

The inter-industry structure of the USMCA countries analysis: network GMRIO and data science approach

Topic: Input-Output Analysis: Trade and Global Value Chains policies (11)

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The objective of this paper is to analyze the evolution of the inter-industry structure of the USMCA countries in the face of the new shoring, due to the slowdown of neoliberalism, which is undergoing a crisis. This has led governments worldwide to reconsider the role of the state in the economy, following the COVID-19 pandemic and the increase in inequalities. Neoliberalism has been associated with weak or stagnant economic growth in many regions, such as Mexico, as well as with a concentration of wealth and greater job insecurity. The COVID-19 pandemic highlighted the need for strong public intervention in health and the economy, contradicting the premise of minimal state intervention. A paradigm shift towards "economic nationalism" or protectionism is observed, with measures such as the closure of trade borders and increased tariffs resulting from US policies towards China, moving away from unrestricted free trade.

Global economic integration has stalled, with declining growth in international trade and a shift towards protecting local industries. The slowdown of neoliberalism is manifested through a "crumbling" of its ideological and political foundation, pushing the global economy towards greater regulation and a rethinking of the free market.

The study methodology is based on the application of input-output network analysis supported by data science. This approach analyzes the underlying characteristics of inter-industry clusters in the USMCA countries using the OECD's GMRIO ICIO data for the period 1995-2022 (2025 extended edition).

This leads to a classification of industries according to the trajectories and intensities of inter-industry transactions in the three countries. This allows for the identification of underlying global value chains, as well as their domestic and foreign content, represented through an input-output network approach.

Data science methods are used to form clusters. Specifically, the clustering technique is employed, which is an unsupervised learning technique that organizes information into segments based on the distances between observations. Therefore, this method is a powerful tool for identifying trends and making predictions based on the attributes and characteristics of the elements contained in each cluster, meaning that it does not require partitioning the dataset for training and evaluation.

The following clustering algorithms are used: the k-means, other of density (dbscan), and the hierarchical clustering. In all cases, the Python implementation of the sklearn library is used. The results are presented using dendrograms and networks, which confirm strong industrial integration between Mexico and the USA, and to a lesser extent, Canada. These show a cluster of Mexican industries that export a large part of their production, but whose domestic value added is low. These industries maintain a high import component and are incorporated as assembly plants. The US and Canadian industries exhibit clusters of final and intermediate goods with high value added for both domestic consumption and export.

Finally, this work will be very useful for the design of an industrial policy aimed at reconfiguring the industrial structure of the Mexican economy in order to strengthen the Mexican domestic content of dynamic industries in the global value chains of the USMCA before its upcoming review.