



THE OTHER SIDE OF THE COIN

CHAPTER 3: HUMAN CAPITAL IN THE AUTOMOTIVE AND AUTOPARTS INDUSTRY IN MEXICO



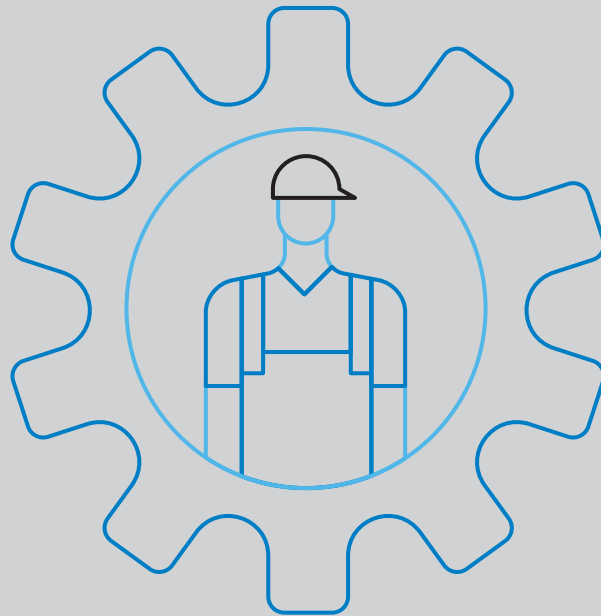
INA
Industria Nacional
de Autopartes, A.C.

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THE NEW GLOBAL: TALENT SHORTAGE AND REINDUSTRIALIZATION



1

1. THE CHALLENGE OF U.S. REINDUSTRIALIZATION



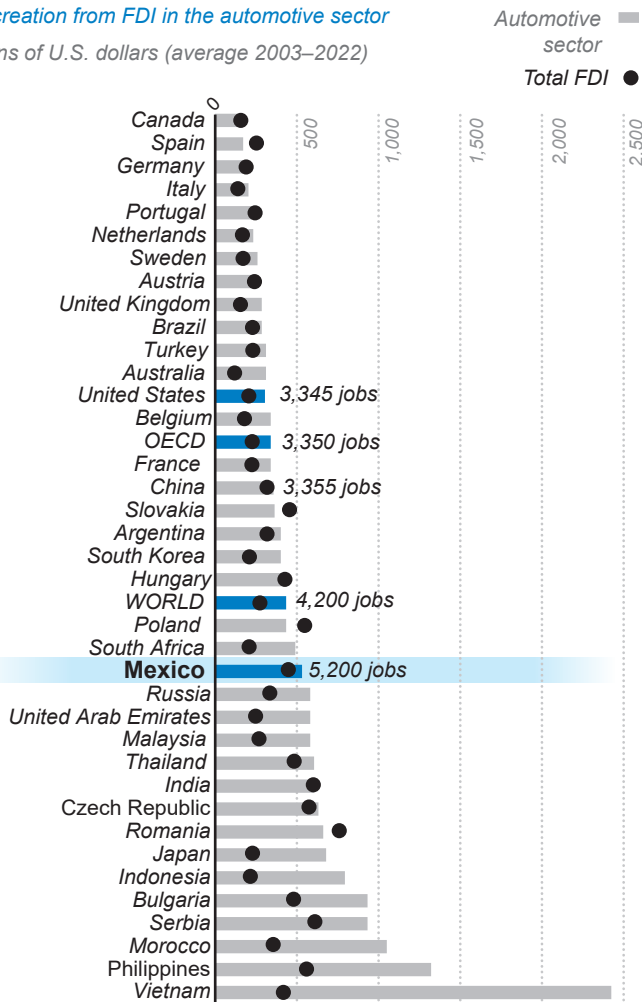
One of the greatest challenges in the current U.S. reindustrialization project is not only physically relocating automotive plants from Mexico and Canada to its own territory but also replicating the talent ecosystem and certification frameworks that support the industry in North America.

According to international data, OECD countries generate an average of 3,350 jobs for every one billion dollars invested in new automotive facilities..

JOB

Job creation from FDI in the automotive sector

Billions of U.S. dollars (average 2003–2022)



Source: OECD, calculations based on the FDI Index by the Financial Times (data include the FDI Markets groups Automotive OEM and automotive components).



The structural human capital deficit in the United States and the growing shortage of skilled talent in industrial areas will make it difficult to reach these figures in the short term.



THIS CHALLENGE IS NOT LIMITED TO TALENT

The competitiveness of Mexico's automotive industry also relies on a highly developed industrial certification infrastructure.



Currently, Mexico ranks sixth worldwide in the number of certifications within the automotive sector, which represents years of compliance with international standards and a continuous improvement process in the supply chain. Replicating this structure in the United States would require time, institutional investment, and ministerial cooperation, which cannot be resolved immediately.

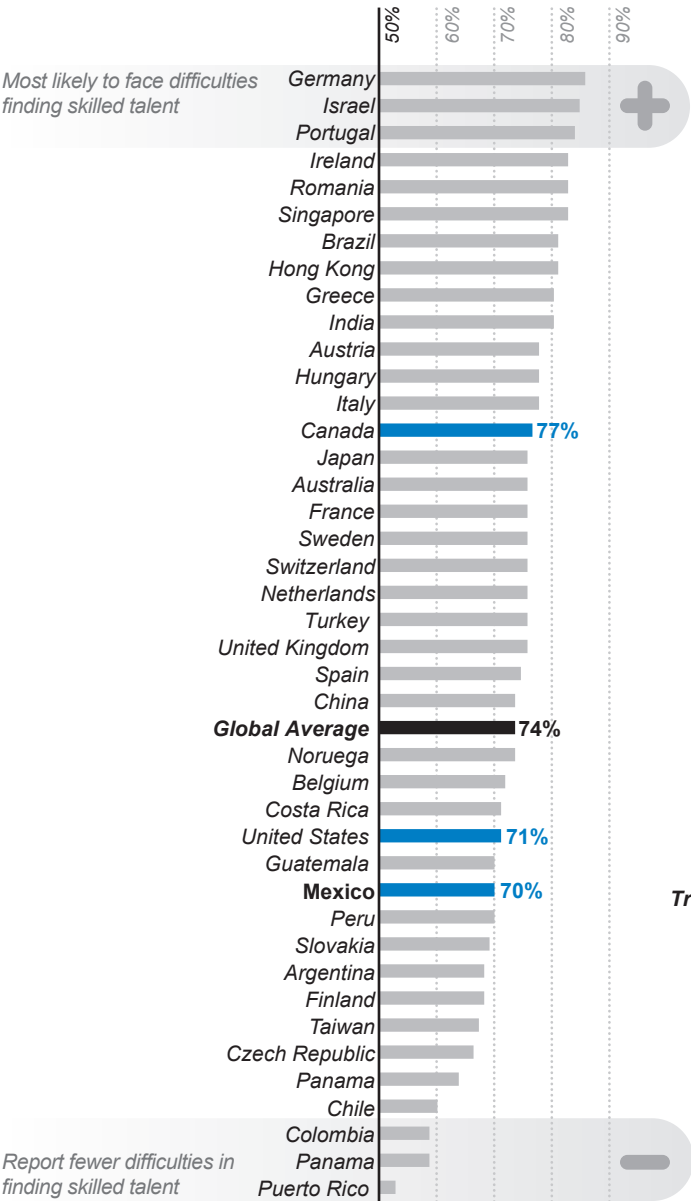
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2. THE GLOBAL AND U.S. LABOR SHORTAGE



THE TALENT SHORTAGE CONTINUES WORLDWIDE

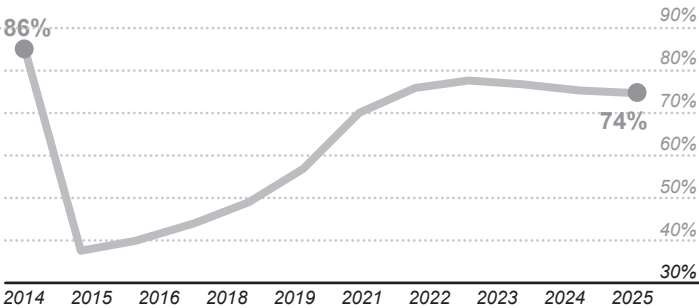
The shortage of skilled talent affects almost 3 out of 4 employers worldwide (74%).



According to ManpowerGroup's annual study, the shortage of human talent has shown an upward trend over the last decade. In 2015, 38% of employers worldwide reported difficulties in filling vacancies. By 2025, this figure has already reached 74%, affecting especially sectors such as automotive, where the demand for technical and digital skills is increasingly high.

HUMAN TALENT SHORTAGE

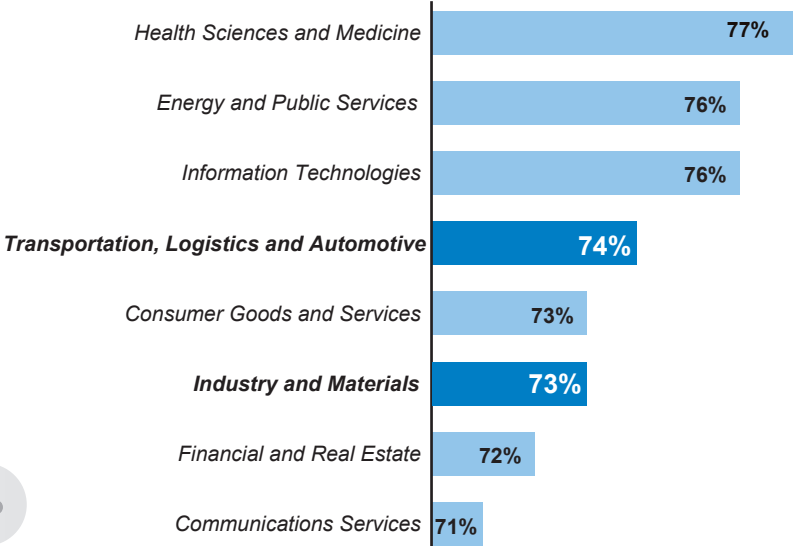
Percentage



Note: The annual talent shortage survey was not conducted in 2017 and 2020.

GLOBAL TALENT SHORTAGE

Percentage by sector



Source: INA based on information furnished by the Global Talent Shortage Report by ManpowerGroup.

Source: INA based on information furnished by the 2025 Global Talent Shortage Report, ManpowerGroup.



THE UNITED STATES FACES A STRUCTURAL WORKER SHORTAGE

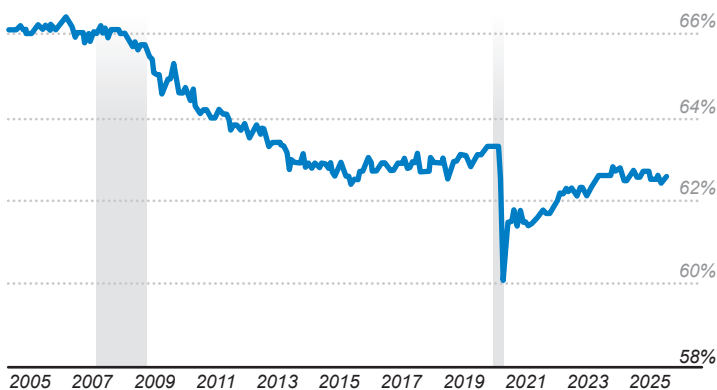
The talent shortage is not limited to emerging countries. The United States, Mexico's main trading partner, is also facing a structural crisis in labor force participation. U.S. manufacturers are struggling to fill their current job openings.



The labor force participation rate has shown a downward trend for more than 20 years. In 2000, it stood at around 66%, but since 2021 it has remained mainly between 62% and 63%. Although it has begun to recover, it suffered a sharp drop during the pandemic due to early retirements, challenges with childcare, and lower immigration, resulting in a significant shortage of workers in the country.

CIVILIAN LABOR FORCE PARTICIPATION RATE

Number of people



Source: INA based on information furnished by the U.S. Census Bureau of Labor Statistics.



In recent years, the gap between job vacancies and unemployed individuals has narrowed, yet the labor market remains competitive. As of April 2025, the United States was still facing a worker shortage: there were more job openings than people seeking work.

Even if all unemployed individuals found a job, vacancies would still remain. While this situation varies across industries, at the national level the gap has narrowed considerably.

IN 2023, EMPLOYERS CREATED 3.1 MILLION NEW JOBS, BUT MANY REMAIN UNFILLED BECAUSE THE UNITED STATES DOES NOT HAVE ENOUGH WORKERS TO COVER THEM.

Although there are now more Americans active in the labor market than before the pandemic, the proportion of the population participating in the labor force has decreased. If the current labor force participation rate were to match that of February 2020, there would be more than two million additional Americans in the labor force, which would help fill those vacancies.



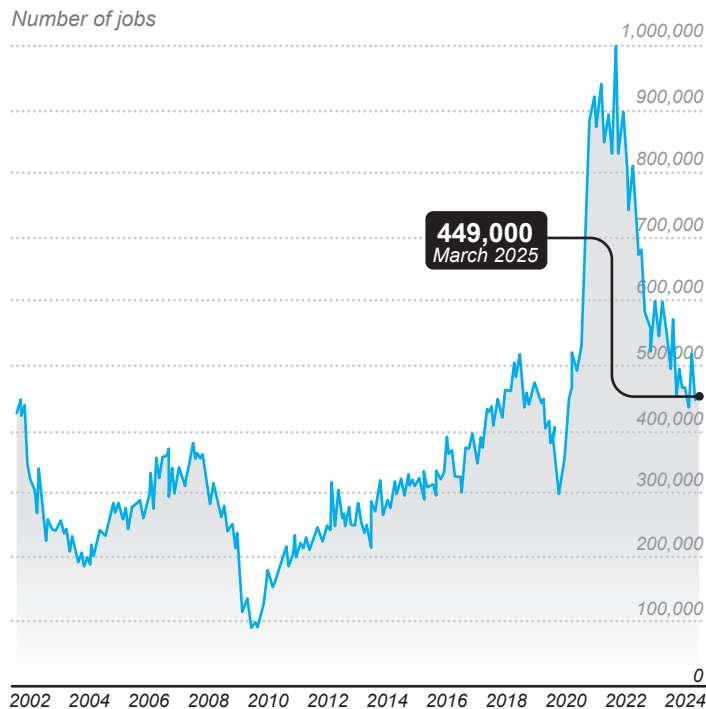
SHORTAGE OF VACANT MANUFACTURING JOBS IN THE U.S.

Beyond future projections, the talent shortage in U.S. manufacturing is already a concrete reality. According to data from the Federal Reserve Bank of St. Louis, in March 2025 alone there were 449,000 unfilled vacancies in the U.S. manufacturing sector.

Although this figure represents a decrease from the peak of one million vacancies reached in 2022, it remains a clear indication of a structural gap in the industrial labor market.

HALF A MILLION VACANT MANUFACTURING JOBS IN THE U.S.

Vacancies peaked in April 2022 with around 1 million after a post-pandemic rebound



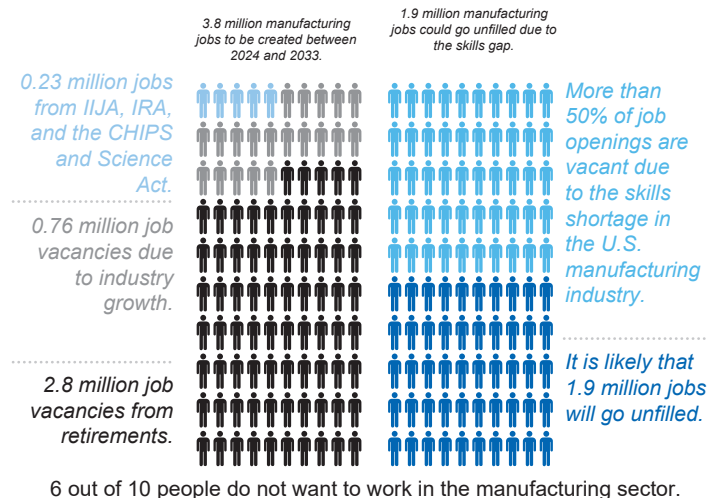
Source: INA based on information furnished by the Federal Reserve Bank of St. Louis.



The shortage of skilled personnel is not a recent phenomenon nor exclusive to the post-pandemic period. According to a survey conducted by Deloitte and the Manufacturing Institute of more than 200 companies, 65% of firms stated that their greatest challenge was hiring and retaining qualified staff.

It is estimated that the U.S. manufacturing industry will need to add 3.8 million new workers between 2024 and 2033. However, 1.9 million of those vacancies—half—could remain unfilled if two critical factors are not addressed: the skills gap and the lack of applicants. *la brecha de habilidades y la falta de postulantes.*

AN ESTIMATE INDICATES THAT 1.9 MILLION VACANCIES COULD BE DIFFICULT TO FILL BY 2033.



Source: INA based on information furnished by JMJ Phillip and McKinsey & Company.

Factors such as an aging population, the decline in labor force participation, and high employee turnover (due to retirements, family responsibilities, and differing generational expectations) exacerbate this phenomenon.



Although some argue that higher wages could attract more local talent, this calls into question the viability of maintaining competitive production compared to regions with lower labor costs and already available talent.

The evolution of job profiles further complicates the search for talent. Although the manufacturing industry projects sustained growth in its workforce, this is occurring in an environment where the labor market is already tight, and competition for technical occupations—such as welders or electricians—has intensified due to the rebound in the construction sector driven by public incentives.



This is compounded by a profound shift in skills requirements. According to the World Economic Forum, 40% of current competencies in advanced manufacturing will change over the next five years. Companies are restructuring roles and prioritizing three key capabilities to drive their transformation toward Industry 4.0: leadership, digital skills, and soft skills.

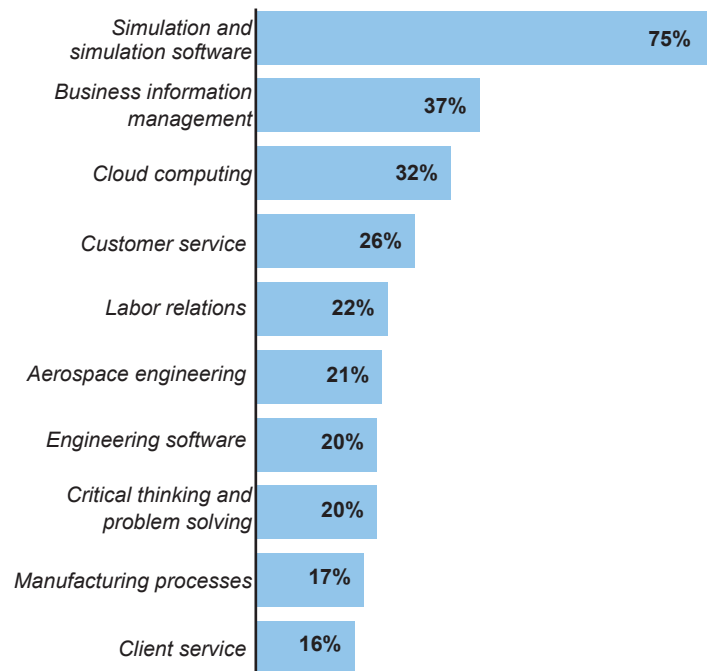


This process is already reflected in labor demand data. Between 2019 and 2023, the fastest-growing skills in U.S. manufacturing job postings were mainly digital in nature: simulation and simulation software (+75%), information systems management (+37%), and cloud computing (+32%). Demand has also grown for aerospace engineering, software development for engineering, critical thinking, and manufacturing processes.



The combination of digital skills, soft skills, and high-level technical skills shows the fastest compound annual growth rates in the manufacturing sector between 2019 and 2023.

COMPOUND ANNUAL GROWTH RATES OF THE MAIN SKILL CATEGORIES WITH THE HIGHEST GROWTH



Source: INA based on information furnished by Deloitte based on Lightcast database.

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GLOBAL EMPLOYMENT SHIFT TOWARD 2030

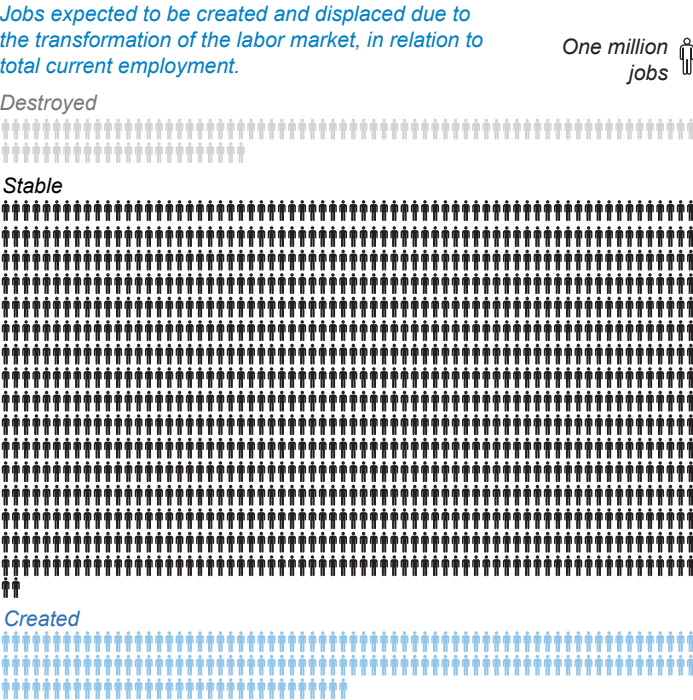


By 2030, the global labor market will undergo an unprecedented transformation driven by digitalization, automation, the energy transition, and industrial relocation.

It is estimated that in the next five years, 170 million new jobs will be created worldwide, equivalent to 14% of current employment. However, these will be partially offset by the loss of 92 million jobs, representing 8% of total employment.

The net result will be an increase of 78 million jobs, equivalent to 7% of current formal employment, which represents a structural turnover of 22% of the total 1.2 billion formal jobs worldwide.

GLOBAL EMPLOYMENT CHANGE TOWARD 2030



Source: INA based on information furnished by the World Economic Forum, Future of Jobs Survey 2024; International Labour Organization, ILOSTAT.



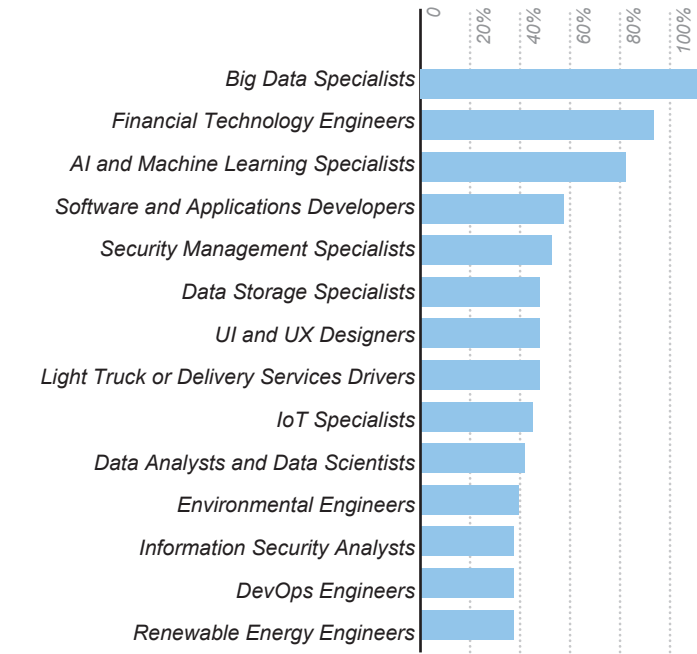
In this new environment, the automotive industry will position itself as one of the sectors with the fastest growth in talent demand.

The role of specialist in autonomous and electric vehicles will be the seventh fastest-growing job worldwide in net growth, reflecting the central role this industry will play over the next five years.

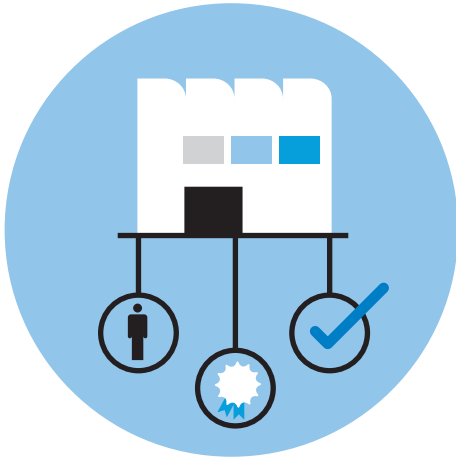
In addition, several of the other most in-demand jobs are also directly related to the automotive industry and its technological transformation. These include artificial intelligence and machine learning engineers, software developers, information security specialists, data analysts, Internet of Things specialists, and renewable energy specialists.

FASTEST-GROWING JOBS

Jobs with the highest projected net growth between 2025 and 2030



Source: INA based on information furnished by the World Economic Forum, Future of Jobs Survey 2024; International Labour Organization, ILOSTAT.



This transformation of the global labor market foreshadows a race for specialized technical talent. Countries with qualified young people, efficient technical training systems, and solid continuous training strategies—such as upskilling and reskilling—will be the ones best positioned in the new industrial dynamic.



For the United States, the challenge is structural. Relocating its industry without a young and sufficient human capital base would mean facing higher training costs, greater turnover, and an inevitable dependence on external talent.



In this context, any strategy aimed at relocating automotive operations from Mexico and Canada to the United States must consider more than just physical infrastructure: it is not only about building new plants, but also about having the people to operate them.



Mexico, on the other hand, combines three key assets: an ongoing demographic bonus, a large base of technical talent in training, and a mature productive infrastructure. This convergence places it in a better position to meet the growing demand of the global automotive industry, not as a replaceable link, but as a strategic partner for the future.

4

TALENT AVAILABILITY FOR HIRING

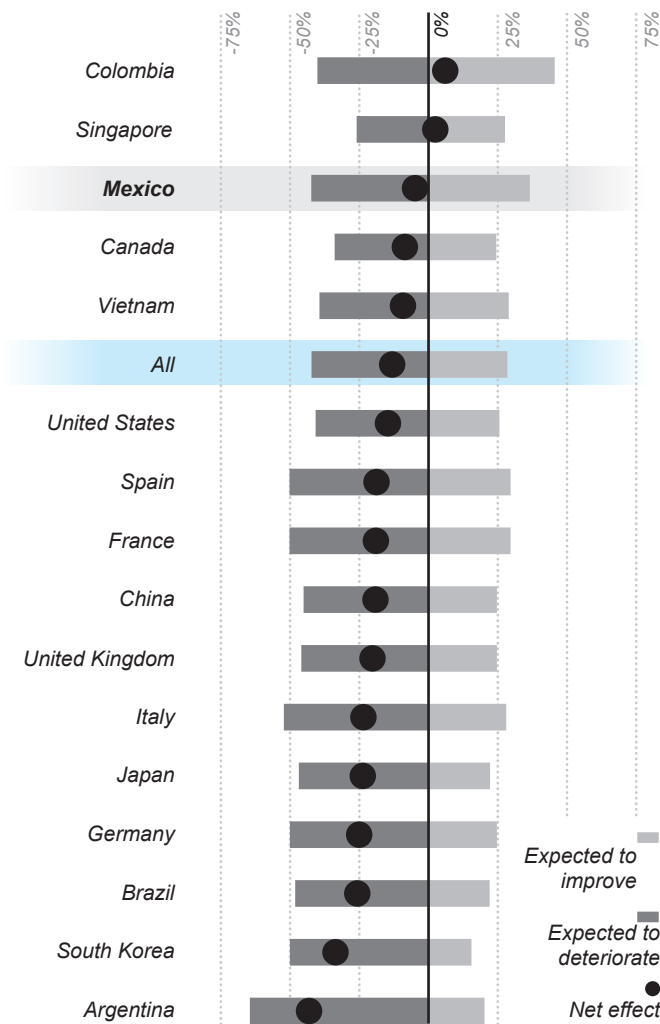


As the transformation of industries accelerates, the availability of talent is emerging as one of the most critical variables for investment location.

AVAILABILITY OF TALENT FOR HIRING

Percentage of surveyed employers who expect an improvement or deterioration in the availability of talent for hiring between 2025 and 2030, and its net effect.

By economy, 2025–2030



While more than 50% of employers in the United States and Canada anticipate a deterioration in the availability of talent, Mexico maintains a net positive outlook, placing it ahead of several advanced economies, including the United States, Canada, and China.



This difference should be understood as a strategic factor. While the United States foresees greater challenges in attracting and retaining skilled talent within the context of its reindustrialization, Mexico has more favorable conditions to support this transformation, thanks to its demographic bonus and technical training capabilities.



In a regional dynamic marked by the growing demand for specialized profiles, collaboration among North American countries will be key. Mexico can contribute a young and skilled talent base that strengthens the industrial competitiveness of the entire region.



MEXICO'S DEMOGRAPHIC ADVANTAGE



5

MEXICO AT THE CENTER OF THE GLOBAL DEMOGRAPHIC TRANSFORMATION



The world is undergoing two simultaneous demographic transformations: population aging in high-income countries and the growth of the working-age population in emerging economies. These phenomena are redefining access to talent globally.

In this context, Mexico is in a unique demographic position. According to the World Economic Forum, the country is at a midpoint between both trends: it is neither facing severe aging nor stagnation in its economically active population.

The following chart illustrates a strategic combination: a growing proportion of young people of working age and lower vulnerability to aging compared to other economies.

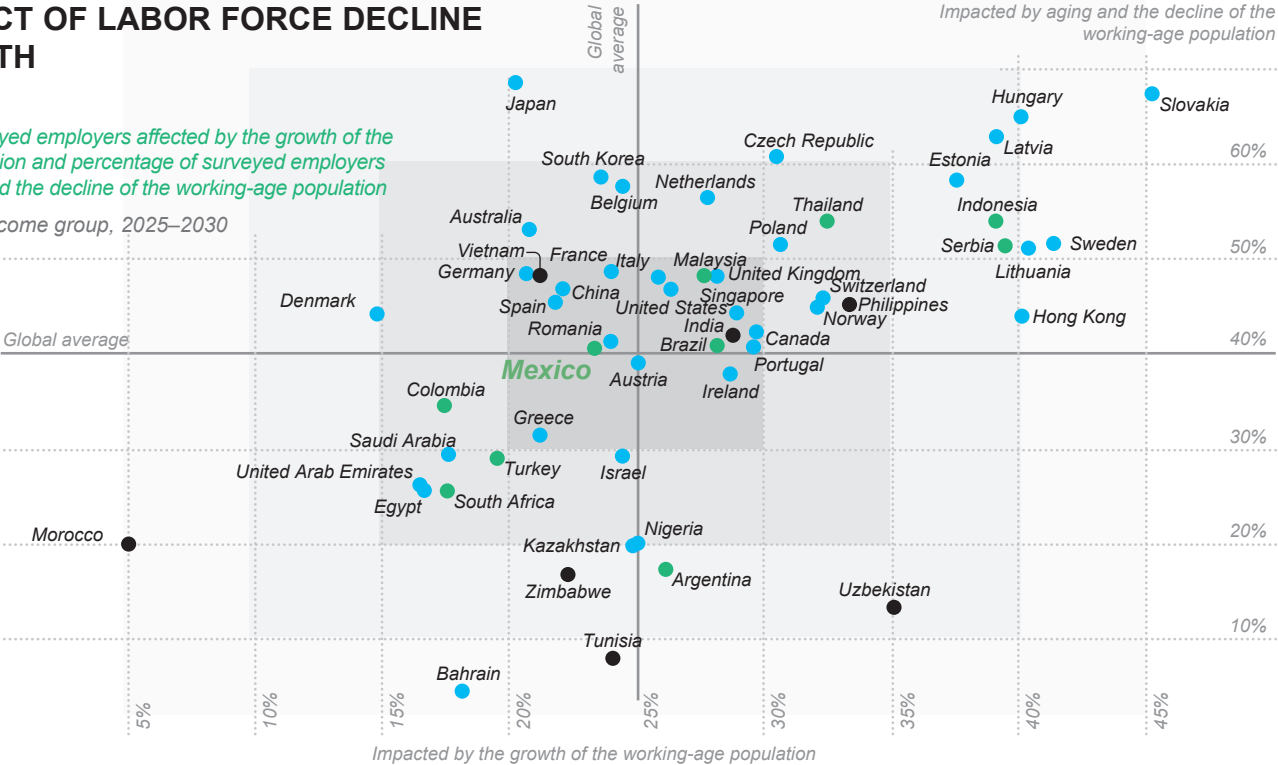
DUAL IMPACT OF LABOR FORCE DECLINE AND GROWTH

Percentage of surveyed employers affected by the growth of the working-age population and percentage of surveyed employers affected by aging and the decline of the working-age population

By economy and income group, 2025–2030

Income levels

- High
- Upper middle
- Lower middle



Source: INA based on information furnished by the World Economic Forum, Future of Jobs Survey 2024.



This strategic position in the global demographic matrix makes Mexico a country with greater stability for planning the training, integration, and retention of young technical talent in strategic sectors such as the automotive industry.



This population stability places Mexico in a better position to sustain industrial growth and meet the growing demand for talent. In contrast, replicating this same dynamism in the United States would mean operating in an environment of accelerated aging, with less availability of qualified young people and higher retraining costs.



According to the World Economic Forum, 40% of employers worldwide already identify aging and the reduction of the labor force as impacting their operations, while only 25% report being transformed by the growth of the young population. This difference reveals a global labor environment more affected by the shortage of talent than by its expansion.



Mexico not only has greater availability of young talent, but also benefits from mechanisms for technical training, dual education, and specialization in strategic sectors. This makes it an indispensable partner, not a replaceable link.



The United States reflects this pattern: the aging of its labor force is already a growing pressure factor. Canada faces a similar situation, although with a working-age population slightly more stable than that of the United States, but less dynamic than Mexico's.

6

MEXICO HAS ONE OF THE LARGEST YOUNG POPULATIONS IN THE OECD



Mexico is at a decisive moment to capitalize on its demographic bonus. With a median age of 29, the country has a young population base that represents a competitive advantage over other advanced economies with aging populations. In contrast, the median age in the United States exceeds 38 years, while in China it reaches 40.

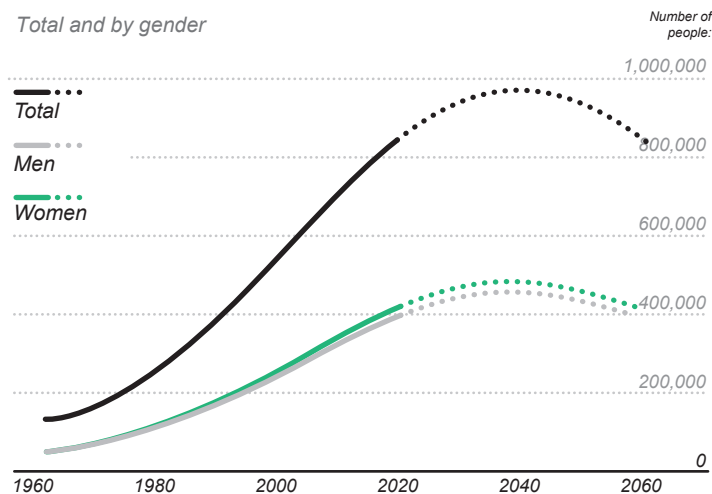
This demographic difference places Mexico in a privileged position to attract investment and strengthen strategic sectors such as automotive, where the availability of young technical and professional talent is key to responding quickly to new market demands and the technological transformation of the industry.

Currently, Mexico has 31 million young people between the ages of 15 and 29, a strategic demographic base for the productive sector. Of the total youth population, 54.1% are part of the economically active population, and of these, 95.2% are employed. In addition, 16.5% work in professional or technical activities, reflecting an increasingly skilled profile aligned with industrial needs.

WORKING-AGE POPULATION

Mexicans aged 15 to 64

Total and by gender



Source: INA based on information furnished by CONAPO.



Over the next five years, around 2 million young people will enter the labor market annually. This constant flow of new talent represents a unique opportunity to strengthen value chains, boost productivity, and develop the country's technological capabilities.

This demographic bonus offers an opportunity to address the structural labor shortage in the United States, especially in sectors that require young and specialized talent.

This demographic transition underscores the urgency of leveraging the population and academic profile that today positions Mexico as a key player in the development of a more innovative, efficient, and competitive automotive and auto parts industry—not only as a manufacturing platform, but as a talent seedbed for North America and other regions of the world.

7

LABOR COSTS AS A KEY DIFFERENTIATOR AMONG TYPES OF MANUFACTURERS



An analysis by Oliver Wyman revealed that labor cost per vehicle varies significantly depending on the type of automotive manufacturer. In 2024, EV-only manufacturers showed the widest and highest cost range, with figures reaching up to \$13,281 per unit and an average of \$1,660. This is explained by high technological requirements, battery complexity, and the need for highly skilled talent.

In contrast, Chinese manufacturers recorded the lowest costs, averaging \$585 per vehicle, which reinforces their ability to compete aggressively on price at the global level.

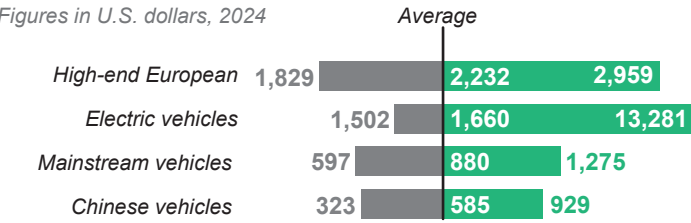
Mainstream vehicle manufacturers remained in the middle range, with an average cost of \$880 per unit, while major European brands reported the highest costs among traditional manufacturers, averaging \$2,232 per vehicle, due to their labor-intensive processes requiring specialized labor.

This contrast highlights the pressure companies face to optimize their production location decisions.

LABOR COST RANGES

Per vehicle within each category

Figures in U.S. dollars, 2024



Source: INA based on information furnished by Oliver Wyman analysis, automotive manufacturer websites, GlobalData original database, German Association of the Automotive Industry (VDA), Liepin.

Labor cost per vehicle is now one of the main determinants of the profitability and viability of manufacturing operations.



In this scenario, countries with competitive labor costs and a skilled technical workforce, such as Mexico, are consolidating as a viable alternative for all segments—from high-volume assembly plants to new facilities focused on electromobility.

MEXICO: THIRD MOST COMPETITIVE COUNTRY IN AUTOMOTIVE INDUSTRY LABOR COSTS

Mexico ranks as the third country with the lowest labor cost per vehicle worldwide, averaging \$305 per unit. Only Morocco (\$106) and Romania (\$273) report lower figures.

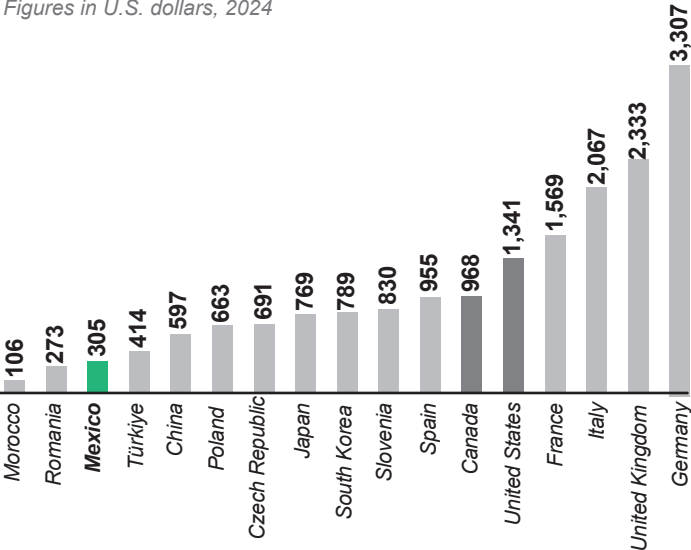
This indicator reflects not only a cost advantage, but also the result of decades of productive specialization, availability of technical talent, and operational efficiency.

While economies such as the United States and Canada face labor costs per vehicle about 10 times higher, Mexico has positioned itself as an attractive destination for global automotive manufacturing, especially in high-volume segments.

LABOR COST

Per vehicle by country

Figures in U.S. dollars, 2024

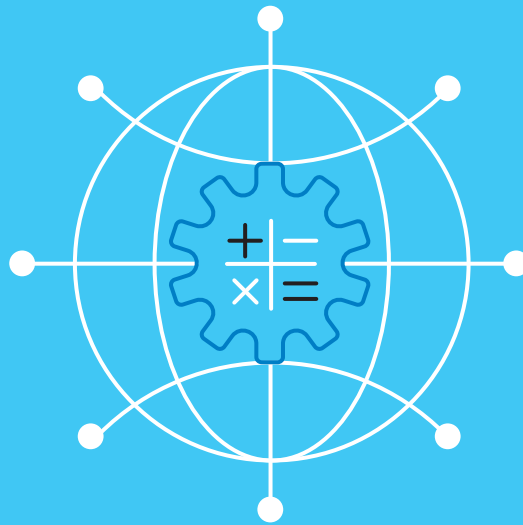


Source: INA based on information furnished by Oliver Wyman analysis, automotive manufacturer websites, GlobalData original database, German Association of the Automotive Industry (VDA), Liepin.



STEM:

**THE NEW GLOBAL
COMPETITIVENES
S FACTOR**



8

CHINA VS. U.S.: THE OTHER FRONT IN THE GLOBAL TECHNOLOGICAL COMPETITION



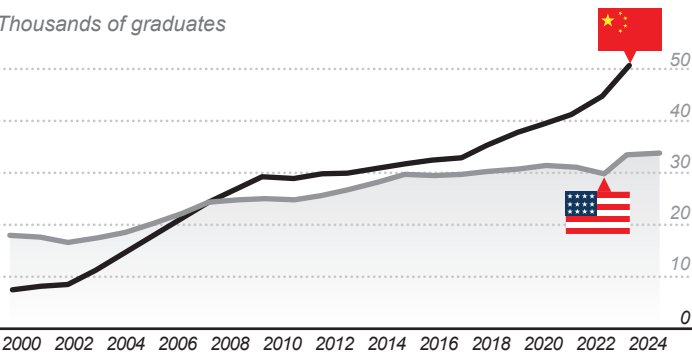
While the discussion on tariffs and relocation dominates headlines, the true axis of competition between China and the United States is being defined in laboratories, classrooms, and research centers.

The gap in STEM talent development and university investment is shaping a long-term asymmetry in strategic sectors for industrial and technological development.

GRADUATES

China produces more STEM PhD graduates than the United States and conducts more research in various fields.

Thousands of graduates



The United States data correspond to doctorates focused on research in agricultural sciences and natural resources, biological sciences, computer science, engineering, geosciences, mathematics, and physical sciences.

China's data cover broader STEM fields: science, engineering, and agriculture. Medical sciences are excluded for both countries.

Source: INA based on information furnished by the U.S. National Center for Science and Engineering Statistics and China's Ministry of Education.

Since 2007, China has surpassed the United States in the number of doctorates awarded in science, technology, engineering, and mathematics (STEM). In 2022, Chinese universities awarded more than 50,000 doctorates in these fields, while the United States granted around 34,000.

The difference is not only numerical: while China has doubled its number of STEM PhD graduates since 2007, the United States has recorded a 41% increase over the same period. This trend reflects a structural gap that has steadily widened in recent years.



This growth has been driven by active state support. China has increased its public funding to universities, research centers, and programs aimed at attracting scientific talent.



In contrast, the United States has begun to restrict resources to top-tier universities. In April 2025 alone, the U.S. Department of Education froze \$2.2 billion in funding to Harvard, in addition to another \$80 million in contracts

Similar measures have been reported at institutions such as Cornell and Northwestern, which could affect their ability to retain and attract high-level academic talent.





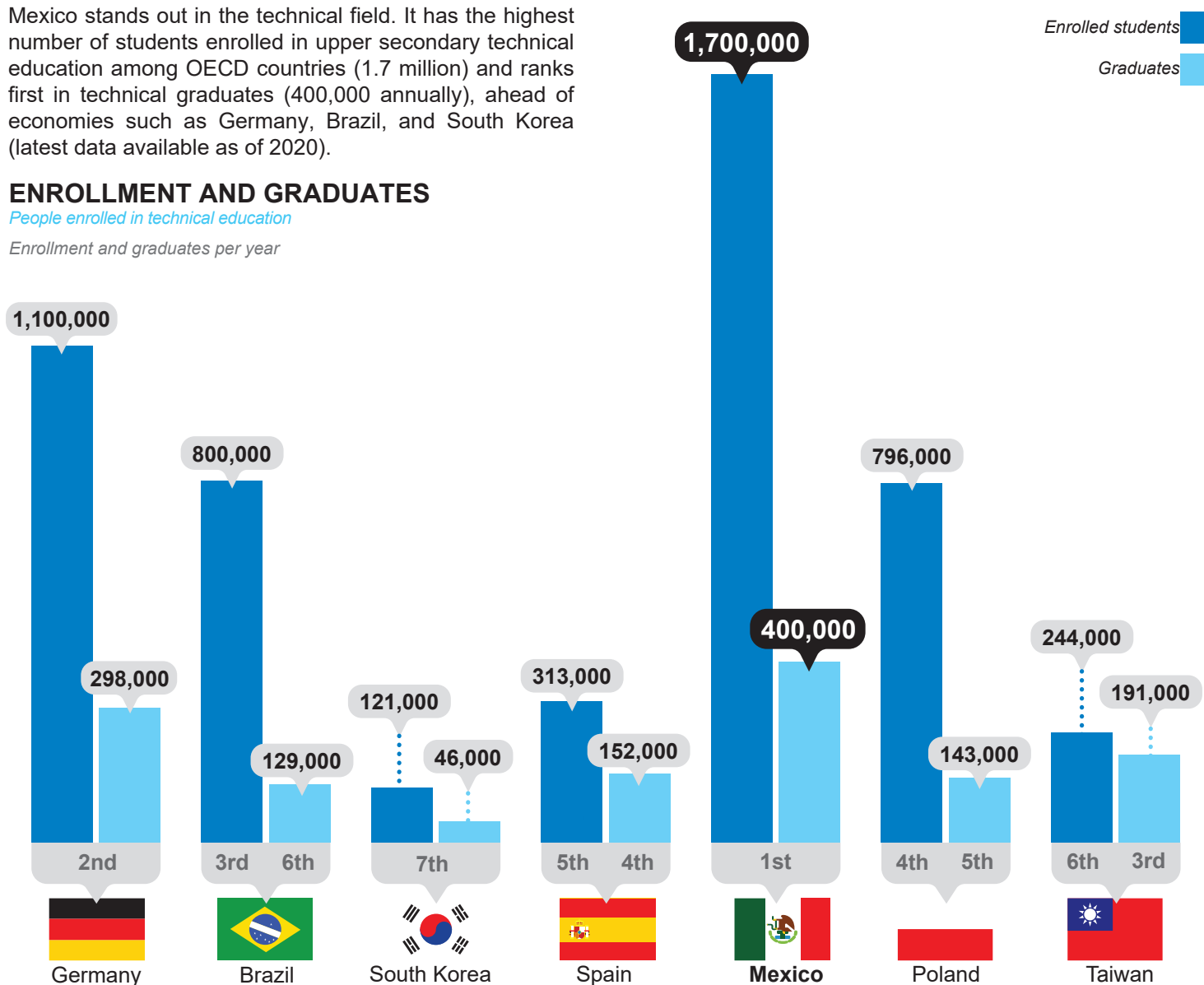
MEXICO RANKS FIRST IN TECHNICAL GRADUATES AMONG OECD COUNTRIES

Mexico stands out in the technical field. It has the highest number of students enrolled in upper secondary technical education among OECD countries (1.7 million) and ranks first in technical graduates (400,000 annually), ahead of economies such as Germany, Brazil, and South Korea (latest data available as of 2020).

ENROLLMENT AND GRADUATES

People enrolled in technical education

Enrollment and graduates per year



9

NORTH AMERICA'S AUTOMOTIVE INDUSTRY RELIES ON MEXICAN TALENT



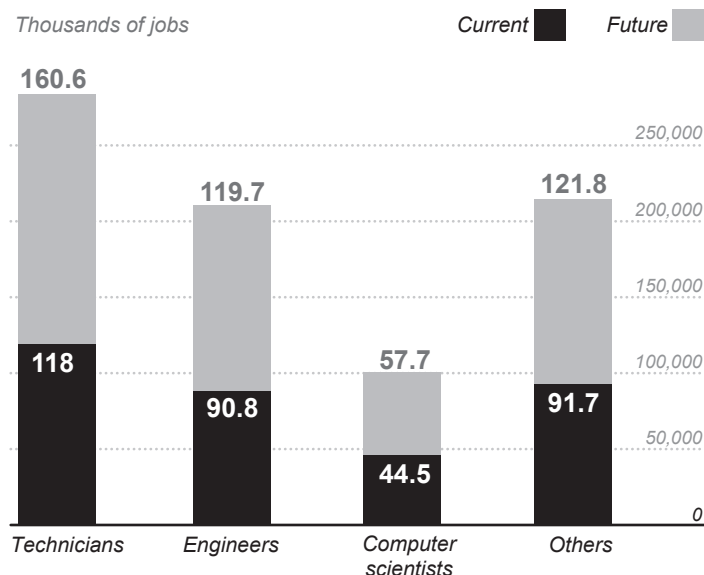
North America's automotive industry faces a paradox: while manufacturing demand grows due to nearshoring, the United States suffers from a structural shortage of skilled labor that limits its productive capacity.

In the U.S. alone, more than 2.1 million manufacturing jobs could remain unfilled by 2030 due to the retirement of specialized workers and the low incorporation of young talent into the sector.

One of the main constraints to fully relocating the manufacturing industry to the United States is the shortage of skilled labor and high labor costs. The semiconductor industry, for example, will require 114,800 new employees by 2030. In addition to projected expansion, the sector will need to replace workers who retire or change occupations, increasing pressure on an already limited labor market.

CURRENT AND FUTURE JOBS

In the semiconductor industry



Source: INA based on information furnished by Oxford Economics.

10

DOMESTIC TALENT: AN ESSENTIAL COMPONENT IN REGIONAL SUPPLY CHAINS



Domestic talent has become an essential component within regional supply chains. Thanks to its preparation, Mexico has consolidated an auto parts industry that reached a national production value of \$121.693 billion in 2024, representing an increase of 1.20% compared to 2023.

AUTO PARTS EXPORTS REACHED \$106.079 BILLION. 87% WERE DESTINED FOR THE U.S.

In 2024, Mexico achieved a historic record of \$38.872 billion in foreign direct investment (FDI). Of this total, 54% went to the manufacturing industry.

FDI DESTINED FOR THE AUTOMOTIVE INDUSTRY REACHED \$6.925 BILLION, REPRESENTING A 36% ANNUAL INCREASE.

The auto parts sector received more than \$2.487 billion in FDI, representing a 21.5% increase compared to 2023.

A significant portion of these investments is linked to projects requiring skilled technical talent to open new production lines, integrate suppliers, and adapt to the new T-MEC rules of origin.

At the regional level, North America's automotive industry produces more than 15.4 million vehicles annually and sells over 5.1 million engines and 8.5 million transmissions, with 67% assembled in the United States, 25% in Mexico, and 8% in Canada.

In a global context marked by a shortage of skilled labor, the availability, specialization, and integration of Mexican talent into regional supply chains is a strategic asset not only for Mexico, but for all of North America.



While the United States continues to face a structural shortage of skilled manufacturing personnel, Mexico offers a young, technically skilled, and abundant workforce. Without Mexican talent, North America's automotive value chain could not sustain its current production volume or maintain its global competitiveness.

Furthermore, the capabilities of Mexico's technical workforce have not only supported growing industrial demand but have also been instrumental in positioning Mexico's automotive plants among the most competitive worldwide. Some of the most notable examples include:

FORD MOTOR COMPANY in Hermosillo, Sonora: recognized as Ford's most efficient assembly plant globally.

STELLANTIS in Toluca, State of Mexico: awarded J.D. Power's "Gold Award" as the plant with the fewest defects in the Americas.

BMW GROUP in San Luis Potosí: known for assembling premium light vehicles with high automation levels.

AUDI in San José Chiapa, Puebla: a state-of-the-art plant producing the Q5 model for all global markets.

GENERAL MOTORS in Ramos Arizpe, Coahuila: a multipurpose facility assembling both combustion and electric vehicles.



These international distinctions would not be possible without the high level of specialization of the Mexican workforce, which has proven its ability to operate production lines that meet global standards.

11

EDUCATIONAL ALIGNMENT OF MEXICAN TALENT



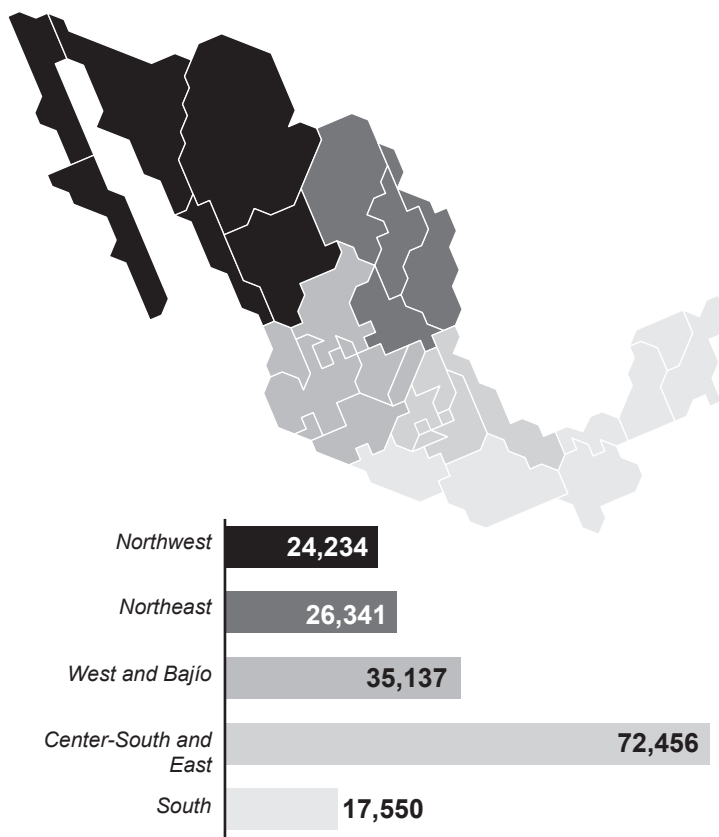
According to the Ministry of Economy, there are currently more than 859,000 men and women graduates with technical and professional education, many specialized in strategic areas such as electromobility, semiconductors, medical devices, and agribusiness.

Of this total, 175,718 graduated from STEM fields (115,340 men and 60,378 women), of which 70% specialized in engineering, manufacturing, or construction..

STEM DEGREE GRADUATES

National level

Undergraduate and graduate by region, 2022–2023



Note: Geographic regions are classified according to INEGI's distribution.

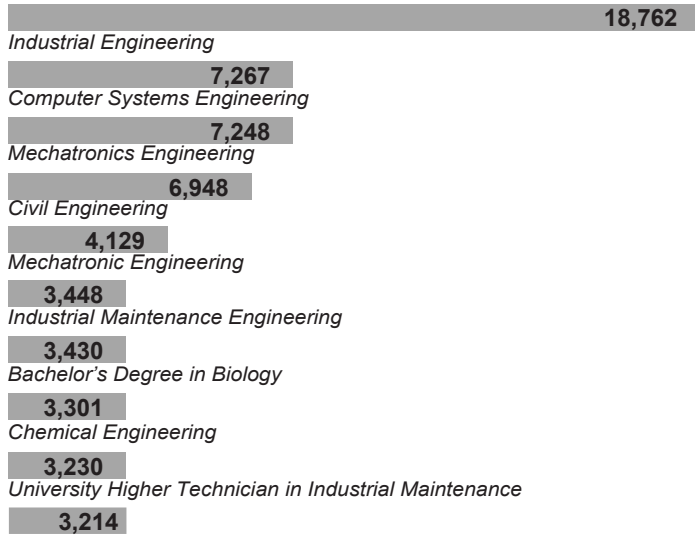
Source: INA based on information furnished by the Government of Mexico.



TOP 10

STEM degrees with the most graduates at the higher education level

School year 2022–2023



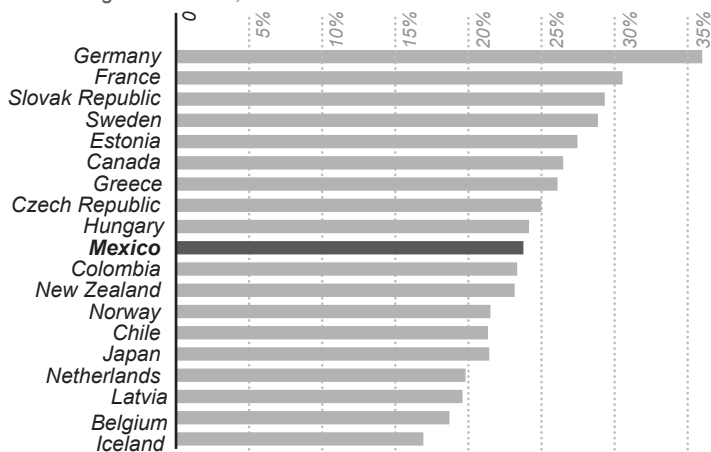
Source: INA based on information furnished by the Government of Mexico.

Mexico stands out for the percentage of graduates in engineering programs compared to the total number of graduates. According to OECD data, the country surpasses economies such as Norway, Japan, and the Netherlands, reinforcing its position as a generator of specialized talent.

TERTIARY GRADUATES BY FIELD

Technology, engineering and mathematics

Percentage of students, 2023



Source: INA based on information furnished by OECD.

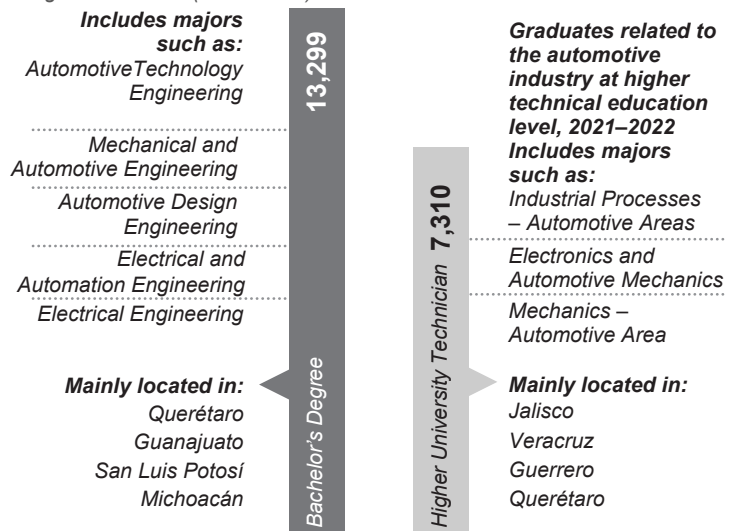


The country has more than 13,000 annual graduates from higher education automotive programs, such as mechanical engineering, electrical engineering, automation, or automotive design.

GRADUATES

Related to the automotive industry

Higher education (2021–2022)



Source: INA based on information furnished by the Government of Mexico.

These figures help supply highly specialized sectors, such as the automotive industry, which require competencies in engineering, robotics, electronics, and industrial maintenance.

In addition, institutions such as Conalep have updated their technical programs to train specialized personnel in electric vehicle conversion, in partnership with companies like General Motors, John Deere, MG Motor, and BMW.

Mexican youth are not only abundant but also highly qualified. The education system has directed a significant portion of its offerings toward STEM fields (Science, Technology, Engineering, and Mathematics), which today account for 37.5% of graduates from bachelor's, higher technical, and postgraduate programs in public institutions. This focus responds to the demands of the industrial sector and strengthens Mexico's capacity to produce highly specialized technical talent.



INTERINSTITUTIONAL WORKING GROUPS

As part of the 2nd edition of the International Aftermarket Summit, the Educational Council for Productive Transformation and Innovation (CETPI) — composed of the Secretariat of Public Education (SEP) and the Secretariat of Economy of Mexico— in coordination with INA, held the Annual Curriculum Update Meeting to align technical and professional training with the needs of strategic sectors such as automotive, auto parts, and electromobility.

This effort is part of the *Plan México* strategy, aimed at strengthening national technical talent as a foundation for a more competitive industry. With this vision, two working group sessions were held to present various findings.

EDUCATIONAL OFFER

Currently, the Mexican educational system offers five technical programs at the upper-secondary level and seven university degrees directly linked to the sector.

Educational offer linked to the automotive and auto parts sector

● Upper Secondary Education ● Tertiary Education



Motor Transport



Autoelectronics



Electromobility



Automotive Maintenance



Diesel Engines



Automotive Engineering



Automotive Design Engineering



Automotive Systems Engineering



Electromobility Engineering



Automotive Mechanical Engineering



Automotive Mechatronics Engineering



Bachelor's Degree in Mechanical Engineering



NATIONAL MAPPING

Educational programs linked to the automotive and auto parts sector

Higher education: professional level



402

Institutions



1,106

Educational programs



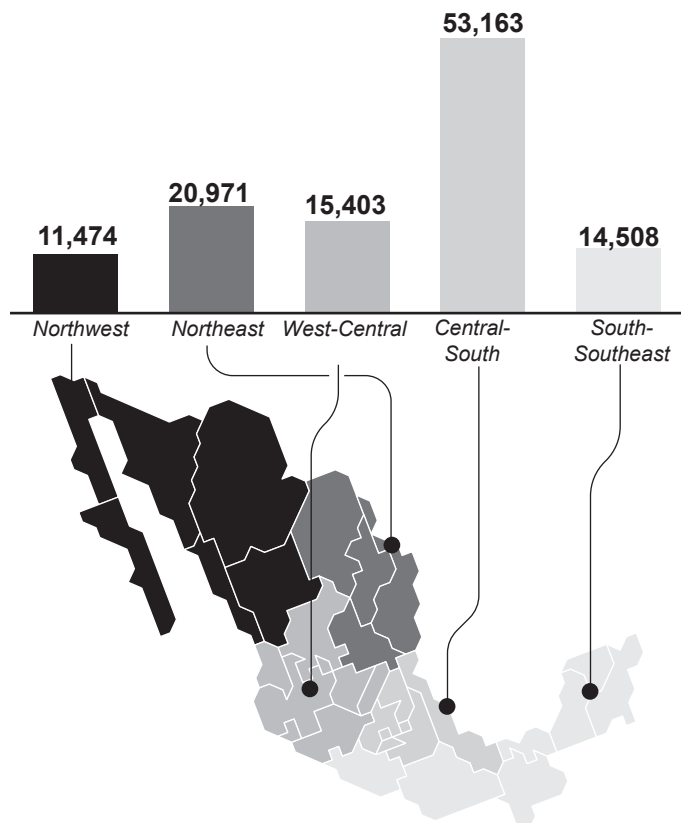
115,519

National enrollment

ENROLLED STUDENTS LINKED TO THE SECTOR

The Central-South region concentrates half of the students, reflecting the degree of specialization by region and highlighting the need to balance educational coverage.

Regional distribution in the automotive and auto parts sector



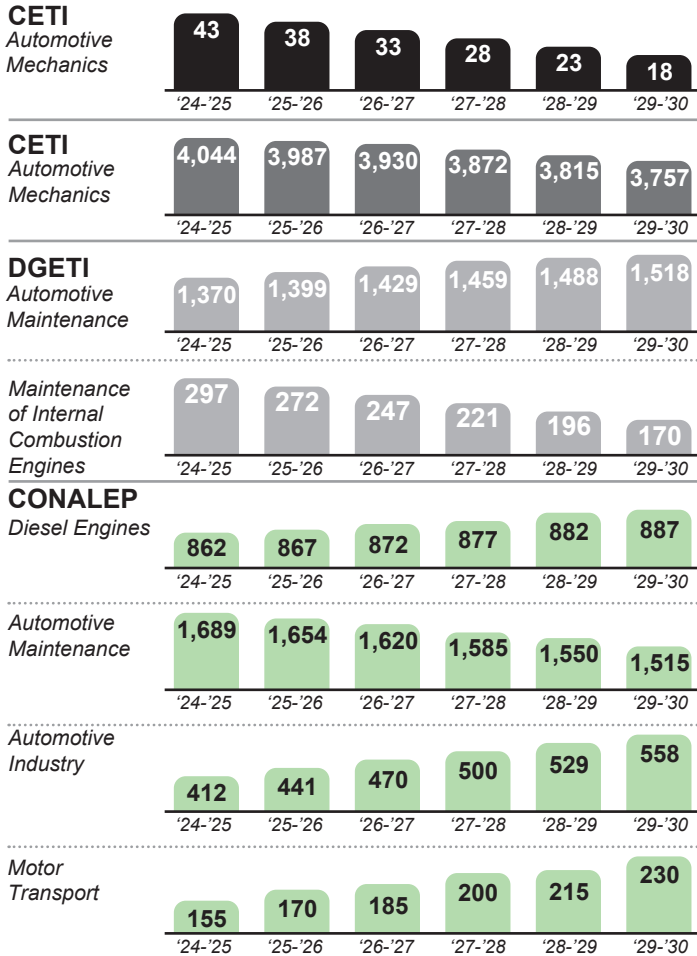
Source: INA based on information by the Undersecretariat of Foreign Trade, Ministry of Economy, and Secretariat of Public Education.



AUTOMOTIVE TRAINING

Graduates by academic institution

Projection from 2024 to 2030



SEVERAL TRAINING PROGRAMS SHOW A DOWNWARD TREND, WHILE OTHERS PRESENT GROWTH RATES, REVEALING A RECONFIGURATION IN STUDENT PREFERENCES.

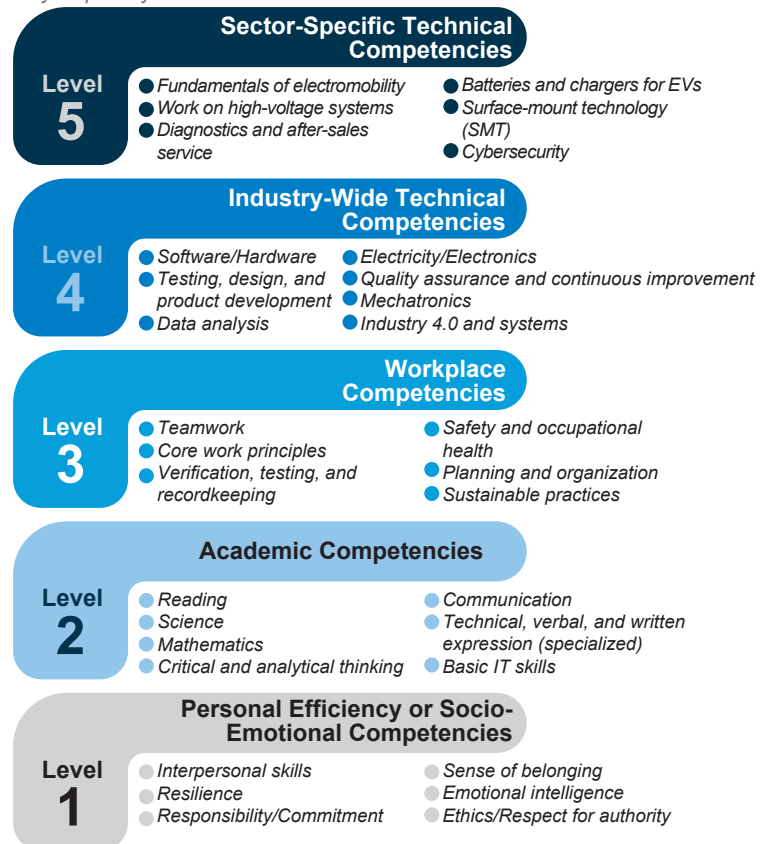
Given this scenario, it is necessary to transform the educational system, with better vocational guidance schemes, the development of socio-emotional skills, and greater linkage with the productive sector.

Source: INA, based on information furnished by the Statistics Area of the Sectoral Coordination for Planning and Administration of the Undersecretariat of Upper Secondary Education, April 2025.

This approach requires promoting models such as micro-credentials, dual training, credit portability, hybrid learning schemes, and continuous curriculum updates. These strategies are already being implemented thanks to joint work with strategic partners such as AMIA, ANPACT, ANUIES, AMIVE, WRI México, CAMEXA, CCE, and COPARMEX, who have contributed concrete proposals to strengthen the connection between academic training and the skills demanded by the industry.

COMPETENCY MODEL FOR ELECTRIC VEHICLES

Key Capability Levels



Source: INA based on information furnished by IYF, Competency Model for Electric Vehicles.

TECHNICAL EDUCATION AND DUAL TRAINING ARE KEY TO CLOSING TALENT GAPS



Dual Education in Mexico has established an efficient model for integrating academic training with work experience. In the 2022–2023 school year alone, more than 21,000 students chose this modality, with over 4,000 economic units across the country participating.



This model has shown significant progress: over the past six years, enrollment in Dual Education at the upper secondary level has increased fivefold, reflecting the growing demand for technical profiles with practical experience. Furthermore, in 2023, 40% of students in the Dual modality were women, marking progress toward greater inclusion in industrial careers.



The trust of the productive sector has also been key to its expansion. Eighty-one percent of the companies participating in this model agree that the knowledge, skills, and competencies of graduates meet the current requirements of the labor market.

DUAL TRAINING OFFER

In Mexico by educational level and institution

EDUCATIONAL LEVEL	TYPE OF INSTITUTION	HIGHLIGHTED PROGRAMS	TOTAL DUAL PROGRAMS	TOTAL CAMPUSES
Upper Secondary	CBTIS, CETIS, CONALEP, CETI, DGETI, DGETAyCM, CECyTES.	Programming, Electromechanics, Industrial Maintenance, Mining, Construction, Automotive Mechanics, Total Quality and Productivity, Agribusiness, Food Production, Logistics, Industrial Welding, Architecture, Computer Support and Maintenance.	51	691
Higher Technical University (TSU)	Technological Universities (43 in 21 states), Polytechnic Universities	Mechatronics, Industrial Processes, Logistics, Digital Design, Renewable Energies, Gastronomy, Paramedics, Chemistry, Tourism, Accounting, Administration, International Business Operations.	Not specified	Not specified
Higher Education (Bachelor's and Engineering)	State Public Universities, IPN, Intercultural Universities, Technological Institutes	Mechatronics, Civil Engineering, Automotive Systems, Manufacturing Technologies, Physical Therapy, International Business, Logistics and Transportation, Environmental Engineering, Biochemistry, Biotechnology, Architecture, Public Accounting, Administration, Community Development.	Variable by institution	>200 institutions

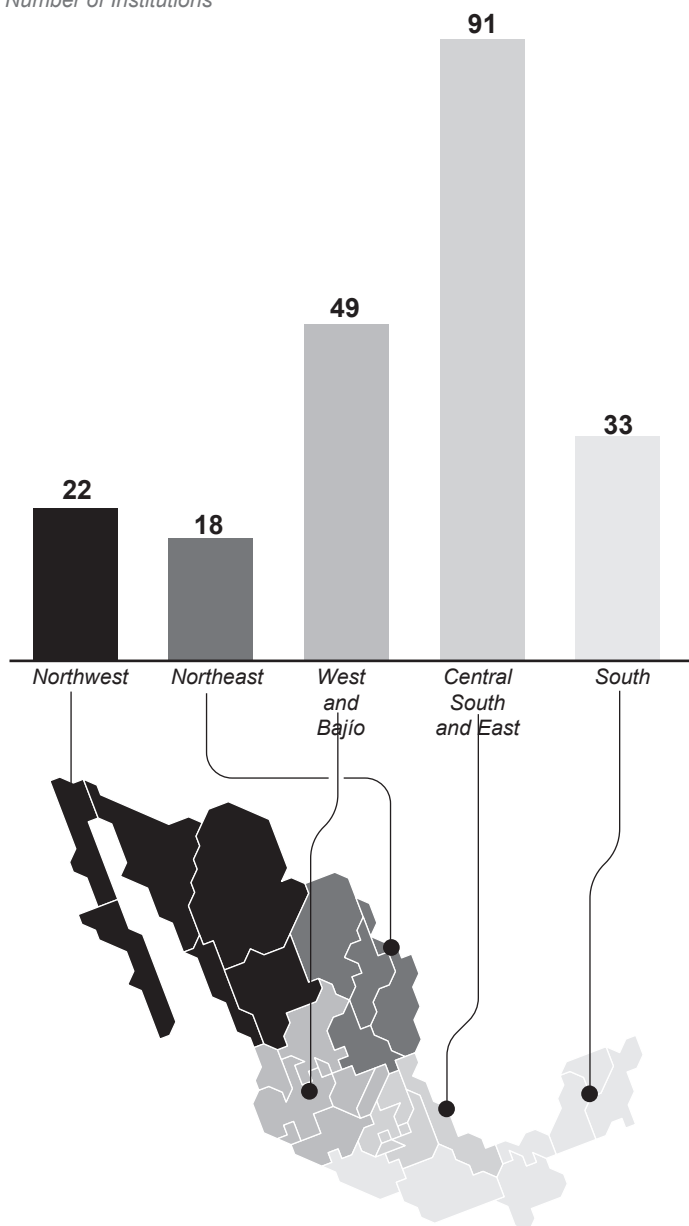
Source: INA base on information furnished by the Government of Mexico.



REGIONAL DISTRIBUTION

Institutions with dual education in Mexico

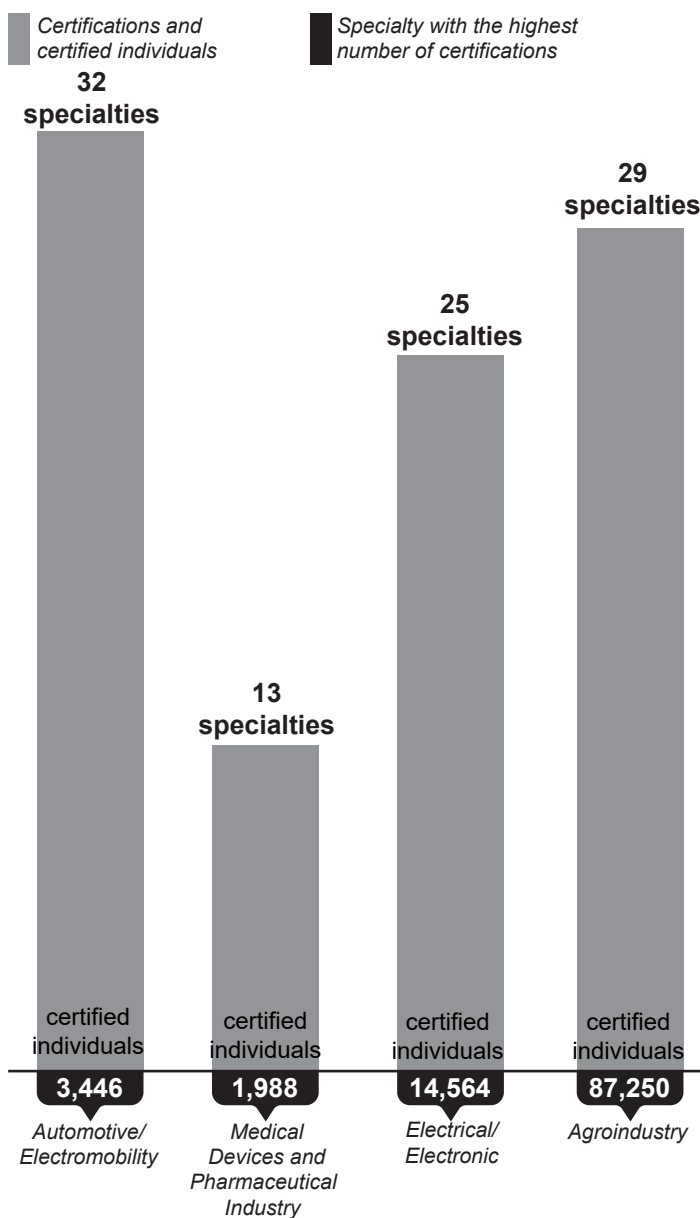
Number of Institutions



CERTIFICATIONS

Technical specialty in Mexico

By sector



Source: INA based on information furnished by the Government of Mexico.

TRADE WITH MEXICO ALSO SUPPORTS MILLIONS OF U.S. JOBS



The impact of Mexican human talent is not limited to national territory. Thanks to productive integration, Mexican exports also generate millions of jobs in the United States.

THE STATES WITH THE HIGHEST NUMBER OF JOBS SUPPORTED BY FOREIGN TRADE ARE:



CALIFORNIA
1,650,200 jobs linked to exports worth \$86.9 billion.



TEXAS
1,107,000 jobs from \$143.4 billion in exports.

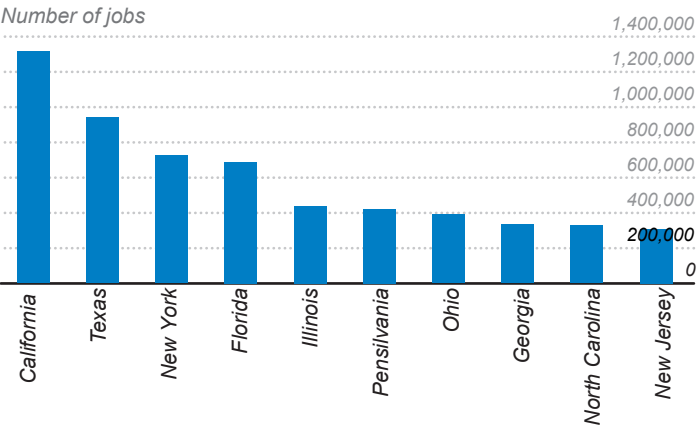


NEW YORK
848,300 jobs associated with exports worth \$24.8 billion.

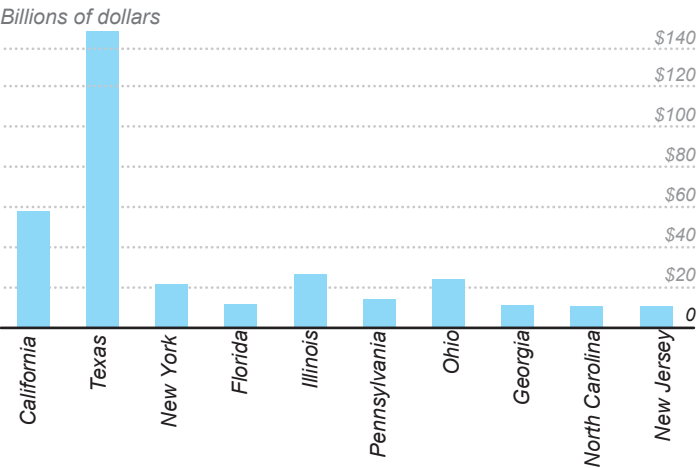


FLORIDA
813,300 jobs derived from exports worth \$12.8 billion.

JOBS *Generated in the United States through trade with Mexico and Canada*



EXPORTS *Generated in the United States through trade with Mexico and Canada*



Source: INA based on information furnished by Business Roundtable.

These figures reflect how the strength of Mexico's human talent directly contributes to job creation, economic growth, and the stability of the automotive industry in the United States.

CONCLUSION

The United States has laid out one of the most ambitious industrial bets of recent decades: reindustrializing its economy and bringing the production of strategic sectors back within its borders. But there is one variable this plan cannot overlook: human capital.

Replacing the automotive plants currently operating in Mexico and Canada with new facilities on U.S. soil would require not only infrastructure, investment, and time. It would also demand a volume of technical talent that the United States does not have today and will hardly be able to develop in the short term.

Meanwhile, Mexico not only has the youth required, but also the specialized talent and training programs that are moving toward greater alignment with the sector's needs. Proof of this is the inter-institutional effort led by CETPI to update curricula, define priority competencies, and strengthen schemes such as Dual Education and microcredentials.

The risk of attempting to relocate production without addressing the talent gap is significant. Without trained personnel, there is no production. Without production, there is no integration. And without integration, North America's competitiveness weakens against regions advancing with scale and specialization, such as Asia.

In this scenario, Mexican human capital is not an expendable link, but a structural condition for the continuity and success of the automotive industry in North America. Recognizing its value and strengthening trilateral collaboration ties is not a concession—it is a strategic decision.

Because, as this document demonstrates, simply moving plants is not enough: what fills production lines is not bricks or steel, but skilled people with experience and a vision for the future. And today, a large part of that future is being built in Mexico.



+52 (55) 5682 5862



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