Chapter 3
Economic Development and High-Value Supply Chains

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Abstract The reorganization of the global supply process is giving shape to a new value creation paradigm, where clusters of local producers are becoming the pillars of global supply chains. This phenomenon, known as regionalization, demands the identification of regional productive sectors that exhibit the specialization and dynamism required to create high-value supply chains. Thus, regional development and high-value supply chains are related. In this chapter, we propose a methodological framework to identify the potentialities and opportunities of regional productive sectors to create industrial clusters and high-value supply chains. The State of Tamaulipas (in Mexico) and its municipalities functioned as the region and subregions of analysis, respectively. The results reveal that productive sectors with the more significant potential to create high-value supply chains are the agricultural and manufacturing sectors.

Keywords Regionalization · Supply chains · Economic development · Regional vocation

3.1 Introduction

Regional development and high-value supply chains are closed related (Twomey and Tomkins 1996; Dewhurst and McCann 2007; Silva et al. 2021). Recently, regional development has been increasingly structured around value chains, recognizing the influence of regional and local factors in the global production processes (Bolea et al. 2022).

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Exports indicate participation in global value chains (Johnson 2018). In the global supply process, the components of any product come from different regions in the world. Some productive sectors exhibit a high level of specialization and dynamism that allows them to create industrial clusters of local producers that become the pillars and commercial bridges of global supply chains.

From an economic perspective, the level of specialization and dynamism required by the industrial sectors to create high-value supply chains comes together with regional development. In other words, to impulse regional development in any county is critical to clearly define which industrial sectors have the best possibilities to compete in the international market. In Europe, for instance, regional policymakers strive to develop local clusters to promote regional economic growth mainly through supply chain development initiatives, particularly in regions dominated by branch plants of large multinational enterprises (Brown 2000). The aim is to establish a road map through transformative policies to manage the resources, accelerate industrial growth, and create an environment favorable for innovation in related industries.

In the literature, the relationship between transportation infrastructure, freight traffic, economic market drivers, and regional economic development has been widely studied (Clos and Bolumole 2015; Perevozova et al. 2020); with growing importance in the study of the impact of transportation, logistics, and supply chain management operations to support industrial activities in regional economies. Recently, Silva et al. (2021) demonstrated that in emerging economies, micro and small enterprises' supply chains contribute significantly to regional socioeconomic development, enhancing their resilience to crises because they focus on long-lasting economic activities within the regional ecosystems. Thus, the regional compositions of economic activities are not the only determinant of within-country differences in economic performance (Thissen et al. 2018).

To the best of our knowledge, in the supply chain management community, there is a need for a methodological framework able to identify the potentialities and opportunities of regional productive sectors to create industrial clusters and high-value supply chains, which is the aim of this chapter.

3.1.1 Related Literature

The World Bank defines *economic development* as the qualitative change and restructuring of a region's economy concerning technological and social progress. From a broader perspective, we can consider that economic development is linked to the growth of production but also includes other aspects that affect the quality of life of the population, such as health, employment, and education, as well as conservation and caring for the environment (Sepúlveda 2008). Therefore, to reach economic development, economic growth is a necessary condition, but not a sufficient one. Thus, assuming that regional development depends on the ability to create transversal value in the global productive sectors, before undertaking any productive project, it

is critical to have a complete diagnosis that offers a comprehensive vision of the technical, economic, and social potential of the region (Coe and Hess 2010).

Regional development is related to two main concepts: productive vocation and economic potential. Productive vocation is the aptitude, capacity, or special characteristic a locality has for its development. The real and apparent productive vocations differentiate each other. The real productive vocation exists when the capacities of the locality, regarding production and commercialization in the internal or external markets, generate an economic and social benefit for an important part of the locality. The apparent productive vocation exists when, despite unbeatable local production conditions, no market allows them to improve their income. Hence, producers find it challenging to expand the volume or amount of income, causing the production level to remain constant yearly.

On the other hand, economic potential is related to potentialities, which are resources or capital, or both, unused, partially used or misused. Potentialities are activated starting from a good combination of these resources or capitals and responding to a social and economic environment. Using the potentialities can reduce poverty, more significant employment, improvements in well-being, greater citizen participation, and greater social cohesion. In the socioeconomic dynamics, the potentialities assume the approach of the three capitals: natural, human, and physical (which includes financial capital), accompanied by the catalytic role of institutions and social norms, called social capital.

From the supply chain management point of view, the current paradigm of value creation has been taking shape for several years (Notteboom and Rodrigue 2005; Johnson 2018), where clusters of local producers become the pillars and commercial bridges of global supply chains. The reorganization of the global supply process in production chains responds to the regionalization paradigm and is a consequence of at least four factors: (a) the growing concern about the increase in risks in international connections (commercial wars, transport interruptions, natural disasters, etc.) (Adenso-Díaz et al. 2018); (b) the governmental requirements to involve more local producers in international supply chains (Horner and Alford 2019); (c) the growing awareness of customers about the level of sustainability, such as the footprint of transport, products, and services; and (d) the increasing demand of productive sectors to gain flexibility and agility in operations to respond to uncertainty.

The COVID-19 pandemic represented the last century's most fundamental disruption to economic activity. It presents enormous challenges to the world economy, raising the fundamental question of how to reshape global supply networks (Enderwick and Buckley 2020) to move towards a more regional world economy (Panwar et al. 2022). The fundamental idea is to seek a better balance between national and international interests (Rodrik 2019), efficiency and resilience of supply chains (Reeves and Varadarajan 2020), and growth and equity.

The regionalization of production chains, based on a network of industrial clusters, solves various logistical problems related to reliability, flexibility, and cost reduction (Gulledge and Chavusholu 2008; Cedillo-Campos et al. 2021). It maintains the fluidity of regional cargo, given that the production systems are not disconnected from the territories (Guerrero et al. 2014), opposing the latent risk of interregional

transport. Therefore, specific territorial variables will play an increasing role when designing, organizing, and operating global supply chains in the coming years (Pla-Barder et al. 2021; Scholvin et al. 2022). Hence, to make decisions under this global industrial reconfiguration, new methods, models, and approaches are needed to recognize and analyze the new variables that improve supply chain decisions based on the new territorial paradigm.

Although there has been much discussion recently about a process of continentalization, regionalization, or Nearshoring of global supply chains, the models and procedures available to make decisions during this new phase remain largely unmapped. Consequently, most of them do not address the essential discussion about which factors related to the territory are significant in promoting regional development and the creation of high-value supply chains.

The rest of the chapter depicts the methodological framework and the case study results, where the State of Tamaulipas (in Mexico) and its municipalities functioned as the region and subregions of analysis, respectively.

3.2   Proposed Methodology

From a methodological point of view, a complete diagnosis and characterization of the region are necessary to identify the potentialities and opportunities of regional productive sectors to create industrial clusters and high-value supply chains. The diagnostic structure must consider the region's socioeconomic and demographic aspects, aiming to identify the economic structure of regional productive sectors. This data comes from economic and population censuses. After identifying the region's economic structure, the study must quantify the potential of regional productive sectors in the second stage. This stage requires using classical economic indices and coefficients or a combination of analytical and data mining techniques. The third step requires identifying the most relevant and promising class of industrial clusters. Finally, the last step in the methodological framework is the strategic choice of relevant clusters with the most significant potential to create high-value supply chains while meeting the values and goals of regional development (see Fig. 3.1).

From a theoretical point of view, this framework considers the convergence of several new phenomena and concepts such as regionalization, productive vocation, economic potential, circular economy, and the interaction between them, as well as the application of analytical tools (analytic hierarchical process, fuzzy multi-objective optimization, and clustering methods) in the regional supply chain decision making. The aim is to understand, from a general perspective, the multisectoral challenges this kind of study represents.
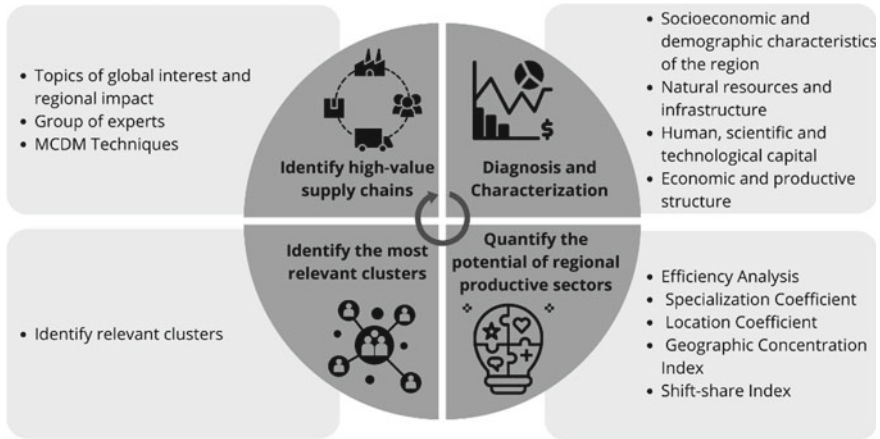
Fig. 3.1 The methodological approach

3.2.1 Stage 1—Diagnose and Characterization of the Region

The preparation of a diagnosis with a territorial approach is a process whose duration and complexity vary depending on the size of the territory, the characteristics that identify it, the variables to be analyzed, and the difficulties or facilities faced when collecting, processing, and interpreting the information. According to Economic Commission for Latin America and the Caribbean (ECLAC, https://www.cepal.org/en), different approaches exist to elaborate diagnoses that consider the territory as the main object of study. However, when the study's objective is identifying strategic opportunities for development, there are advantages to using a comprehensive and participatory diagnosis.

A diagnosis is comprehensive when it manages to characterize the priority variables that determine the development of a region to create sustainable, competitive, and inclusive societies and territories. The participatory perspective of the diagnosis implies involving local actors in its elaboration and decision-making since this produces an appropriation of the process, which guarantees the continuity of the actions.

The structure of the territorial diagnosis varies according to the thematic areas that make up and build the territory's profile. Our diagnostic model considers four dimensions for analysis and 18 thematic axes that collect information on more than 50 variables (see Table 3.1).

Table 3.1 Areas of analysis and thematic axes for the diagnosis

Dimension	Objective	Thematic axis
Socioeconomic and demographic characteristics of the region	Identify how the economic and sociodemographic structure of the region is made up	Geographic aspects Demography and population dynamics Socioeconomic aspects Environment Health Education
Natural resources and infrastructure	Identify what natural resources and infrastructure the region has for its development	Water Land Electrical infrastructure Hospitals Telecommunications and transportation
Human, scientific, and technological capital	Identify what scientific and technological capital the region has for its development	Regional scientific capital
Economic and productive structure	Investigate the economic conditions of the territory of analysis, including its recent dynamics and current situation	Participation in the VACB Structure of the VACB Importance of sectors in the state Dynamics and evolution of the economy by economic sector Analysis by sector Identification of product classes

3.2.2 Stage 2—Quantify the Potential of Regional Productive Sectors

The comparison of productive structures and intra-regional differentiation is required to determine the degree of specialization or vocation. There are a series of methodologies and techniques in the literature whose application depends on information and time availability. To quantify the potential of regional productive sectors, we will rely on economic indies and coefficients using the following terminology:

n Number of economic branches (productive sectors) in the region
m Number of subregions in the region
E_{ij} Value added in branch j in subregion i
E_i Total value added in subregion i
N_j Value added in branch j at the regional level
N Total value added at the regional level.

3.2.2.1 Specialization Coefficient

The specialization coefficient (SC), also known as differentiation, measures the degree of similarity in the economic structure of subregion i regarding the region's economic structure. The SC coefficient measures the specialization degree of a region, assuming a diversified reference distribution in relative terms.

$$SC_i = \frac{1}{2} \sum_{j=1}^{n} \left| \frac{E_{ij}}{E_i} - \frac{N_j}{N} \right| \tag{3.1}$$

where: $0 < SC_i < 1$.

Interpretation:

– If $SC_i \rightarrow 0$, the economic structure of subregion i is close to the economic structure of the region.
– If $SC_i \rightarrow 1$, the economic structure of subregion i tends towards specialization.

3.2.2.2 Location Coefficient

The location coefficient (LC) measures the locality's degree of productive specialization regarding another territory or region (Saravia and Camargo 2012).

$$LC_i = \frac{E_{ij}/E_i}{N_j/N} \tag{3.2}$$

Interpretation:

– If $LC_i < 1$: there is insufficient local production; therefore, it is necessary to import goods and services to supply local demand. The activity is not very localized.
– If $LC_i = 1$: there is sufficient local production to supply its demand, but there is no surplus to export, we can say that the activity is localized.
– If $LC_i > 1$: the local economy is specialized in this activity, production is greater than local demand, and therefore, there are possibilities to export.

3.2.2.3 Geographic Concentration Index

The geographic concentration index (GCI_j) expresses the degree of geographic distribution or spatial concentration of a productive sector j. The GCI assesses the concentration of economic activities.

$$GCI_j = \frac{1}{2} \sum_{i=1}^{m} \left| \frac{E_{ij}}{N_j} - \frac{E_j}{N} \right| \tag{3.3}$$

where $0 < GCI_j < 1$.

Interpretation:

– If $GCI_j \to 0$, the geographical distribution of productive sector j is close to the geographical distribution of regional production.
– If $GCI_j \to 1$, there is a geographical concentration of productive sector j in the region. The total production sector is less geographically distributed in the region.

3.2.2.4 Motor Products

The motor products class are those that currently contribute the most to the production and employment in the region; this class of products reflects a level of economic weight and growth superior to the other economic activities in the region.

3.2.2.5 Star Products

The star products class has the highest rate of specialization and the most significant possibility of creating production chains; in this class of products, the level of specialization and dynamism is high regarding its behavior at the national level. The Concentration Index (CI) measures the level of specialization and dynamism, considering three variables: Total Employed Personnel (*TEP*), Gross Census Added Value (*GCAV*), and Total Gross Production (*TGP*).

$$CI_j^{VAR} = \left(\frac{VAR_j^{reg} / \sum_{r=1}^{n} VAR_r^{reg}}{VAR_j^{nac} / \sum_{r=1}^{n} VAR_r^{nac}} \right) \tag{3.4}$$

where VAR = {TEP, GCAV, TGP}. The super indexes reg and nac refer to regional and national environments, respectively.
Interpretation:

– If $CI_j^{var} > 1$ and its growth rate between two consecutive periods $(t - 1)$ and t is positive, then this product is defined as a star product since it concentrates economic production in an activity in which investments and employment are specialized.

3.2.2.6 Leading Products

The leading products class are those with evidence of containing the most competitive products in the region. A leading product class reflects the competitiveness of economic activity in each region. To measure regional competitiveness, the shift-share index (SSI) considers the same variables as the Concentration Index.

$$SSI_j^{VAR} = VAR_{j,(t-1)}^{reg} \cdot \left(\frac{\sum_{r=1}^{n} VAR_{r,t}^{nac}}{\sum_{r=1}^{n} VAR_{r,(t-1)}^{nac}} - 1 \right) \tag{3.5}$$

where $(t-1)$ and t are two consecutive periods of censed data for the economic variables.

Interpretation:

– If $\text{SSI}_j^{\text{VAR}} > 0$ indicates that VAR related to the manufacture of product j in the region grows faster than at the national level and, therefore, is more competitive and consequently is a leading product.

3.2.3 Stage 3—Identify the Most Relevant Clusters

Several methodologies exist in the literature to identify industrial clusters (Cruz and Silva 2014). Of the many ideas and concepts that have emerged in the last years, the model proposed by Michael E. Porter is the most widely used as an analysis tool. Porter (2003) defines the concept of a cluster as follows: "*A cluster is a geographically dense group of connected companies and institutions, belonging to a specific field, united by common features and complementary to each other*".

The main characteristic of clusters is that their economic units can operate more efficiently, sharing technologies, infrastructure, pools of knowledge, and common demands. The presence of clusters can be an essential engine of regional competitiveness and innovation, for which it is necessary to identify the limits of the industry of each cluster.

Delgado et al. (2016) re-examined inter-industry relationships using suitable clustering methods based on input–output ratios, job occupations, and job-sharing and facility-sharing patterns, resulting in definitions of reference clusters for the industry. In making these new definitions, the descriptions of the North American Industry Classification System (NAICS) classification codes were used, with 6-digit disaggregation, proposing a new set of reference cluster definitions.

This chapter uses The Regional Development Group of the Tecnológico de Monterrey approach (Vilalta-Perdomo and Koch 2009) to identify the relevant products in the region (with 6-digit disaggregation). In the most promising class of products converge, two or three of the following products: the motor products class, the star products class, and the leading products class.

3.2.4 Stage 4—Identify High-Value Supply Chains

This stage aims to define priorities and identify those clusters with higher potential to create high-value supply chains while meeting the values and goals of regional development. This problem must consider multiple factors (criteria) which are not precisely known, creating vagueness and uncertainty in the decision environment. Therefore, due to the vagueness and uncertainty associated with this decision, we

propose to use the fuzzy set theory to model the preferences using the Fuzzy Analytical Hierarchical Process (Fuzzy AHP) and conduct the selection process. The selection process involves selecting the best subset of clusters (regional productive sectors) with a competitive advantage and higher potential to result in high-value supply chains.

3.3   Case Study

Tamaulipas is northwest of the Mexican Republic, having remarkably favorable characteristics such as its coast and border strip. The State of Tamaulipas has an extension of 80,249 km^2, representing 4.1% of the Mexican territory. Forty-three municipalities (subregions) comprise the region, the largest one is Soto la Marina (subregion 037), with 6,422.14 km^2, and the smallest is Ciudad Madero (subregion 009), with 46.6 km^2. According to the last population and housing census, Tamaulipas has 3,527,735 inhabitants, where the proportion between women and men is 50.8% and 49.2%, respectively. The average population growth rate for men in Tamaulipas is 11.94%, and for women, it is 12.71%. The highest growth rate in the last 15 years for men occurred in 2010–2015 with 17.58%, while for women, it was in 2015–2020 with 17.56%. The most recent growth rate (2020–2015) was 6.77% for men and 17.56% for women.

3.3.1   Stage 1: Diagnose the Region—Economic Structure

To identify the economic structure of the region (Tamaulipas) and its subregions (43 municipalities), we perform an analysis of the 2013 and 2018 economic censuses reported by the INEGI (https://www.inegi.org.mx/app/saic/). Specifically, we reviewed the variables corresponding to Economic Units (*EU*), Total Gross Production (*TGP*), Gross Census Added Value (*GCAV*), Total Employed Personnel (*TEP*), and Gross Fixed Capital Formation (*GFCF*).

3.3.1.1   Economic Units (EU)

These are the statistical units on which data is collected. They are engaged in one type of activity permanently in buildings and fixed installations, combining actions and resources under the control of a single owner or controlling entity to produce goods and services, whether for commercial purposes or not. They are defined by sector according to the availability of accounting records and the need to obtain information with the highest level of analytical precision.

3.3.1.2 Total Gross Production (TGP)

It is the value of all the goods and services produced or commercialized by the economic units because of the exercise of its activities, including the value of the elaborated products; the gross marketing margin; the works executed; income from the provision of services, as well as the rental of machinery and equipment, and other movable and immovable property; the value of fixed assets produced for own use, among others. Includes the change in inventories of products in the process. Goods and services are valued at producer prices.

3.3.1.3 Gross Census Added Value (GCAV)

The value of production is added during the work process by the creative activity and transformation of employed personnel, capital, and organization (factors of production), carried out on the materials consumed in the economic activity. Arithmetically, the *GCAV* results from subtracting the Intermediate Consumption from the Total Gross Production. It is called gross because the consumption of fixed capital has not been deducted.

3.3.1.4 Total Employed Personnel (TEP)

All persons who worked during the reference period, depending contractually or not on the economic unit, are subject to its direction and control.

3.3.1.5 Gross Fixed Capital Formation (GFCF)

It is the value of the fixed assets purchased by the economic unit (whether domestic or imported, new or used), less the value of the sales of fixed assets made. As part of the purchase of fixed assets, the value of renovations, improvements, and major reforms carried out on fixed assets that extended their useful life by more than one year or increased their productivity, and fixed assets produced by the Economic Unit for own use.

Table 3.2 summarizes the economic information of the municipalities and the State. The subregions 032 (Reynosa) and 022 (Matamoros) are the municipalities with the largest number of Economic Units. It should be noted that both subregions are on the border with the United States of America.

In Table 3.3, we observe the Gross Census Added Value in the region's different economic activities or sectors.

According to the 2018 economic census reported by INEGI, the sector corresponding to transport, mail, and storage are the most important at the national level, followed by agriculture, animal husbandry and exploitation, forestry, fishing, and hunting, as well as manufacturing industries.

Table 3.2 Economic information from municipalities

Subregion	EU	TEP	GFCF (MDP)	TGP (MDP)	GCAV (MDP)
001	370	1,012	5.792	296.318	243.402
002	972	2,547	66.477	677.034	373.232
003	6,781	56,438	2,081.645	133,971.360	44,041.988
004	197	404	18.748	225.795	137.942
005	98	159	0.038	21.310	14.574
006	82	107	0.050	8.832	5.479
007	737	1,747	12.355	418.095	239.059
008	24	21	0.000	2.625	2.463
009	6,020	33,691	8,779.116	109,208.199	19,407.405
010	39	43	0.120	2.676	1.369
011	118	490	0.185	178.804	84.641
012	1,619	5,043	20.384	1,503.245	715.179
013	73	230	1.094	82.194	51.506
014	174	409	0.735	74.416	47.342
015	719	2,922	16.480	679.772	412.180
016	392	775	2.663	176.638	130.765
017	415	1,223	3.838	529.263	108.428
018	211	344	0.654	54.399	27.824
019	275	663	0.193	186.524	124.127
020	19	5	0.000	0.549	0.121
021	4,254	15,047	54.522	6,875.871	3,556.241
022	17,736	147,208	1,466.172	65,986.766	34,339.548
023	41	56	0.029	19.675	14.913
024	239	535	0.111	53.183	28.555
025	1,725	4,387	21.452	1,281.875	804.539
026	95	148	0.272	9.803	5.419
027	12,635	100,285	1,100.863	47,897.262	28,219.184
028	125	271	0.432	36.209	21.193
029	393	787	1.073	108.156	65.932
030	468	1,133	2.732	246.013	187.166
031	47	98	0.218	26.660	16.888
032	19,224	233,862	8,991.819	153,259.384	91,640.790
033	4,779	20,868	571.698	8,502.839	5,179.026
034	82	144	0.006	32.630	28.098
035	1,607	7,159	43.046	5,351.365	3,092.138
036	2	0	0.000	0.000	0.000

Table 3.2 (continued)

Subregion	EU	TEP	GFCF (MDP)	TGP (MDP)	GCAV (MDP)
037	728	2,362	22.858	563.248	397.176
038	13,652	81,686	789.131	35,274.708	19,502.831
039	917	1,818	5.728	290.499	195.509
040	3,262	17,227	308.780	6,978.374	4,955.882
041	10,543	62,609	538.355	21,727.989	14,027.537
042	69	111	0.220	25.315	15.411
043	631	2,743	0.501	1,226.839	676.461
Region	112,589	816,605	24,953.233	609,593.763	275,776.656
National	4,800,157	27,132,927	746,451.840	22,212,249.976	9,983,800.258

MDP (millions of MXN Pesos)

Table 3.4 shows the growth rate of each one of the economic sectors or activities regarding the Gross Census Added Value variable.

According to the 2013 and 2018 economic censuses reported by INEGI, the sector that grew the most in the GCVA variable is *agriculture, animal husbandry and exploitation, forestry, fishing, and hunting*, followed by *information in the mass media* and *wholesale trade.*

Table 3.5 identifies the most relevant economic sectors in the region, considering the GCVA data from 2018.

3.3.2 Stage 2—Quantifying the Potential of Productive Sectors in Tamaulipas

With the information obtained from the economic censuses published by INEGI in 2013 and 2018, we quantify the potential of regional productive sectors using the approach proposed by The Regional Development Group of the Tecnológico de Monterrey to identify the most promising class products.

Table 3.6 shows the twenty-eight products in the motor products class in 2018, contributing the most to regional production and employment. These products exhibit a greater economic weight than other regional economic activities.

Table 3.7 shows the thirty-eight products contained in the star products class. These products exhibit the greatest possibility of creating production chains, as these products demonstrate a greater level of specialization and dynamism than others compared with the national level.

Table 3.8 shows the thirty-one products contained in the leading products class. These products are the most competitive in the region.

Table 3.9 shows the twenty-three products comprehended in the list of the most promising products class. A prelaminar analysis shows that twelve (52.17%) are

Table 3.3 Sectorial participation of the GCAV

Economic activity	National 2018 (MDP)	Region 2018 (MDP)	The portion of regional GCAV regarding national GCAV 2018 (%)
Sector 11 Agriculture, animal husbandry and exploitation, forest approval, fishing, and hunting	19,894.37	871.53	4.38
Sector 21 Mining	944,384.55	34,016.82	3.60
Sector 22 Generation, transmission, distribution and commercialization of electrical energy, supply of water and natural gas through pipelines to the final consumer	217,343.77	2,500.44	1.15
Sector 23 Construction	185,179.21	4,460.79	2.41
Sector 31–33 Manufacturing industries	3,193,797.39	117,274.57	3.67
Sector 43 Wholesale trade	877,495.02	23,111.51	2.63
Sector 46 Retail trade	1,255,312.84	41,110.57	3.27
Sector 48–49 Transport, mail, and storage	356,582.20	16,756.95	4.70
Sector 51 Information in mass media	196,268.58	4,593.17	2.34
Sector 52 Financial and insurance services	862,021.02	924.65	0.11
Sector 53 Real estate services and rental of movable and intangible assets	112,452.29	1,539.93	1.37
Sector 54 Professional, scientific, and technical services	182,806.47	2,238.88	1.22
Sector 55 Corporate	401,484.62	1,571.31	0.39
Sector 56 Business support services and waste management, and remediation services	465,586.85	7,085.79	1.52
Sector 61 Educational Services	136,594.10	3,893.00	2.85

Table 3.3 (continued)

Economic activity	National 2018 (MDP)	Region 2018 (MDP)	The portion of regional GCAV regarding national GCAV 2018 (%)
Sector 62 Health and social assistance services	83,652.61	2,278.90	2.72
Sector 71 Cultural and sports entertainment services and other recreational services	51,657.05	558.42	1.08
Sector 72 Temporary accommodation and food and beverage preparation services	300,821.11	6,357.53	2.11
Sector 81 Other services except for government activities	140,466.20	4,631.89	3.30
Total	9,983,800.26	275,776.66	2.76

related to the transformation industry, the manufacture of transport and the manufacture of computer equipment, communication, measurement, and other equipment, the most frequent. Another 13.04% was in the retail trade sector, where the most frequent activity or class was retail trade in self-service and department stores. Similarly, the transport, mail, and storage sector obtained a 13.04% share. Temporary accommodation and food and beverage preparation services obtained a share within these promising products of 8.69%. Lastly, both the business support and waste management services sector and remediation services (4.34%), as well as the educational services sector (4.34%) and other services except government activities (4.34%), each of them obtained the same value.

3.3.3 Stage 3—Identifying the Most Relevant Clusters in Tamaulipas During 2018

Table 3.10 identifies the eleven most relevant clusters in the region where the automotive and the logistic clusters are the most relevant for Tamaulipas.

Table 3.4 GCAV growth rate (2013–2018)

Economic activity	Region 2013 (MDP)	Region 2018 (MDP)	Growth rate (%)
Sector 11 Agriculture, animal husbandry and exploitation, forest approval, fishing, and hunting	269.65	871.53	223.21
Sector 21 Mining	–	34,016.82	–
Sector 22 Generation, transmission, distribution and commercialization of electrical energy, supply of water and natural gas through pipelines to the final consumer	2,386.39	2,500.44	4.78
Sector 23 Construction	3,159.99	4,460.79	41.16
Sector 31–33 Manufacturing industries	68,751.31	117,274.57	70.58
Sector 43 Wholesale trade	9,204.04	23,111.51	151.10
Sector 46 Retail trade	18,105.05	41,110.57	127.07
Sector 48–49 Transport, mail, and storage	10,631.65	16,756.95	57.61
Sector 51 Information in mass media	1,435.73	4,593.17	219.92
Sector 52 Financial and insurance services	910.52	924.65	1.55
Sector 53 Real estate services and rental of movable and intangible assets	847.74	1,539.93	81.65
Sector 54 Professional, scientific, and technical services	1,215.78	2,238.88	84.15
Sector 55 Corporate		1,571.31	
Sector 56 Business support services and waste management, and remediation services	3,932.16	7,085.79	80.20
Sector 61 Educational Services	3,357.53	3,893.00	15.95
Sector 62 Health and social assistance services	1,362.95	2,278.90	67.20
Sector 71 Cultural and sports entertainment services and other recreational services	519.52	558.42	7.49
Sector 72 Temporary accommodation and food and beverage preparation services	3,581.48	6,357.53	77.51

(continued)

Table 3.4 (continued)

Economic activity	Region 2013 (MDP)	Region 2018 (MDP)	Growth rate (%)
Sector 81 Other services except for government activities	3,042.42	4,631.89	52.24
Total	163,387.95	275,776.66	68.79

Table 3.5 Importance of the sectors in the region

Economic activity	Contribution to the region in 2018 (%)	ranking
Sector 31–33 Manufacturing industries	42.53	1
Sector 46 Retail trade	14.91	2
Sector 21 Mining	12.33	3
Sector 43 Wholesale trade	8.38	4
Sector 48–49 Transport, mail, and storage	6.08	5
Sector 56 Business support services and waste management, and remediation services	2.57	6
Sector 72 Temporary accommodation and food and beverage preparation services	2.31	7
Sector 81 Other services except for government activities	1.68	8
Sector 51 Information in mass media	1.67	9
Sector 23 Construction	1.62	10
Sector 61 Educational Services	1.41	11
Sector 22 Generation, transmission, distribution and commercialization of electrical energy, supply of water and natural gas through pipelines to the final consumer	0.91	12
Sector 62 Health and social assistance services	0.83	13
Sector 54 Professional, scientific, and technical services	0.81	14
Sector 55 Corporate	0.57	15
Sector 53 Real estate services and rental of movable and intangible assets	0.56	16
Sector 52 Financial and insurance services	0.34	17
Sector 11 Agriculture, animal husbandry and exploitation, forest approval, fishing, and hunting	0.32	18
Sector 71 Cultural and sports entertainment services and other recreational services	0.20	19

Table 3.6 Motor products class in 2018

Class	Product
312,111	Manufacture of soft drinks and other non-alcoholic beverages
322,210	Manufacture of cardboard packaging
325,180	Manufacture of other basic inorganic chemicals
325,190	Manufacture of other basic organic chemicals
326,110	Manufacture of flexible plastic bags and films
332,810	Metallic coatings and finishes
333,411	Manufacture of air conditioning and heating equipment
334,310	Manufacture of audio and video equipment
334,410	Manufacture of electronic components
335,311	Manufacture of electric motors and generators
336,320	Manufacture of electrical and electronic equipment and its parts for motor vehicles
336,360	Manufacture of seats and interior accessories for motor vehicles
336,390	Manufacture of other parts for automotive vehicles
461,110	Retail trade in grocery, grocery, and miscellaneous stores
462,111	Retail trade in supermarkets
462,112	Retail trade in mini supermarket
468,411	Retail sale of gasoline and diesel
484,129	Other foreign general cargo transport
488,511	Customs agency services
488,519	Other brokerage services for freight transport
517,311	Wired telecommunications service operators
561,330	Supply of permanent staff
611,171	Private-sector schools that combine various levels of education
611,311	Private sector colleges
722,511	Restaurants with food preparation service a la carte or fast food
722,514	Restaurants with service of preparation of tacos and tortas
811,111	General mechanical repair of cars and trucks
812,110	Beauty salons, clinics, and hairdressers

3.4 Conclusions

In this chapter, we propose a four steps methodological approach to identify the potentialities and opportunities of regional productive sectors to create industrial clusters and high-value supply chains. As a case study, the State of Tamaulipas (in Mexico) and its municipalities were considered as the region and subregions of analysis, respectively. The diagnostic of its economic structure reveals that the subregions with the largest number of industries are on the border with the United States. The productive sectors with the greater economical participation regarding the

Table 3.7 Star products class in 2018

Class	Product
114,111	Shrimp fishing
114,119	Fishing and capture of other fish, crustaceans, mollusks, and other species
236,111	Single-family home construction
237,121	Construction of oil and gas distribution systems
238,221	Hydro-sanitary and gas installations
238,222	Installations of central air conditioning and heating systems
311,710	Preparation and packaging of fish and shellfish
311,830	Preparation of corn tortillas and grinding of nixtamal
312,111	Manufacture of soft drinks and other non-alcoholic beverages
315,223	Mass production of uniforms
315,229	Mass production of other outerwear of textile materials
316,999	Manufacture of other leather products, fur, and substitute materials
321,920	Manufacture of products for packaging and wooden containers
321,992	Manufacture of wooden articles and utensils for the home
322,210	Manufacture of cardboard containers
323,111	Printing of books, newspapers, and magazines
323,119	Printing of continuous forms and other forms
326,110	Manufacture of flexible plastic bags and films
326,193	Manufacture of plastic packages and containers for packaging with and without reinforcement
326,212	Tire revitalization
326,290	Manufacture of other rubber products
327,112	Manufacture of bathroom furniture
327,219	Manufacture of other glass products
327,330	Manufacture of pipes and cement and concrete blocks
334,220	Manufacture of transmission and reception equipment for radio and television signals and wireless communication equipment
334,310	Manufacture of audio and video equipment
335,311	Manufacture of electric motors and generators
336,330	Manufacture of parts for steering and suspension systems for automotive vehicles
336,370	Manufacture of die-cast metal parts for automotive vehicles
336,390	Manufacture of other parts for automotive vehicles
464,122	Retail sale of orthopedic articles
468,212	Retail trade of used parts and spare parts for cars, vans, and trucks
484,129	Other foreign general cargo transport
486,210	Transportation of natural gas through pipelines
488,511	Customs agency services

Table 3.7 (continued)

Class	Product
523,122	Exchange centers
531,119	Rental without the intermediation of other real estates
611,141	Private-sector technical secondary schools

Table 3.8 Leading products class in 2018

Class	Product
325,180	Manufacture of other basic inorganic chemicals
333,411	Manufacture of air conditioning and heating equipment
333,999	Manufacture of other machinery and equipment for industry in general
334,310	Manufacture of audio and video equipment
334,410	Manufacture of electronic components
334,519	Manufacture of another measurement, control, navigation instruments and electronic medical equipment
335,220	Manufacture of white goods
336,320	Manufacture of electrical and electronic equipment and its parts for motor vehicles
336,330	Manufacture of parts for steering and suspension systems for automotive vehicles
336,350	Manufacture of parts of transmission systems for motor vehicles
336,360	Manufacture of seats and interior accessories for motor vehicles
336,390	Manufacture of other parts for automotive vehicles
337,920	Manufacture of blinds and curtain rods
339,111	Manufacture of non-electronic equipment for medical, dental and laboratory use
462,111	Retail trade in supermarkets
462,112	Retail trade in mini supermarket
466,111	Retail trade of home furnishings
466,212	Retail sale of telephones and other communication devices
468,111	Retail of new cars and trucks
468,211	Retail trade of new parts and spare parts for cars, vans, and trucks
468,411	Retail sale of gasoline and diesel
484,129	Other foreign general cargo transport
484,239	Other specialized foreign freight transport
488,519	Other brokerage services for freight transport
561,110	Business administration services
561,330	Supply of permanent staff
561,620	Protection and custody services through the monitoring of security systems
611,311	Private sector colleges
722,511	Restaurants with food preparation service a la carte or fast food
722,514	Restaurants with service of preparation of tacos and tortas
812,110	Beauty salons, clinics, and hairdressers

Table 3.9 The most promising products class in 2018

Class	Product	MPC	SPC	LPC	Promising
334,310	Manufacture of audio and video equipment	1	1	1	✓
336,390	Manufacture of other parts for automotive vehicles	1	1	1	✓
484,129	Other foreign general cargo transport	1	1	1	✓
312,111	Manufacture of soft drinks and other non-alcoholic beverages	1	1		✓
322,210	Manufacture of cardboard containers	1	1		✓
325,180	Manufacture of other basic inorganic chemicals	1		1	✓
326,110	Manufacture of flexible plastic bags and films	1	1		✓
333,411	Manufacture of air conditioning and heating equipment	1		1	✓
334,410	Manufacture of electronic components	1		1	✓
335,311	Manufacture of electric motors and generators	1	1		✓
336,320	Manufacture of electrical and electronic equipment and its parts for motor vehicles	1		1	✓
336,330	Manufacture of parts for steering and suspension systems for automotive vehicles		1	1	✓
336,360	Manufacture of seats and interior accessories for motor vehicles	1		1	✓
462,111	Retail trade in supermarkets	1		1	✓
462,112	Retail trade in mini supermarket	1		1	✓
468,411	Retail sale of gasoline and diesel	1		1	✓
488,511	Customs agency services	1	1		✓
488,519	Other brokerage services for freight transport	1		1	✓
561,330	Supply of permanent staff	1		1	✓
611,311	Private sector colleges	1		1	✓
722,511	Restaurants with food preparation service a la carte or fast food	1		1	✓
722,514	Restaurants with service of preparation of tacos and tortas	1		1	✓
812,110	Beauty salons, clinics, and hairdressers	1		1	✓

national values are Sector 11 (Agriculture, animal husbandry and exploitation, forest approval, fishing, and hunting) and Sector 48–49 (Transport, mail, and storage). The sectors with the greater growth rate (2013–2018) were Sector 11 (Agriculture, animal husbandry and exploitation, forest approval, fishing, and hunting) and Sector 51 (Information in mass media). While the productive sectors with the greater economic value added in 2018 were Sector 31–33 (Manufacturing industries) and Sector 46 (Retail trade).

When quantifying the potential of regional productive sectors, twenty-eight products were identified to contribute the most to regional production and employment.

Table 3.10 The most promising clusters in the region

Cluster	Products
Automotive	336,320 Manufacture of electrical and electronic equipment and its parts for motor vehicles
	336,330 Manufacture of parts for steering and suspension systems for automotive vehicles
	336,360 Manufacture of seats and interior accessories for motor vehicles
	336,390 Manufacture of other parts for automotive vehicles
Logistics	488,511 Customs agency services
	488,519 Other brokerage services for freight transport
	484,129 Other foreign general cargo transport
Information technology and analytical instrumentation	334,310 Manufacture of audio and video equipment
	334,410 Manufacture of electronic components
Technology for production and heavy machinery	333,411 Manufacture of air conditioning and heating equipment
Food preparation and processing	312,111 Manufacture of soft drinks and other non-alcoholic beverages
Paper and packaging	322,210 Manufacture of cardboard containers
Chemical processing	325,180 Manufacture of other basic inorganic chemicals
Plastics	326,110 Manufacture of flexible plastic bags and films
Lighting and electrical equipment	335,311 Manufacture of electric motors and generators
Business support service	561,330 Supply of permanent staff
Education and talent development	611,311 Private sector colleges

Thirty-eight products were identified to exhibit the greatest possibility of creating production chains, as these products demonstrate a greater level of specialization and dynamism in the region. And thirty-one products were identified as the most competitive products in the region.

The previous analysis identified eleven clusters as the most relevant in the region: where the automotive and the logistic clusters exhibit the larger number of promising products.

As further research, the criteria related to regional development priorities, values, and goals will be identified through an unstructured interview with the main actors of the region's industrial, economic, and social sectors. These criteria will be analyzed using the Fuzzy Analytical Hierarchical Process (Fuzzy AHP) and other multicriteria decision-making methods.

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