was guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) methodology to transparently organize the identification, screening, and selection of documents (Figure 1).

The search was conducted on Google Scholar and Scopus between June and July 2026, using combinations of the terms "nearshoring," "impact," "border region," and "Mexico." A total of 300 records were identified: 200 on Google Scholar and 100 on Scopus. The selection process applied four exclusion criteria: 1) duplicate records; 2) documents without access to the full text; 3) documents that did not provide relevant information; and 4) documents whose subject matter differed from that of this study. Before the screening process, 120 records were eliminated, 60 of which were duplicates; during the screening process, 30 records were excluded; 10 reports could not be retrieved; and during the eligibility assessment, 37 were excluded due to insufficient information and 54 because they did not meet the study's objective. A total of 49 documents were included. The article cites 22 of these, in addition to statistical sources from INEGI; the rest were consulted for contextual information. The cited documents were published between 2022 and 2026, in Spanish and English. The information was organized into the categories of Mexico's competitive advantages, economic impact, industrial development, infrastructure, employment, foreign investment, and challenges of nearshoring, and was analyzed using the analytical-synthetic method to identify convergences, divergences, and trends among authors.

The second component is the descriptive analysis of INEGI time series: the National Occupation and Employment Survey (ENOE) for Chihuahua and the Manufacturing and Maquiladora Export Statistics (EMME) for manufacturing establishments with IMMEX permits in Ciudad Juárez, the state of Chihuahua, and the national total. The monthly IMMEX time series were aggregated by year

(sums for inputs and averages for employed personnel), and these were used to calculate average annual growth rates, percentage changes, and the share of domestic inputs in total consumption. The analysis does not include econometric models or hypothesis testing; therefore, its results describe trends and do not establish causal relationships.

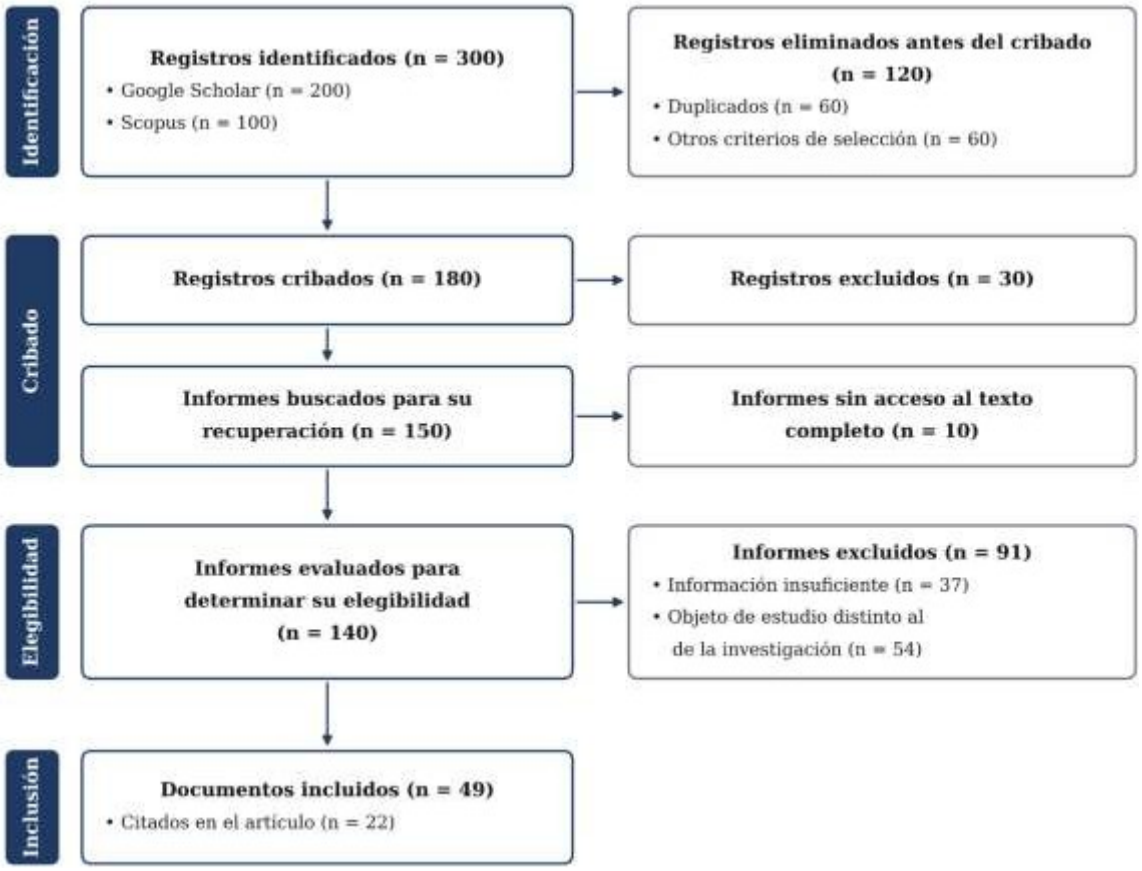


Figure 1. *Flowchart of the literature search and selection.*

Source: *Prepared by the authors based on the PRISMA 2020 guidelines.*

Results

The results are organized into three parts: manufacturing employment in Chihuahua and in establishments participating in the IMMEX program, input consumption by IMMEX companies in Ciudad Juárez, and the national investment context. The IMMEX program time series correspond to manufacturing establishments and were aggregated by year using monthly data from INEGI; since the series begins in July 2007, the annual analysis covers the period from 2008 to 2025. Monetary values are expressed in current pesos.

Manufacturing Employment

According to the ENOE, in the first quarter of 2026, the manufacturing industry employed 509,654 people in Chihuahua, 25,124 fewer than in the same quarter of 2025 (−4.7%), and its share of the state's employed population fell from 30.0% to 28.0% (National Institute of Statistics and Geography [INEGI], 2026a). The decline occurred while the state's total employed population increased by 38,348 people, indicating an adjustment specific to the sector rather than to the labor market as a whole.

The same trend is observed in establishments with IMMEX programs. Nationwide, the number of employed workers totaled 3,174,116 in April 2026, 1.6% less than a year earlier (INEGI, 2026b). In Ciudad Juárez, the number of employed workers in IMMEX manufacturing establishments rose from an average of 159,107 in 2009 to a peak of 315,848 in 2023, then fell to 262,213 in 2025—a 17.0% decline over two years (Figure 2c). In July 2026, 250,878 people were recorded, 4.2

% fewer than in July 2025. Even so, in 2025, Juárez accounted for 68.9% of Chihuahua's employed IMMEX manufacturing workforce and 9.2% of the national total.

Inputs Consumed by IMMEX Companies in Ciudad Juárez

Between 2008 and 2022, total input consumption by IMMEX manufacturing establishments in Ciudad Juárez rose from 164.7 to 958.2 billion pesos, equivalent to an average annual growth rate of 13.4% (Table 1). Almost all of this consumption consists of imported inputs, which peaked in 2022 at 939.4 billion pesos (Figure 2a). Beginning in 2023, the trend reversed: in 2025, total inputs amounted to 563.3 billion pesos, 41.2% less than in 2022.

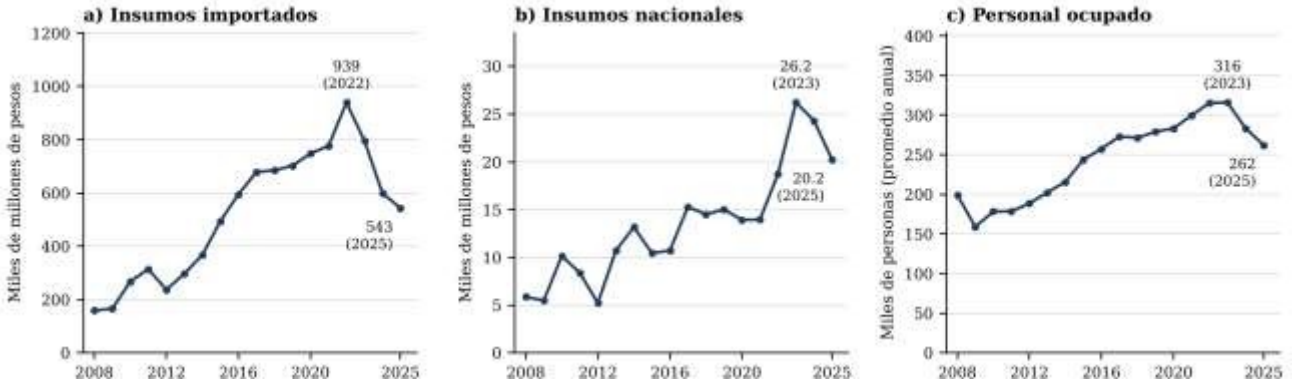


Figure 2. *Inputs consumed and employees at IMMEX manufacturing establishments in Ciudad Juárez, 2008–2025.*

Source: Author*'s own analysis based on data from INEGI (2026b).*

Domestically sourced inputs followed a different trajectory. They grew at an average annual rate of 8.7% between 2008 and 2022, peaked one year after imported inputs, reaching 26.2 billion pesos in 2023, and declined by 22.8% by 2025 (Figure 2b). Their share of total consumption is small: they accounted for 3.6% in 2008, 2.0% in 2022, and 3.6% in 2025. The increase in their share between 2023 and 2025 is due to the fact that imported inputs fell more rapidly, not because purchases from domestic suppliers continued to grow.

Table 1. *Indicators for IMMEX manufacturing facilities in Ciudad Juárez, 2008–2025.*

Indicator	2008	2022	2023	2025	TMCA 2008–2022 (%)	Change 2022–2025 (%)
Total Inputs	164.7	958.2	822.0	563.3	13.4	−41.2
Imported inputs	158.9	939.4	795.8	543.1	13.5	−42.2
Domestic Inputs	5.9	18.7	26.2	20.2	8.7	8.1
Share of Domestic Inputs (%)	3.6	2.0	3.2	3.6	n.a.	n.a.
Employees (annual average)	199,256	315,471	315,848	262,213	3.3	−16.9

Note: *Inputs in billions of current pesos. CAGR: compound annual growth rate. N/A: not applicable.*

Source: Author's *own calculations based on data from INEGI (2026b).*

A regional comparison puts this result into perspective. In 2025, domestic inputs accounted for 31.1 % of consumption by the country's IMMEX manufacturing establishments and 8.5% in the state of Chihuahua, compared to 3.6% in Ciudad Juárez. The data are consistent with a period of expansion that culminated in 2022–2023, coinciding with the nearshoring boom, followed by a contraction in employment and production. Since this is a descriptive analysis, these coincidences do not allow us to causally attribute either the expansion or the contraction to nearshoring.

Consolidation of Nearshoring in Mexico (2021–2025)

The period from 2021 to 2025 represents the phase of greatest consolidation of nearshoring in Mexico, characterized by sustained growth in Foreign Direct Investment (FDI), the strengthening of trade with the United States, and the implementation of public policies aimed at capitalizing on the relocation of companies. In terms of investment, Mexico experienced a steady post-pandemic recovery.

In 2021, it attracted approximately $31,500 million in FDI, a figure that rose to $35,300 million in 2022 (Ramírez Sierra et al., 2025). Subsequently, in 2023, a historic high of over $36,000 million was reached, while in 2024 a new record of $36,800 million was set. Furthermore, foreign investment inflows in the first quarter of 2025 were 5.4% higher than in the same period of the previous year, demonstrating international companies' interest in establishing a presence in Mexico (Castillo Rodríguez and Castañeda Martínez, 2026).

This growth is also reflected in investment announcements related to nearshoring. Since 2021, more than 100 projects valued at over $30,000 million have been recorded, while between January and October 2023 alone, 173 new investments were announced, with a combined value exceeding $42,000 million (Cuevas, 2025). These figures demonstrate that Mexico continues to position itself as one of the leading destinations for corporate relocation. In the commercial sphere, 2023 was a historic year as Mexico became the United States' leading trading partner, displacing China as the largest exporter of goods to that market. Furthermore, since 2022, trade between the two countries has exceeded $700,000 million for the first time, strengthening the integration of supply chains in North America (Monreal Ávila, 2023). At the same time, the growing interest in nearshoring was also reflected in an increase in online searches for this concept, especially beginning in June 2022, when the topic began to gain greater prominence in the business sector. The impact of nearshoring has been particularly evident in the northern region of the country.

The growing demand for industrial space caused the availability of industrial warehouses (buildings designed for the production, storage, and logistics of goods) to decline from approximately 7% in 2022 to levels close to 0% in 2023, reflecting the high demand for infrastructure to support new investments (Cuevas, 2025).

Similarly, various strategic projects reinforced this trend, including Tesla's project announced in 2023 for Nuevo León, the development of the Sonora Plan focused on the semiconductor and clean energy industries, as well as the expansion of the Interoceanic Corridor of the Isthmus of Tehuantepec through the Development Hubs for Well-being (PODECOBIs) (Santillán Luna et al., 2024). Regarding the regulatory environment, various factors contributed to the strengthening of

nearshoring. The passage of the U.S. CHIPS and Science Act in 2022 spurred the development of capabilities for semiconductor manufacturing and testing in Mexico.

However, the growth of nearshoring also faces significant challenges. Donald Trump's return to the U.S. presidency in 2025 and his policies of imposing new tariffs on imported goods have created uncertainty among future investors. And just as is the case now in 2026, with the revision of the United States-Mexico-Canada Agreement (USMCA), potential changes to rules of origin and regional content requirements are also expected, which could affect companies' localization strategies.

Overall, these developments demonstrate that 2021–2025 represents the period of greatest growth for nearshoring in Mexico, positioning the country as one of the leading destinations for manufacturing investment. However, capitalizing on this trend will depend on the ability to strengthen infrastructure, secure energy supplies, expand the supply of industrial parks, and maintain a competitive regulatory environment that fosters sustained growth along the northern border region.

DISCUSSION

The results answer the research question in two ways. Through 2022–2023, employment and input consumption at IMMEX establishments in Ciudad Juárez grew steadily; thereafter, both indicators declined. The expansion phase aligns with the available evidence for the country as a whole. Ramírez Sierra et al. (2025), using generalized synthetic controls for 2020–2023, estimate that states along the northern border and in the Bajío region recorded a 5.2 percentage point increase in manufacturing output and an 11.4 percentage point increase in foreign direct investment, with Chihuahua among the states that benefited the most. Pietrobelli and Seri (2023), on the other hand, find limited evidence of nearshoring to Latin America, with Mexico as the exception.

Regarding employment, the findings align with previous studies in that the effect is weak but differ in their most recent assessment of its direction. Rangel et al. (2025) identify initial gains in manufacturing employment through June 2023 in the industries most exposed to nearshoring, with no improvements in wages or a consistent effect on productivity, while Ramírez Sierra et al. (2025) find a positive but not significant effect. Both studies end in 2023, right at the peak of the Juárez time series. The data from 2024 to 2026 presented here show that those initial gains did not take hold in the city: the

number of IMMEX employees fell by 17.0% over two years. This study does not allow us to determine the causes of the decline; the tariff uncertainty of 2025 and the USMCA review, noted in the previous section, are plausible explanations that require a specific analysis.

The second finding concerns local supply chains. Maya Martínez and Sosa Juarico (2024) argue that nearshoring can reproduce the enclave economies of the maquila sector—that is, export hubs that import their components without establishing regional productive linkages—and Blecker et al. (2025) point out the same limitation of the model. Data from Ciudad Juárez support this warning: domestic inputs did not exceed 4% of consumption in any year of the period, and in 2025 they accounted for 3.6%, compared to 31.1% in the country's IMMEX establishments. The increase in domestic purchases between 2021 and 2023—from 14.0 to 26.2 billion pesos—indicates that there was some incorporation of suppliers during the boom, but their subsequent decline suggests that this was not a structural change.

Finally, the infrastructure constraints documented in the literature help interpret these results. Chiquiar and Tobal (2024) link the potential benefits of nearshoring to an elastic supply of skilled labor, reliable and competitively priced energy, transportation and communication networks, and an institutional framework that enforces contracts. Pressure on the power grid (Ponce et al., 2025), the shortage of industrial space (Cuevas, 2025), and congestion at border crossings (Delgado Ramos and Pohlenz De Tavira, 2025) indicate that several of these conditions are not fully met along the northern border. The main limitation of this study is its descriptive nature: it uses current-price values and focuses on a single municipality, so it does not isolate the effect of nearshoring from other factors, such as the exchange rate, inflation, or the U.S. industrial cycle.

CONCLUSIONS

Nearshoring coincided with a phase of expansion in Ciudad Juárez's export industry that peaked in 2022–2023: between 2008 and 2022, the consumption of inputs by IMMEX manufacturing establishments grew at an average annual rate of 13.4%, and the number of employees peaked at 315,848 in 2023. During the same period, foreign direct investment attracted by the country increased from 31,500 million dollars in 2021 to 36,800 million in 2024.

That expansion was not sustained. Between 2022 and 2025, input consumption fell by 41.2%, and between 2023 and 2025, the number of IMMEX employees declined by 17.0%; in Chihuahua, manufacturing employment

lost 25,124 jobs between the first quarter of 2025 and the first quarter of 2026, and nationwide, the number of IMMEX employees fell by 1.6% annually in April 2026. The benefits of nearshoring in the region are therefore neither permanent nor automatic.

The integration of domestic suppliers remains limited: in 2025, domestic inputs accounted for 3.6% of consumption at IMMEX establishments in Ciudad Juárez, compared to 31.1% nationwide. This result indicates that the local industry retains characteristics of the enclave model and that supplier development is the main task still to be addressed, along with the constraints related to energy, industrial space, and logistics infrastructure documented in the literature. The study is descriptive and based on current values; therefore, its results do not establish causal relationships.

FUTURE RESEARCH

It is recommended that future studies focus on the effect of nearshoring on Mexico's northern border region, proposing a comparative analysis among the main border states and industrial sectors. The aim is to compare these areas to identify differences in investment, employment, infrastructure, and industrial development. This analysis is important, given the need to understand the extent to which nearshoring is affecting different regions and sectors along the border unequally. It is also recommended to conduct a study on the effect of U.S. economic and trade policies—particularly those introduced since the beginning of President Donald Trump's administration—on nearshoring in Mexico.

In particular, the implications for tariffs, foreign trade, and supply chains should be taken into account. This analysis is critical for assessing how U.S. trade policy decisions may affect the attraction of new investment to the border region. Another relevant aspect is the review of the United States-Mexico-Canada Agreement (USMCA), with a focus on rules of origin, regional content, and supply chain security. Since this review is scheduled for 2026, it is essential to analyze the potential impact of these changes on companies operating in Mexico and their relationship to nearshoring.

Finally, it is suggested that future research consider including indicators related to employment, wages, consumption of local inputs, foreign investment, energy availability, and industrial space. This will make it possible to determine whether nearshoring is producing lasting economic benefits

for the population and businesses in the border region, rather than merely a temporary surge in investment. The Economic Commission for Latin America and the Caribbean (ECLAC) highlights the importance of these factors.

CONFLICT OF INTEREST

The authors declare that they have no conflicts of interest.

DATA AVAILABILITY

All datasets relevant to the results of this study are available in their entirety in the article.

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This study did not receive funding from any organization.

STATEMENT ON GENERATIVE AI

The authors declare that no generative artificial intelligence tools were used at any stage of this study.

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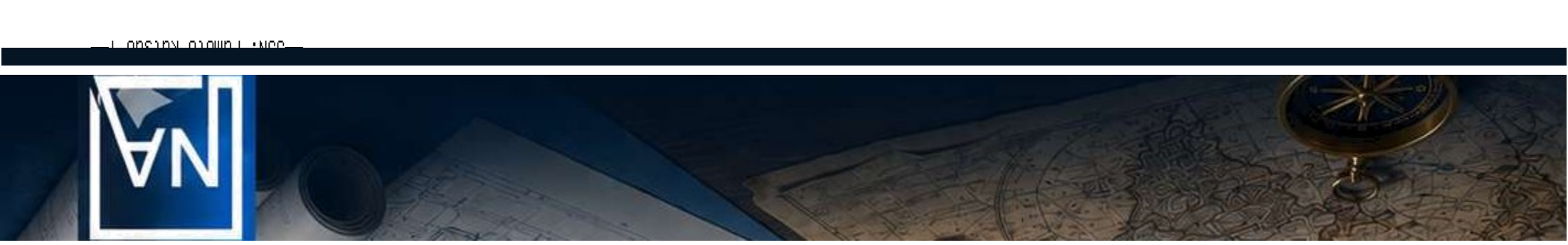
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