International Journal of Research in Social Sciences
Vol. 16 Issue 11, Nov 2026,
ISSN: 2249-2496 Impact Factor: 7.081 UGC Approved Journal Number: 48887
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gate as well as in Cabell's Directories of Publishing Opportunities, U.S.A

Sustainable Competitiveness and the Evolution of Mexico's Automotive Clusters

First Author* Dr. Arturo Laure Vidriales
Second Author Dr. Raúl Heredia Cerda**
Third Author* Carlos Salvador Gutiérrez Carrillo**

Abstract

The research reviews the concept of clusters and their application within the Mexican automotive industry, identifying the principal development hubs located in some states in Mexico. Together, these regions account for 84.2% of national vehicle production and generate 75.3% of sectoral employment. Comparative data on national production and employment between 2021 and 2025 are also presented, revealing sustained growth through 2024 and a slight contraction in 2025, associated with export dynamics and demand fluctuations in the North American market.

Overall, the article seeks to provide a comprehensive perspective linking productive structures with the challenges of sustainability, innovation, and regional development, contributing academic and strategic insights for understanding the evolution and future prospects of the Mexican automotive industry within the global economy.

Finally, the article examines the advantages, disadvantages, opportunities, threats, and challenges faced by automotive clusters in Mexico. Key advantages include the attraction of foreign direct investment, the generation of specialized employment, and integration into global value chains. Conversely, major disadvantages include a high dependence on the United States market and territorial concentration. Opportunities are associated with electromobility, digitalization, and technological innovation, while threats and challenges involve international competition, logistical disruptions, and the need for market diversification.

Copyright © 201x International Journals of Multidisciplinary Research Academy. *All rights reserved.*

Keywords:

Competitiveness;
Productive Articulation;
Sustainable;
Clusters;
Automotive Industry.

Author correspondence:

First Author, Arturo laure Vidriales
Pre Grade Program, Economic-Administratives Studies
Universidad de Guadalajara, Zapopan, Jalisco, Mexico
Email: artlaure3@gmail.com

1. Introduction

The Mexican automotive industry constitutes one of the strategic pillars of both the national and global economy, accounting for a significant share of manufacturing production and exports to the United States and other international markets. This article examines its role within the framework of competitiveness and economic globalization, highlighting how Mexico's integration into international value chains has strengthened its position as the world's fourth-largest producer of light vehicles. The study analyzes the importance of productive articulation and business networks, which facilitate cooperation among assemblers, suppliers, academic institutions, and state governments, thereby consolidating the structure of regional automotive clusters.

Theoretical Framework: Business Networks and Productive Articulation as Drivers of Competitiveness in Cluster Formation.

According to Porter (1985), competitiveness refers to a firm's ability to produce and market products under superior conditions of price, quality, and timeliness compared with its competitors. Ivancevich and Lorenzi (1997) define competitiveness as the extent to which a nation, operating under conditions of free and fair markets, is capable of producing goods and services that successfully meet the test of international markets while simultaneously maintaining and increasing the real income of its citizens.

The Economic Commission for Latin America and the Caribbean (ECLAC, 2003), through its course Competitiveness, Business Networks, and Business Cooperation, developed with Italian support and cooperation, proposed that productive development describes a phenomenon that has become increasingly important and widespread in the contemporary economic environment. This phenomenon can be understood as the spontaneous establishment of collaborative agreements among independent economic actors seeking to achieve outcomes that would be unattainable through isolated action.

Within economic literature, one of the most widely recognized historical debates concerns the conceptual differences between John Maynard Keynes and Milton Friedman. Keynes argued that governments should stimulate aggregate demand, whereas Friedman maintained that the state's role should be limited primarily to regulating the money supply. This debate ultimately contributed to the emergence of the notion that economic development should rely on "less government and more free markets." Particularly during the 1980s, this perspective helped shape the economic model commonly referred to as economic globalization, understood as the increasing integration of countries through expanded trade in goods and services, cross-border investment flows, and the movement of human capital.

Economic globalization is characterized by several factors, including the international commercialization of products, increased consumption of goods and services, specialization, the strengthening of industrial structures, the reduction or elimination of trade barriers among geographical regions, and lower transportation costs resulting from advances in communication technologies.

Consequently, and considering the above, it is important to review the concept of productive articulation and related organizational approaches such as business networks and clusters, as discussed by Dini (2010). These mechanisms have increasingly been adopted by SMEs and are largely a response to the conditions of demand, consumption, and

competitiveness generated by trade agreements, particularly the North American Free Trade Agreement (NAFTA) and later, the United States–Mexico–Canada Agreement (USMCA).

Table 1. Evolution of Competitiveness Concepts in Industrial Development Literature

Author	Main concept	Contribution Competitiveness
Porter (1985)	Competitive Advantage	Firms achieve superior performance through innovation and strategic positioning.
Krugman (1991)	Economic Geography	Geographic concentration enhances productivity and specialization.
Ivancevich & Lorenzi (1997)	National Competitiveness	Capacity to compete internationally while increasing citizens' welfare.
Dussel Peters (2003)	Productive Integration	Integration of firms and sectors through value chains and production networks.
Integration of firms and sectors through value chains and production networks.	Productive Linkages	Strengthening connections among economic actors to increase competitiveness.

Source: Own design with information by the authors base don the cited literatura.

Social Networks and Business Networks: Conceptual Foundations, Interaction Dynamics, and Organizational Scope.

Economic sociology emphasizes the integration of social structures through networks, arguing that individuals' actions are continuously embedded within and influenced by these social relationships. This perspective highlights the roles of solidarity, trust, reciprocity, and exchange among individuals and institutions. Within social networks, there is a constant circulation of social, cultural, and subjective meanings that enriches the understanding of collective action and organizational behavior.

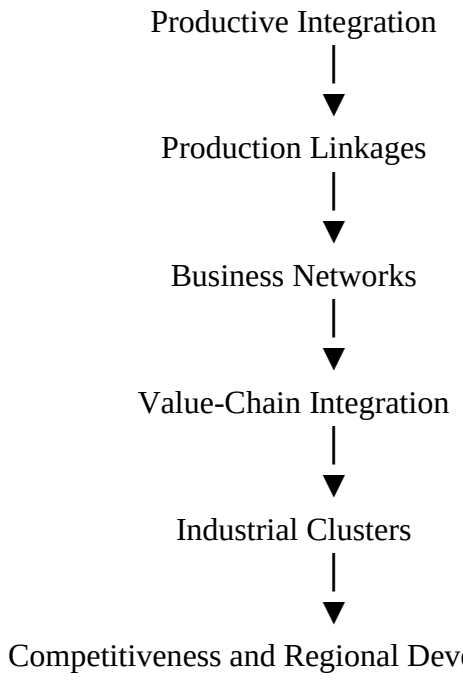
In the process of network formation among diverse actors, dynamic interactions facilitate the transmission of both tacit and codified knowledge. Over time, these exchanges can generate innovation processes within sectors that are strategically important for regional development. Regional knowledge spaces, whose activation and adaptation promote environments conducive to innovation, play a crucial role in stimulating regional innovation systems. These spaces accumulate knowledge generated by public and private institutions, productive organizations, educational entities, and research centers, as well as by productive development initiatives promoted by specialized national and regional business associations (Casalet, 2001).

Productive Integration.

Productive integration refers to the set of economic, organizational, and institutional relationships established among firms, sectors, and territories to enhance coordination within production systems and value chains. These linkages facilitate the exchange of knowledge, resources, technology, and capabilities, generating synergies that strengthen competitiveness, innovation, and regional economic development.

Unlike isolated business strategies, productive integration promotes collective action among firms and supporting institutions, enabling participants to achieve outcomes that would be difficult to attain individually. In contemporary industrial systems, productive integration constitutes a key mechanism for strengthening value chains, fostering innovation, and improving the resilience of regional economies.

Figure 1. Conceptual Framework Linking Productive Integration and Automotive Cluster Competitiveness



Souce: Own design with information by the authors´elaboration

From this perspective, productive integration and business networks provide a robust theoretical framework for understanding the emergence and evolution of industrial clusters. These concepts explain how firms, governments, universities, research centers, and supporting organizations collectively generate the conditions necessary for competitiveness, innovation, knowledge diffusion, and regional development.

Within the Mexican automotive industry, productive integration has facilitated the creation of highly specialized regional clusters connected to global value chains. These

collaborative structures have strengthened technological capabilities, promoted investment attraction, enhanced supplier development, and reinforced Mexico's position as one of the world's leading automotive manufacturing platforms.

Productive Integration

Productive integration has emerged as a central concept in contemporary theories of industrial development, regional competitiveness, and economic globalization. The concept refers to the coordinated interaction among firms, institutions, governments, research centers, and supporting organizations that collectively participate in the production, distribution, and commercialization of goods and services. Productive integration extends beyond simple commercial transactions and encompasses the establishment of strategic relationships that facilitate the exchange of knowledge, resources, technology, and organizational capabilities.

From a development perspective, productive integration contributes to strengthening industrial ecosystems by creating synergies among economic actors. These synergies enhance productivity, reduce transaction costs, stimulate innovation, and facilitate access to domestic and international markets. Furthermore, productive integration promotes collective efficiency by enabling firms to leverage complementary resources and capabilities that would be difficult to develop independently.

In increasingly globalized markets, productive integration has become a critical mechanism through which regions and industries enhance competitiveness and improve their capacity to respond to technological, economic, and institutional changes. For emerging economies, productive integration represents an important strategy for increasing participation in global production systems and fostering sustainable economic development.

Table 2. Comparative Characteristics of Productive Integration Mechanisms

Dimension	Productive Integration	Production Linkages	Value-Chain Integration	Industrial Clusters
Scope	Broad	Operational	Strategic	Territorial
Main Actors	Firms and Institutions	Suppliers and Customers	Entire Value Chain	Regional Ecosystem
Objective	Cooperation	Coordination	Value Creation	Competitiveness
Geographic Scale	Local to Global	Local to Global	Global	Regional
Innovation Potential	High	Moderate	Very High	High

Source: Authors' elaboration.

Value-Chain Integration

Value-chain integration represents a more advanced form of productive integration that focuses on the coordination of activities across the entire value creation process. The concept

originates from value-chain theory and emphasizes the interdependence among actors involved in design, research and development, production, logistics, marketing, distribution, and after-sales services.

According to the global value chain approach, firms increasingly compete not as isolated entities but as participants in interconnected networks that span multiple countries and regions. Consequently, value-chain integration has become essential for achieving competitive advantages in industries characterized by technological complexity and international competition.

Value-chain integration enables firms to improve efficiency, reduce production costs, accelerate innovation processes, and access specialized knowledge. It also facilitates the dissemination of best practices, quality standards, and technological capabilities throughout the production network. As a result, firms participating in highly integrated value chains are generally better positioned to respond to market demands and technological transformations.

Table 3. Main Automotive Clusters in Mexico

State	Main OEMs	Strategic Characteristics
Guanajuato	GM, Mazda, Toyota, Honda	Strong supplier network
Puebla	Volkswagen, Audi	Export-oriented production
Nuevo León	Kia	Advanced industrial ecosystem
Coahuila	GM, Stellantis	Manufacturing specialization
San Luis Potosí	BMW	High technology adoption
Aguascalientes	Nissan	Integrated supplier base
State of Mexico	Multiple Suppliers	Strategic logistics location

Source: Own elaboration with information by AMIA

Furthermore, the transition toward electric vehicles, digital manufacturing systems, artificial intelligence, and Industry 4.0 technologies has increased the strategic importance of value-chain integration. These transformations require higher levels of collaboration among firms, research institutions, governments, and technology providers to ensure the successful adoption.

Industrial Clusters

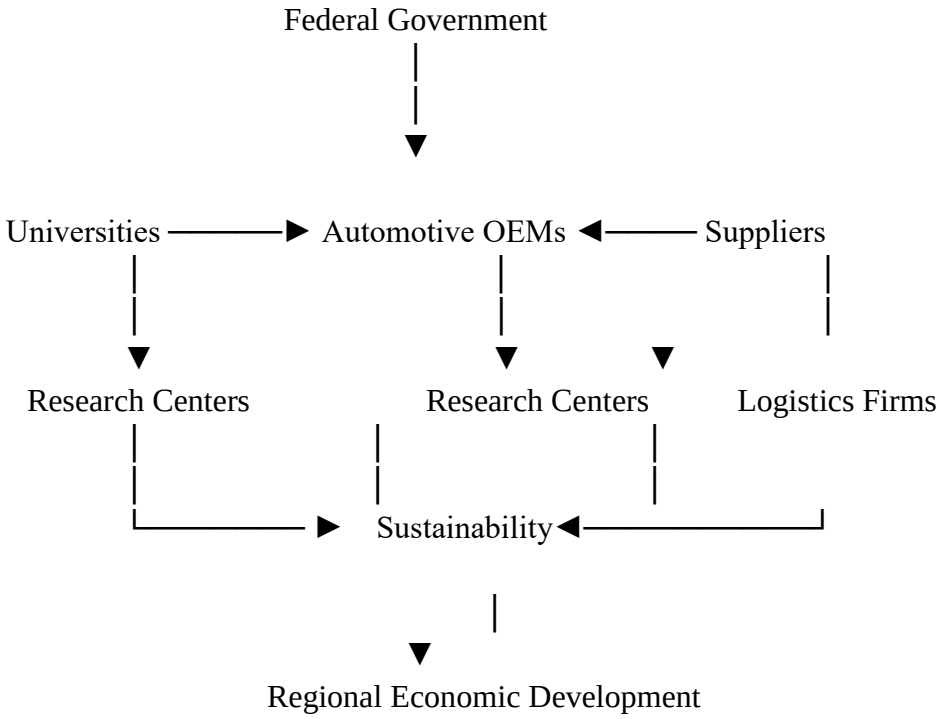
Industrial clusters represent geographically concentrated networks of interconnected firms, suppliers, service providers, academic institutions, research centers, and government agencies operating within related industries. The concept gained prominence through the work of Porter (1998), who argued that clusters generate competitive advantages by fostering innovation, productivity growth, and knowledge spillovers.

Clusters facilitate frequent interactions among economic actors, enabling firms to benefit from proximity-based advantages such as reduced transaction costs, specialized labor markets, shared infrastructure, and enhanced access to knowledge and innovation. These conditions contribute to the development of localized competitive advantages that are difficult to replicate elsewhere.

Sustainability Challenges and Opportunities for Mexican Automotive Clusters

The transition toward sustainable mobility represents one of the most significant challenges facing the Mexican automotive industry. The increasing adoption of electric vehicles, stricter environmental regulations, and changing consumer preferences require firms to invest in technological innovation, workforce reskilling, and cleaner production systems. At the same time, these transformations create opportunities for Mexico to strengthen its position within global automotive value chains.

Figure 2. Sustainable Automotive Cluster Ecosystem



Source: Own design with information by INEGI

This model integrates the traditional Triple Helix framework with sustainability principles. It demonstrates that competitiveness increasingly depends upon collaboration among industry, academia, and government while simultaneously incorporating environmental responsibility, innovation, and social development objectives.

2. Research Method

This study adopts a qualitative, exploratory, and descriptive research design aimed at analyzing the evolution, competitiveness, and sustainability of the Mexican automotive industry within the context of economic globalization and industrial transformation. The research focuses on understanding how productive integration, production linkages, business networks, value-chain integration, and industrial clusters contribute to strengthening industrial competitiveness and regional development.

The study is grounded in documentary research and content analysis methodologies, which are particularly suitable for examining complex economic and industrial phenomena involving multiple actors, institutions, and territorial dynamics. Documentary analysis allows the systematic examination of existing academic literature, official statistical reports, industrial databases, public policy documents, and institutional publications relevant to the automotive sector.

Research Approach

A qualitative approach was selected because it allows for an in-depth understanding of the structural relationships that characterize the Mexican automotive industry. Rather than focusing exclusively on numerical indicators, the study seeks to explain the mechanisms through which firms, institutions, governments, universities, and research centers interact to create competitive advantages and foster sustainable industrial development.

The qualitative perspective facilitates the interpretation of production networks, cluster dynamics, and governance structures that cannot be fully understood through quantitative indicators alone. It also enables the identification of emerging trends associated with electromobility, digital transformation, nearshoring, environmental sustainability, and industrial innovation.

Sources of Information

The study relies on a combination of primary documentary sources and secondary statistical information obtained from highly reliable institutions. The principal sources include:

* Mexican Automotive Industry Association (AMIA).
* National Institute of Statistics and Geography (INEGI).
* Economic Commission for Latin America and the Caribbean (ECLAC).
* International Labour Organization (ILO).
* Automotive cluster organizations.
* International academic journals indexed in Scopus and Web of Science.
* Government reports and industrial development strategies.
* Publications from international organizations related to competitiveness and sustainable development.

Analytical Framework

The research framework is structured around four interconnected dimensions:

Productive Integration

Refers to the mechanisms through which firms and institutions coordinate activities, resources, knowledge, and capabilities to improve collective performance and competitiveness.

Production Linkages

Focuses on the relationships established among firms participating in different stages of production, including suppliers, assemblers, logistics operators, and service providers.

Value-Chain Integration

Examines how firms become embedded in regional and global production systems through coordinated economic activities and technological collaboration.

Industrial Clusters

Analyzes the geographic concentration of interconnected firms and institutions that generate competitive advantages through proximity, cooperation, innovation, and specialization.

These dimensions are analyzed through a sustainability lens that incorporates environmental responsibility, technological innovation, and regional economic development.

Research Procedure

The study was conducted in four stages.

The first stage involved a comprehensive review of the literature on competitiveness, productive integration, industrial clusters, business networks, value chains, and sustainable industrial development.

The second stage consisted of collecting and systematizing statistical information from official databases regarding production, employment, exports, and industrial concentration within the automotive sector.

The third stage focused on identifying the main automotive clusters operating in Mexico and examining their organizational characteristics, productive specialization, and integration into global value chains.

The fourth stage involved interpreting the findings within the broader context of sustainability transitions, technological transformation, and regional development strategies.

3. Results and Analysis

Expansion and Consolidation of the Mexican Automotive Industry

The analysis reveals that the Mexican automotive industry has strengthened its position as one of the most competitive manufacturing sectors in the global economy. The sector experienced significant growth during the study period, increasing vehicle production from 2.98 million units in 2021 to nearly 4 million units in 2024.

This expansion reflects several structural factors, including the recovery of international demand following the COVID-19 pandemic, the reconfiguration of global supply chains, increased foreign direct investment, and Mexico's strategic position within the North American production system.

The slight contraction observed in 2025 does not represent a structural decline but rather a market adjustment associated with fluctuations in export demand and changes in inventory management strategies among major manufacturers.

The evidence indicates that the automotive industry continues to serve as a fundamental pillar of the Mexican economy, generating substantial employment, attracting foreign investment, and contributing significantly to exports and manufacturing GDP.

Regional Concentration and Cluster Development

One of the most significant findings concerns the geographic concentration of automotive activities within specialized industrial clusters.

The states of Guanajuato, Coahuila, Nuevo León, Puebla, San Luis Potosí, Aguascalientes, and the State of Mexico have developed highly integrated production ecosystems characterized by the presence of vehicle assemblers, supplier networks, logistics infrastructure, research institutions, and government support mechanisms.

These clusters have evolved into strategic platforms for industrial development because they facilitate economies of agglomeration, reduce transaction costs, improve access to specialized labor, and promote knowledge spillovers among firms.

The concentration of productive activities within these territories has generated positive effects on regional economic growth and has strengthened Mexico's competitiveness within global automotive value chains.

Productive Integration and Business Networks

The findings demonstrate that productive integration plays a central role in the competitiveness of the automotive industry.

The sector operates through complex networks involving assemblers, Tier 1 suppliers, Tier 2 suppliers, universities, technology centers, financial institutions, and government agencies.

These networks facilitate the exchange of information, technology, expertise, and resources, enabling firms to achieve levels of productivity and innovation that would be difficult to attain independently.

The analysis confirms that firms embedded in strong production networks are better positioned to adapt to technological change, respond to market fluctuations, and participate in increasingly sophisticated global value chains.

Sustainability and Industrial Transformation

A major finding of the study is the growing importance of sustainability as a determinant of industrial competitiveness.

The automotive industry is currently undergoing a profound transformation driven by several interconnected trends:

* Electrification of transportation.
* Industry 4.0 technologies.
* Artificial intelligence applications.
* Renewable energy integration.
* Circular economy practices.
* Decarbonization strategies.

These developments are reshaping production processes, supply chains, and business models throughout the automotive sector.

The evidence suggests that future competitiveness will depend increasingly on the capacity of firms and clusters to integrate environmental sustainability into their production systems while maintaining productivity and innovation performance.

Nearshoring and Future Opportunities

The study also identifies nearshoring as one of the most significant opportunities for the Mexican automotive industry.

The relocation of manufacturing activities closer to the North American market has increased Mexico's attractiveness as an investment destination.

Automotive clusters are particularly well positioned to benefit from this trend because of their existing infrastructure, skilled workforce, and established supplier networks.

References(10pt)

[1] Asociación Mexicana de la Industria Automotriz (AMIA). (2022, 2024, 2025).

[2] Arzola, A. (2019). Automotive Cluster of Guanajuato. Cluster Industrial. Retrieved from https://www.clusterindustrial.com.mx/noticia/1334/red-de-clusters-automotrices-de-mexico-por-la-consolidacion-de-la-industria-nacional

[3] Becerra, F. (2008). Business networks and firm dynamics: A theoretical approach. Innovar: Revista de Ciencias Administrativas y Sociales, 18(32), 27–45.

[4] Benítez Nara, E. O., & Schaefer, J. L. (2019). Cooperation networks and business competitiveness in Brazil. *Revista de Administração e Inovação, 16*(2), 45–63.

[5] Carrizo, C., & Sili, M. (2018). Territorial governance and development: Actor dynamics and strategies in territories. Buenos Aires: National University of Quilmes Press.

[6] Carrizo, M. del C., & Sili, M. (2018). Disarticulation and fragmentation of rural development initiatives: The recent experience of Santiago del Estero Province, Argentina. Documentos y Aportes en Administración Pública y Gestión Estatal, 18(30), 43–83.

[7] Casalet, M. (2001). Regional knowledge spaces and innovation systems: Network-building processes among actors. Mexico City: National Autonomous University of Mexico (UNAM), Institute for Social Research.

[8] Cluster Automotriz de Jalisco. (2023). Retrieved from https://www.clautjalisco.org.mx
[9] Cluster Industrial. (2021). *The Mexican automotive industry in 2021: Data and analysis. Retrieved from https://www.clusterindustrial.com.mx/noticia/4387/la-industria-automotriz-mexicana-2021-en-cifras-datos-y-analisis
[10] Economic Commission for Latin America and the Caribbean (ECLAC). (2016). Productive articulation and value chains in Latin America. Santiago, Chile: ECLAC.
[11] Consilium. (2024). What the European Union is doing to boost competitiveness. Council of the European Union.
[12] Coraggio, J. L. (2003). The popular economy and productive articulation strategies in Latin America. Quito: Universidad Andina Simón Bolívar.
[13] Dussel Peters, E. (2003). Productive articulation in Mexico: Value chains and competitiveness. Mexico City: UNAM, Faculty of Economics.
[14] Dussel Peters, E. (2010). Value chains and productive articulation in Latin America. Mexico City: UNAM/ECLAC.
[15] Estrella, V. (2020, April 17). Querétaro requests inclusion of the automotive industry among essential activities. CE Noticias Financieras.
[16] Flores, L. (2021, May 25). Semiconductor shortages may not be resolved until 2022: Nuevo León Automotive Cluster. CE Noticias Financiera.
[17] Flores, L. (2022, May 24). USMCA opens opportunities for Tier 2 participation, but there are not enough suppliers: Nuevo León Automotive Cluster. CE Noticias Financieras.
[18] González Becerra, C. I. (2024). Can we have it all? The evolution of regulatory frameworks in Latin America. Utilities Policy. Elsevier.
[19] González-Campo, C. H. (2010). Theoretical interaction for network characterization. Innovar, 20(37).
[20] Huerta Mata, J. J., Zubillaga Alva, R. M., & Cordero Martín, A. (2017). High-technology, biotechnology, and automotive sectors: Economic development and technological innovation for social growth in Aguascalientes and Jalisco, Mexico. Revista Universitaria Ruta, 19(2).
[21] Instituto Nacional de Estadística y Geografía (INEGI). (2026). Indicator Bulletin 10/26.
[22] Ivancevich, J. M., & Lorenzi, P. (1997). Management: Quality and competitiveness. Mexico City: McGraw-Hill Interamericana.
[23] Krugman, P. (1991). Increasing returns and economic geography. Journal of Political Economy, 99(3), 483–499.
[24] Moisan, A. (2009). Productive articulation: Business cooperation and the construction of competitive advantages. Buenos Aires: National University of Quilmes Press.
[25] Montoya Ortega, M. (2014). Analysis of the contribution of the Nuevo León automotive cluster to regional business development. Cuadernos Latinoamericanos de Administración, 10(19), 7–22.
[26] Montoya Rodríguez, M. (2022). Nuevo León Automotive Cluster. Bulletin, March 2022.
[27] International Labour Organization (ILO). (2020). Productivity ecosystems for decent work. Geneva: ILO.
[28] Pineda, M. (2018). Clustering in Mexico. Modern Machine Shop México. Retrieved from https://www.pt-mexico.com/articulos/la-clusterizacion-en-mexico

[29] Pineda, M. (2021). Industrial clusters in Mexico: Linkages and collaboration for regional development. Modern Machine Shop México.
[30] Pfeffer, J., & Salancik, G. R. (1978). The external control of organizations: A resource dependence perspective. New York: Harper & Row.
[31] Porter, M. (1985). Competitive Advantage: Creating and Sustaining Superior Performance (2nd. Ed). Free Press.
[32] Sarmiento-del Valle, S. (2017). Cluster: An alternative for regional growth. Dimensión Empresarial, 15(2), 169–187. https://doi.org/10.15665/rde.v15i2.1222
[33] Torres González, E. (1997). The integrating company: An alternative for micro, small, and medium-sized enterprises in Mexico (Bachelor's thesis). Faculty of Accounting and Administration, National Autonomous University of Mexico.
[34] Torres Tello, G. P. (2018). The dynamics of business networks and the implementation of a territorial expansion strategy (Bachelor's thesis). Autonomous University of Carmen.
[35] Tovar, E. (2017). Clusters: A crucial part of growth. Modern Machine Shop México. Retrieved from https://www.mms-mexico.com/columnas/clusteres-parte-crucial-del-crecimiento
[36] Zapata, G. J., & Martínez, A. M. (2011). Organizational change: A theoretical study from the perspective of external control. Estudios Gerenciales, 27 (119), 79–98.
[37] Berto, M.C. and Vruce K., "Implementation of a Fuzzy PI Controller for Speed Control of Induction Motors Using FPGA," *Journal of Power Electronics*, vol. 10, pp. 65-71, 2010.
[38] Newmark, P. "Common Mode Circulating Current Control of Interleaved Three-Phase Two-Level Voltage-Source Converters with Discontinuous Space-Vector Modulation," *2009 IEEE Energy Conversion Congress and Exposition, Vols 1-6*, pp. 3906-3912, 2009.
[39] Zed, Yinhai. "A Novel SVPWM Modulation Scheme," in *Applied Power Electronics Conference and Exposition, 2009. APEC 2009. Twenty-Fourth Annual IEEE*, 2009, pp. 128-131.