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Economic polarization of the Hidalgo Territory. An approach from the *concept of space*

Polarización económica en el territorio Hidalguense. Una aproximación a partir del concepto espacio

Maximiliano Gracia Hernández [a]

Abstract

When economic science is reflected, space is a fundamental element for its study, and is that it plays a key role in the development of economic activities. Each economy has a spatial dimension and production factors operate through space. Economic operators determine their localization decisions and this can largely determine the development of a region. Using economic indicators at municipal level is a nearly impossible task. INEGI (National Institute of Statistics and Geography) does not offer statistics on municipal GDP in Hidalgo. With calculated estimates and data for all municipalities in Hidalgo, showed the existing polarization among them, the gap between the richest and the poorest municipalities was 330 times.

Keywords:

Economic Polarization, Municipal GDP, Economic Development.

Resumen

En la ciencia económica el espacio es un elemento fundamental para su estudio, y es que desempeña un papel clave en el desarrollo de las actividades económicas. Cada economía tiene una dimensión espacial y los factores de producción operan a través del espacio. Los operadores económicos determinan sus decisiones de localización y esto puede determinar en gran medida el desarrollo de una región. Usar indicadores económicos a nivel municipal es una tarea casi imposible. El INEGI (Instituto Nacional de Estadística y Geografía) no ofrece estadísticas sobre el PIB municipal en Hidalgo. Con estimaciones y datos calculados para todos los municipios de Hidalgo, esta investigación mostró la polarización existente entre ellos, la brecha entre los municipios más ricos y los más pobres fue de 330 veces.

Palabras claves

Polarización económica, PIB Municipal, Desarrollo económico

Introduction

Space is the representation of reality in a region, it has different characteristics: it is physical, geographical and has heterogeneity of physical, geographical, spatial and economic resources. It is precisely from these dimensions that we approach this work, as the natural space, accompanied by historical, economic, geographical and effective and efficient public policy conditions, led to birth, development and consolidation of developed regions, with the creation of infrastructure, jobs and investment; in contrast to spaces lacking development and economic growth.

We consider that space is fundamental in the determination of industrial location, first so it is offered naturally and, secondly, so in space it is able to build and elaborate through the hand of man.

Based on the theoretical part of space and territory, this research addresses as a subject of study the Hidalgo state economy, which is characterized by having an unequal distribution of resources, whether natural or man-made. This has generated developed or underdeveloped territories, emigration or immigration, development or underdevelopment.

[1] Colegio del Estado de Hidalgo, profesor investigador. Correspondence with the author, https://orcid.org/0000-0003-3174-8006 , Email maximiliano@elcolegiodehidalgo.edu.mx, graciamaximiliano@hotmail.com

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Under the above scenario it is as Hidalgo shows marked differences in its regional development. It has a northern area with poverty, marginalization and lack of infrastructure, whose job creation is insufficient, opportunities lack and presents a population without quality public services. The northern part of the state has unstable municipalities that have difficulty understanding their problems and solving them, to rebuild them and to plan their territories; however, even with its shortcomings, this area has great potentials that must be exploited to improve the quality of life of its inhabitants.

In contrast to the above, we find a southern area in which most of its municipalities have quality services, infrastructure, job creation, access to health and education; in general, the southern territory of the state has a higher human development rate than that observed in the northern area of Hidalgo.

Historically, it has been shown that the existence of physical and human resources to achieve levels of economic growth is not sufficient, but also the technological level generated through applied science is essential. Physical resources require the use of technology to generate high levels of income, because what would be the role of productive force if there are no conditions to generate production? This shows the importance of this work, which joins the theoretical part of space and territory with the regional development of Hidalgo.

In this way, the study aims to link space with the unequal distribution of economic resources in Hidalgo state, since the characteristics of the space are a fundamental part of determining industrial location and development economics in a given region.

The work is structured as follows. The first part reflects on the concepts of *space* and *territory* as fundamental elements of industrial localization. The second section presents some comparative data between the north and south part of the state: roads, road network, state relief, industrial parks and public budget by municipality. In the third section, an interpretation of the Hidalgo economy is made from economic variables, among which are: economic units, occupied personnel and total gross production.

The initial concern to carry out the work was to determine the causes existing in municipal and regional polarization within the State of Hidalgo, which was linked to the spatial characteristics of the territory, a phenomenon observed empirically, but without the existence of indicators that allow us to check what happens there and the level of polarization. Therefore, this investigation obtained original indicators of the Municipal GDP of Hidalgo, information that is not officially available in INEGI, so based in Unikel, L. (1978), we gave ourselves the task of obtaining and analyzing; the results shown here represent an original contribution of the research to the economic knowledge of the Hidalgo state [1]

Space and territory, fundamental elements of industrial location

Space

Since the 18th century, the epistemology of the economy had already perceived concern for spatial analysis, as well as the relationship between the countryside and the city, the loc.

The theories of localization, the fundamental element of which is space, are reflected in von Thünen's analyses with its localization model; in the theory of the central place, with Walter Christaller; in the industrial location of Alfred Weber; in the theory of the development poles of Francois Perroux, and in other authors such as Cantillon and Petty, who studied unequal development in the regions.

Location and space are fundamental elements in the analysis of industrial theory and economic development. Space represents the foundation of all productive activity, and is that it has physical characteristics to use in a particular activity.

Space is a variable that has different dimensions, in it there are social interactions and the workforce is linked to capital. This relationship is part of a productive system in which we consider human, physical, technical and financial resources as elements with which we can detect the productive capacity of the region and its relationship between them; we define the development of their productive forces and, therefore, the economic system generated in each territory.

Each space is intended for a single use based on the potentials it possesses, but can be changed if society influences it through the use of greater production factors and new technologies.

Every economic activity requires physical space, so we consider it as support in itself; in it we can observe which physical elements of it can be used, modified or excluded, and that is that each space itself generates a type of function, determining the relationship between man and nature. The soil is necessarily linked to space and space from an economic approach is very close to the physical resources it provides us.

The agricultural sector uses space with large tracts of land as a factor of production extensively, compared to the other two economic sectors: industrial and services. In addition, the workforce in pauperized regions is carried out with tools of poor technological development. This determines the

improvement in productivity and is amplified by adding to this the effect of climate factors to generate the production process. In contrast to the above, the industry uses the workforce intensively, when combined with high technology; it achieves high productivity in relatively small spaces. Depending on the type of economic sector, a larger or lesser amount of physical space is used.

When we address the space issue, that is, the cost-benefit analysis of the location, we wonder why economic entities decide to locate themselves closer to the market and/or inputs; the answer above determines how dispersed or concentrated an economic activity is within a region. Hence the problem of space as an economic phenomenon, which represents the principle of agglomeration and industrial localization.

The discussion of industrial location has been framed in different notions of space: economic, social and functional, in which different sciences are inserted among which stand out: economics, geography, sociology, mathematics, etc.; however, the relationship between economics and space addresses different relationships that integrate the regional dimension with economic science. Space economics is not a theory, but it does generate explanations that serve other disciplines of knowledge for its integral reflection [2].

Economic activities are spatially concentrated; represent the first elements in space economic studies that try to explain why companies are concentrated in certain spaces. However, the space economy interprets the structures of concentrations, as the characteristics of the space in which concentration, urban relations, the centrality of economic activities are inserted and generally interprets in the structures of the space economic system are fully and fully complete. The location of the productive sector affects the space environment, demands inputs, natural resources and labor. A space is properly articulated based on all the productive activities generated in it, the production processes located in the space determine the transformations of the territory, thus generating a type of economic development Specific.

Companies, when determining their location, consider space as an implicit value element, because to determine the geographic location of a company, the various resources in the space are verified. Companies consider profit-maximizing behavior, the determination of maximization is cost-based,-which depend on the distance between sellers and buyers, and this, based on the externalities given the location Geographical

The development of the pauperized regions can be reversed with the use of technological innovation, with it generating a new relationship with space that has a positive effect for those who live in it. Technology allows us to more precisely appropriate the space, influence it and impose our conditions as human beings. The use of new technologies transforms productive spaces and generates a spatial division of production, which modifies and creates regional development.

In regions where spaces with a high economic level are generated naturally or artificially, there is a process of attracting labor force, surrounding industries and new investments (southern region of the state); by contrast, the regions in which conditions of economic growth and development are not generated, there is a process of expulsion of labor and a greater lack of opportunities. Under the above schema, the migration phenomenon is generated. The workforce feeds the productive system, an immigrant represents for the productive sectors and for the whole of the labor force economy, with an economic cost of creation and training equal to zero; immigrants give more than they receive. For its part, the underdeveloped region expelled from labor and human capital loses the investment generated in the creation of this capital that migrates to another economy. As a result the ejector space is transformed more slowly than the receiving space of workforce; it is a spiral in favor of the developed area.

Territory

The concept of territory is a means and not an end in itself. "The territory is the appropriate and valued space —symbolic and/or instrumentally— by human groups" (Giménez, 2000). The territory is the result of appropriating space through the use of production factors. Space gives us the elements of the physical and economic environment; it is the basis for answering key economic questions: what, how? and who to produce for?. [3]

Historically, rich and poor territories have had to generate a spatial mobilization, thereby gestating and concreted the production process, which must have all the resources to carry out the production process. When a territory manages to develop its productive forces and the production factors inserted in it, immigration is generated, if it has technological advances the relationship multiplies.

The economic sectors established in a territory have an effect on it, thus generating a spatial articulation and a specialization of the territory. A territory has a function based on its resources; they determine the activity within the space, which becomes a means of production from which the physical factors contained in the territory are exploited.

In today's economic context, capitals are heading towards those more dynamic territories. Under that scenario, big cities are more striking than precarious regions. R&D and information are fundamental factors; winning territories are the result of territorial dynamics, which are fueled by the development of transport, telecommunications, energy, and human capital.

Investment flows are directed towards regions with the largest services and infrastructure and to urban areas, under this logic the regions are not homogenized, but reinforce their polarization, and that is that the investment seeks to be located in regions where infrastructure exists or, in those better located, centralization reinforces itself.

Polarization between the southern and northern region of Hidalgo State

Road connectivity

As seen in map 1 much of the road network is located in the southern part of the state. Quota, federal and state roads are located in the reference region; in the north, only two sections of the free federal network and a couple of sections of the free state network are located in the north.

There is a strong polarization between the north and south of the state of Hidalgo. The insufficient network of communication routes in the north has a negative effect on the economy for the attraction of productive capital and investment, which leads to a lack in the generation and creation of jobs. Little connectivity means little economic growth. *(Look Map 1)*

State relief

The northern area of Hidalgo is characterized by having mountainous areas difficult to access, as we already argue, the infrastructure road is scarce and is in poor condition, this represents a risk for those who want to invest there. In that scenario, the State of Hidalgo is characterized by having, as map 2 shows, a relatively flat southern space, in contrast, the space of the northern area shows mostly a bumpy topography, which makes it more complex to make decisions of investment, if we add to this the lack of infrastructure and geographical location, which is far from the state's main distribution and marketing region, the economic situation is complicated and remains polarized. *(Look Map 2)*

Industrial parks

Hidalgo has thirteen industrial and/or technological parks in operation and two in process, the ones enabled are: Atitalaquia Industrial Park; Tizayuca Industrial Park; Tula Industrial Park – Atitalaquia; La Reforma Industrial Park; Tepeji del Río de Ocampo Industrial Park, Sahagún–Tepeapulco Industrial Park; Metropolitano Industrial Park; Sahagún A.C. Industrial Park; Hidalgo Logistics Activities Area; Tizayuca Logistics Park; Platah Industrial Park; Huejutla Siglo XXI Industrial Park and Canacintra Industrial Park. The parks in process are: Bicentenario/QUMA Industrial Park and El Manantial Industrial Fractionation.

Of the parks that are in operation, only the Huejulta Siglo XXI Industrial Park is located in the northern part of the state; the rest is located in the south and, of those that are in process, none of them were installed in the northern part of the state. The development of industrial zones and parks are fundamental to economic growth, and it is that in the face of the lack of infrastructure for productive investment, the result is migration, poverty and social marginalization. *(Look Map 3)*

Public budget by municipality.

Based on data from the Secretary of Finance of the government of the state of Hidalgo, a financial year was made with the budget of each municipality according to its location in the north or south region. Each of the assigned municipal budgets was added and divided among the total municipalities located in each territory. For municipalities located in the north, the average annual public budget allocated to each municipality amounted to 44 million pesos during the 2016 financial year. In the case of municipalities located in the south, the average in the allocated public budget amounted to 32 million pesos during the same period indicated.

If the exercise is carried out with the municipal population, the result is similar, in the municipalities located in the north of the state there are 1,916 pesos per capita as a budget per capita average, in contrast, in the southern area there are 862 pesos per capita as budget average per capita.

The Hidalgo Economy. Interpretation from economic variables

In the state of Hidalgo there are territories with a strong agglomeration of people, industries and capitals. By contrast, there are also pauperized regions resulting from neglect and low investment. These elements will be addressed in this part of the investigation.

The state of Hidalgo has a privileged geographical position, is located in the center of the country, near the main consumer market (map 4): Mexico City, is link between the center and the south, east and west; it also has large natural resources, however, economic data show a state with little participation in the national economy, as well as polarized within its territories. *(Look Map 4)*

The most recent data show that the state of Hidalgo participates with 2.2 percent of the wealth generated in the Mexican economy, a fact that contrasts whether we consider its geographical location and the existence of large natural resources.

Hidalgo's economy is mainly based on the services sector, this sector occupies 50% within the sectoral structure of the state, private non-financial sectors participate with 36.7%; manufacturing industry is 12 per cent, and the rest of the sectors with 1.3 per cent.

We use for this study three fundamental variables of the economy of Hidalgo, which are: economic units, occupied personnel and total gross production. In this section we carry out a review of the three variables indicated in the 84 municipalities of the state.

Economic units

In today's economic context, capitals are heading towards the most dynamic regions. In this scenario large cities are more important than precarious regions. R&D and information are fundamental factors, winning territories are the result of territorial dynamics, which are fueled by the development of transport, telecommunications, energy, and human capital.

Investment flows are directed towards territories with the greatest services and infrastructure, particularly to urban areas. Under this logic, regions are not homogenized, but reinforce their polarization, given the focus of investment in regions where there is infrastructure or, in those better localized.

The state of Hidalgo has 119,128 economic units, which are located polarized among the 84 municipalities of the state: only in seven municipalities are located 49 percent of the total economic units, the rest of the municipalities have 51 percent.

The most important municipalities by economic units are Pachuca de Soto, with 17,632; Huejutla de Reyes 4,520; Ixmiquilpan 4,450; Mineral de la Reforma 4,537; Tizayuca 4220; Tula de Allende 4,872 and Tulancingo de Bravo 8,871. Two municipalities have 27 percent of the total state establishments [4]

In contrast to the above, there are municipalities with a very low participation in economic units, it is the case of Pacula, municipality with only 35 units; Tlahuiltepa with 40 units, and Xochicoatlán with 49 units.

We emphasize that, with the exception of Huejutla de Reyes, the rest of the main municipalities with the highest number of economic units are located in the southern part of the state. It can therefore be said that Hidalgo needs reforms that allow it to bring companies and industries to the northern part of the state, which needs to attract economic units to generate jobs, sources of income and combat strong migration in many municipalities of that Territory.

Employed Personnel. Polarization between north and south

Man must produce his means of reproduction and develop his productive capacities to generate goods and services beyond his own basic needs, thereby generating rich territories, in achieving it, man generates free time for his recreation and for the accumulation of wealth.

The state generates 353,978 jobs, which are distributed in polarized form, 10 municipalities absorb 69.3 percent of the jobs generated in the state, the reference municipalities are Pachuca de Soto (78,377); Tulancingo de Bravo (29,041); Chalizayuca (25,315); Tula de Allende (22,668); Mineral de la Reforma (17,575); Tepeapulco (16,941); Tepeji del Río (17,818); Atitalaquia (15,276); Huejutla de Reyes (11,474) and Ixmiquilpan (10,888). All the designated municipalities, with the exception of Huejutla and Ixmiquilpan, are located in the southern part of the state [5]

As we noted in the previous section, the existence of economic units in municipalities affects the creation of jobs. Those municipalities with a shortage of economic units have, as a result, a low creation of sources of labor and income, is the case of Huazalingo, a municipality that generates only 88

jobs; Tlahuitelpa, only 64 jobs; Juárez Hidalgo 112 jobs, and Pacula 116 jobs; the above data contrasts with the 78,377 jobs generated in Pachuca de Soto.

Municipal Wealth Polarization

There are no economic indicators to verify the amount produced in a territory (municipal GDP), which is essential for determining the elements linked to the location and the relationship generated between territory and production. Therefore, the fundamental contribution of this research was to generate the information of the municipal GDP and analyze it within this section.

To obtain the disaggregated data at the municipal level, this research starts from Unikel et. (1976), the methodology states that under the assumptions of a municipal occupied staff index and under a consistent series of data panel by municipalities, the state gross census value can be interpolated, with the aim of separating the component from the municipal participation within the state. Based on the above, the data series panel will have an efficient estimator of municipal GDP[1].

We work under the assumption that the average and marginal product of the work is constant, and that the aggregate production function is of type Leontief; The results allow us to affirm the efficiency of the estimates generated in this research, and that is that by obtaining the sum of the municipal wealth of each of the 84 municipalities of the state, it approaches almost exactly the data of Hidalgo's GDP calculated by INEGI for 2013 and published in the economic censuses of 2014.

Formula 1 was used to achieve the goal:

$$1)\ \text{PIBM} = \left(\sum \frac{POij}{POEi} VABEi \right) + IPNj$$

Where, POij-population occupied by economic activity and municipality; PoEi-population occupied by economic activity; VABEi-state gross value added by economic activity; PIBijo gross domestic product by economic activity and municipality; IPNi-taxes on net products by economic activity. i. 1,2,3,4, . . . n (Economic Activity Sector). j. 1,2,3,4, . . . n (municipality number).

Based on the methodology used, the strong presence of a single municipality, Atitalaquia, which produced 64 percent of the state's total production, far exceeds the second municipality by wealth generation, this is a result of the type of industry installed in Atitalaquia. This industry was installed in that municipality due to the strategic geographical location, excellent connectivity and proximity to the Tula refinery, coupled with public investment to attract companies with the start-up of its industrial park.

The second municipality by wealth generation is Pachuca de Soto and, thirdly, Tepeji del Río is located. In contrast to the above, municipalities with a very low participation in wealth generation are detected, it is the case of Eloxochitlan, a municipality generating 2,196 million pesos; Huazalingo generates 2.350 million pesos; La Misión generated 5,371 million pesos; Yahualica generated 7.137 million pesos. They are municipalities that, as we note, in addition to having a low share in the generation of wealth, have a very low offer in job creation and number of economic units established there.

When considering Gross Domestic Product (GDP) by municipalities in the state of Hidalgo (map 5), we realized the strong polarization in wealth generation, by adding up the production of the three main municipalities by contribution to GDP, we found that they produce the same wealth as that produced by the remaining 81 municipalities. Pachuca de Soto, Tula and Atitalaquia contributed to state GDP 49.9% of the total wealth generated in the state of Hidalgo, in turn the remaining 81 municipalities generated only 51.1%.[4]

The municipality of Pachuca de Soto contributes to the wealth of the entity more than would contribute the sum of 75 municipalities of the state (eliminating the first nine, including Pachuca de Soto). *(Look Map 5)*

If we consider the municipal GDP per capita, (Figure 1), there is a strong polarization among the 84 municipalities of the state, the following municipalities with the highest GDP per capita per year are: Zapotlán, Pachuca, Actopan, Atitalaquia, Tepeji del Río, Progreso, Santiago, Reformation Mineral, Bravo Tulancingo

The question is: what do the municipalities mentioned above have in particular? First, they are entities with a high participation of the secondary and tertiary sector, none of them bases their economy on the primary sector. Second, all of them (with the exception of Ixmiquilpan) are located in the southern part of the state. Third, Atitalaquia, Tizayuca,

Ixmiquilpan and Mineral de la Reforma showed high annual average growth rates.

In contrast to the above, the municipalities with the lowest GDP per capita within the state are: Lolotla, Juárez Hidalgo, Tianguistengo, Tlahuiltepa, Xochiatipan, Metztitlan, Yahualica, San Felipe Orizatlán, Chilcuautla and Huazalingo. The characteristic of the reference municipalities is that, first, their economic base is in the primary sector; second, all (with the exception of Chilcuautla) are located in the northern part of the state. *(Look Figure 1)*

The state of Hidalgo requires more balanced regional development, the greater the polarity between regions, the more difficult it will achieve development and economic growth; on the other hand, the higher the number of municipalities that reach higher levels of development, social welfare will be guaranteed.

Final reflections

The concept of space in economic science and the location of production factors are decisive in the analysis of the agglomeration or concentration of companies in a given territory.

With space economics, explanations are generated that would not be generated under other thematic lines; on the other hand, the concepts of space and territory allowed us to understand and explain the economic success or failure of regions and cities on Hidalgo.

Polarization is very marked in the state of Hidalgo, the southern part has the characteristic of high development, companies, services and infrastructure; by contrast, the northern part is characterized by being an underdeveloped region, with high levels of poverty and marginalization, lack of services, businesses and jobs.

For the municipalities of the state there are two asymmetrical scenarios, on the one hand, there are the municipalities with the highest level of economic growth: Pachuca, Tula, Tepeji, Atitalaquia, Huichapan and Ixmiquilpan; in contrast, the rest of the state's municipalities are largely deprived, little or no economic growth and unable to join the national economy. The result is a dichotomy between rich and poor municipalities, between north and south.

In the new global economic context, we must look to the local; regional development must adopt new modalities, in particular attract investment and strengthen systemic competitiveness. In particular, the northern part of Hidalgo state needs to strengthen its industrial sector through the creation of companies. On the other hand, in the south the problem faced by small and medium-sized entrepreneurs is the existence of imperfections in the value chain, which makes it impossible to generate economies of scale and agglomeration, resulting in devaluation in their production; if we add to this the lack of local industrial structure that absorbs the increasing availability of labour and human capital generated by state universities, we have the inability to take advantage of the market [6]

As Patrick Geddes said, you have to think globally and act locally. Local development strategies should be thought of, because in the current globalization environment countries no longer compete, regions and localities compete, which have potentials that must be exploited. Enhancing the regions and localities involves generating development in which they live there, is a fundamental factor of immobilizing the migration from the countryside to the city, it is an element of development that goes from local to national. Today we cannot keep thinking about the big projects, we need to move from macroeconomic to microeconomic.

Regional development and productive economic transformation are key parts within industrial change. Under this logic, research should contribute to the study of determinants to strengthen and incentivize an industrial cluster in Hidalgo, which allows the change in the production matrix through products and processes more cost and quality efficient, development of new products with higher added value, leadership in export products by taking advantage of the competitive and comparative advantages of the study region, specialization of products and brands by strategic options, internationalization of companies individually and in bulk. Elements that can only be achieved from the formation of industrial clusters and agglomerations of local companies.

A change of the production matrix is required. Linking the university, government and private enterprise, which, from the theoretical and empirical approach, are essential pieces in the creation and development of an industrial cluster. Within it, each of the parties contributes its economic resources, experience and knowledge for its development and consolidation.

State and municipal governments must design policies aimed at improving competitive conditions, promoting companies that have greater economic integration with the state of Hidalgo. Achieving this requires clear and precise knowledge of the competitive advantages of the regions and the companies located in them, coupled with knowledge in the degree of regional integration.

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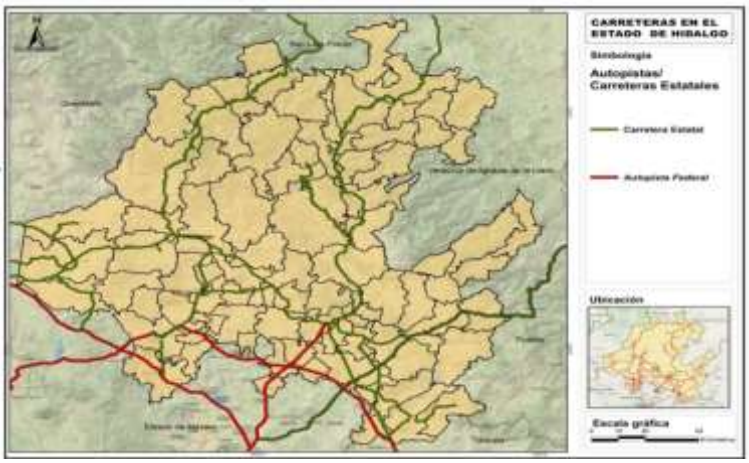
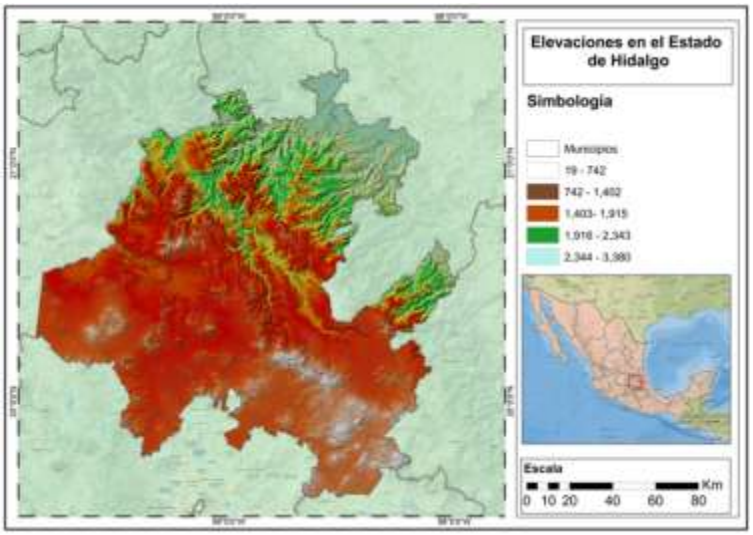
Annex 1

Map 1. Roads in Hidalgo State



Source: Own elaboration based on data from the Secretary of Communications and Transport (2017). General direction of roads. Using the ArcGIS program.

Map 2. Elevations in Hidalgo State



Note: Municipalities with rugged aquamarine topography, intermediate topography in garnet and green and, those with relatively flat topography in coffee and white.

[1] Colegio del Estado de Hidalgo, profesor investigador. Correspondence with the author, https://orcid.org/0000-0003-3174-8006 , Email maximiliano@elcolegiodehidalgo.edu.mx, graciamaximiliano@hotmail.com

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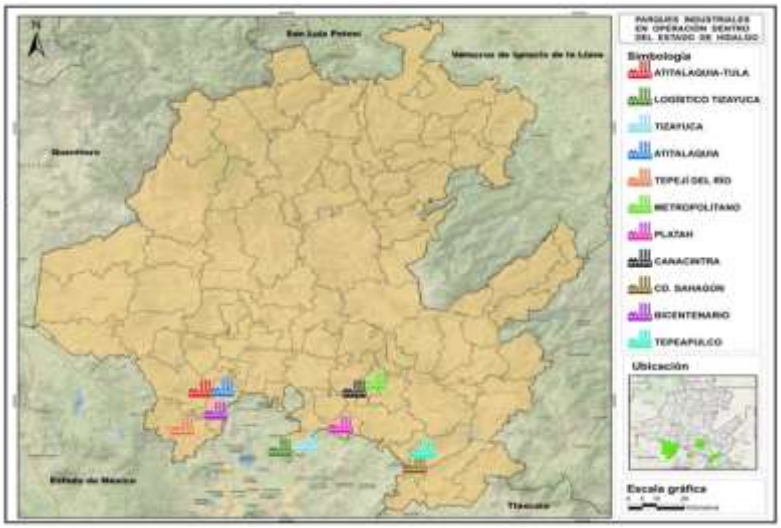
Source: Own elaboration based on INEGI data (2017). Developed with the use of the ArcGIS program.

Map 3. Industrial parks in operation within the State of Hidalgo

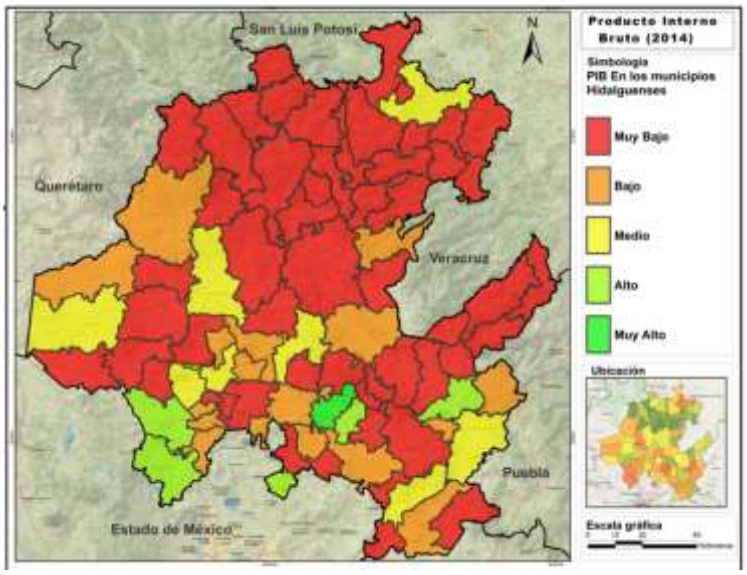


Source: Own elaboration based on Economic and State Information, Secretariat of the Economy (S/F). Developed with the use of the ArcGIS program.

Map 4. Location of Hidalgo state in Mexico

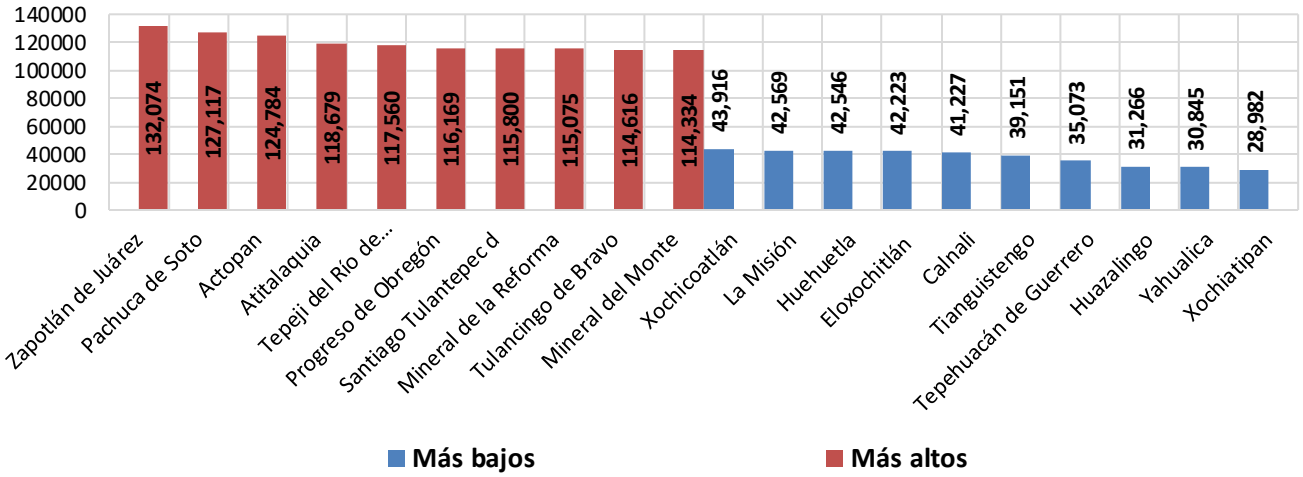
Source: Own elaboration based on Digital Map of Mexico, INEGI (2018). Using the ArcGIS program.

Map 5: Gross Domestic Product in the Hidalguenses Municipalities (2014)



Source: Own elaboration based on own indicators generated from Economic Census, INEGI (2014). Using the ArcGIS program.

Figure 1:
Municipal GDP per cápita in Hidalgo.
(Thousends of pesos)
Municipalities with higher and lower indicator



Source: Own elaboration based on own indicators generated from Economic Census, INEGI (2014)

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