

Evaluation of the competitiveness elements in the operating areas of industrial SMES

Evaluación de los elementos de competitividad en las áreas operativas de PYMES industriales

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Abstract

Systemic Competitiveness is related to the neoclassical theory, which defines the efficient use of production resources and the opportunities to concentrate their products in a market niche (Gil and Torres, 2009). To be competitive, organizations need to align their internal processes, especially in the operations that are daily carried out and are the substantive basis for competition. This research demonstrates the carried out evaluation in the operations functions of small and medium enterprises (SMEs) in the industrial sector in the main cities of Sonora, Mexico. The applied model describes systemic competitiveness, supported by the Economic Commission for Latin America (ECLAC, 1990) under the argument (Suñol, 2006). This methodology describes the required steps for the application of the instrument in the main cities of the state, and thus the objective of evaluating the activities and elements of the micro level that validate systemic competitiveness as indicated by various theoretical models on how to compete for companies. The results describe the evaluation of the elements that contribute to the administrative management in the internal processes and the elements of the administrative management. Finally, the main findings are presented in the conclusion.

Resumen

La competitividad sistémica está relacionada con la teoría neoclásica según Gil y Torres (2009), la cual define el uso eficiente de la asignación de los recursos de la producción y las oportunidades de concentrar sus productos en un nicho de mercado. Las organizaciones para ser competitivas, requieren alinear sus procesos internos, sobre todo en las operaciones que con se llevan diariamente y que son la base sustantiva para competir. En esta investigación se evidencia la evaluación realizada en las funciones operaciones de las pequeñas y medianas empresas (PyMES) en el sector industrial en las principales ciudades de Sonora México. El modelo utilizado fue el que describe a la competitividad sistémica, apoyado por Comisión Económica para América Latina (CEPAL, 1990) bajo el argumento (Suñol, 2006). Esta metodología describe los pasos que se requirieron para la aplicación del instrumento en las ciudades principales del estado, y así el objetivo de evaluar las actividades y elementos del nivel micro que validan la competitividad sistémica como la señalan diversos modelos teóricos sobre la forma de competir por las empresas. Los resultados describen la evaluación de los elementos que contribuyen en la gestión administrativa en los procesos internos y en los elementos de la gestión administrativa. Presentando en la conclusión los hallazgos principales.

Competitiveness, Operational elements, SMES

Competitividad, elementos operativos, PyMES

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Introduction

In order to describe what the concept of competitiveness implies from the point of view of organizations and to be clear about its dimension of what it means to be competitive, Michael Porter (1990) points out that it is necessary to analyze the factors that are required in production, and to understand the economy in which they are developed. Suñol's study (2016) argues that the success of internationally competitive companies is preceded by a prolonged macroeconomic stability in the country of origin; furthermore, it allows the creation of a competitive macroeconomic environment due to "the availability of physical, natural, institutional and human resources, which, when well managed in the long term, are catalysts where companies can compete globally".

In countries with scarce economic resources, it is necessary to take care of their productive processes and invest in the development of the sector where it is produced. Likewise, the theory of competitiveness points out that when describing and studying them, it is evident to assume that governments and the productive sector should be interested in the growth and welfare of each country (Ibarra, Gonzalez and Demuner 2017).

Since the early nineties, the Economic Commission for Latin America (ECLAC), which is mentioned by Hernández (2011) along with other authors, states that "competitiveness is defining the factors that are oriented to the region's productivity in a country and long-term growth, technological evolution and innovation in production processes" to be competitive.

Ibarra, Gonzalez and Demuner (2017), under the systemic competitiveness approach, mention that the organization is also related to business factors that are defined as the situations or activities where the entity has control; moreover, they are located with the grouping of knowledge, strategic actions and internal activities that strengthen technological training in their processes, products, organizational method, human resources and its proper functioning in the administration management (micro aspect of the systemic model).

Figure 1 shows the relationship between the levels of the systemic competitiveness model and its levels in relation to business factors (Medeiros, Goncalves, Camargo, 2019).

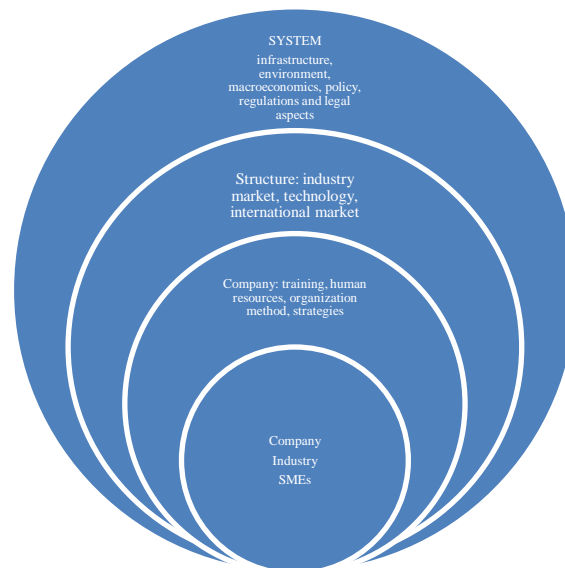


Figure 1 Diagram of competitiveness determinants
 Source: Medeiros, Goncalves, Camargo (2019) on the basis of J. Ferraz, D. Kupfer and L. Haguenaer, made in Brazil: *Competitive Challenges for the industry*, Rio de Janeiro, Campus, 1996

Analyzing and reflecting about the concept of competitiveness, this article describes industrial organizations in the state of Sonora, Mexico, focusing in the main cities: Hermosillo (state capital), Ciudad Obregon, Navojoa, and Nogales. The latter has a number of industrial companies that are located in the main line of businesses of the industry type in Table 1.

Industrial Sector	Size (Large, Medium, Small)
Mining	Medium
Food Industry	Small and Medium
Chemical Industry	Medium and Large
Metal products	Small and Medium
Manufacture of machinery and equipment	Medium and Large
Electronics factory	Medium and Large
Electronics factory	Small and Medium
Communication	Medium and Large
Measuring equipment	Medium and Large

Table 1 Composition of the industrial zone in Sonora Mexico
 Source: According to data from the National Institute of Statistics and Geography (INEGI) and the Ministry of Economy (SE)

Industry is the secondary activity of the state's economy and is composed by the mining, manufacturing, construction, electricity, and food industries as identified in Table 1.

The state of Sonora, according to statistics, reports from the INEGI (2015), shows the following economic participation of the productive sectors. This figure identifies the commerce, industry, service and real estate, and others.

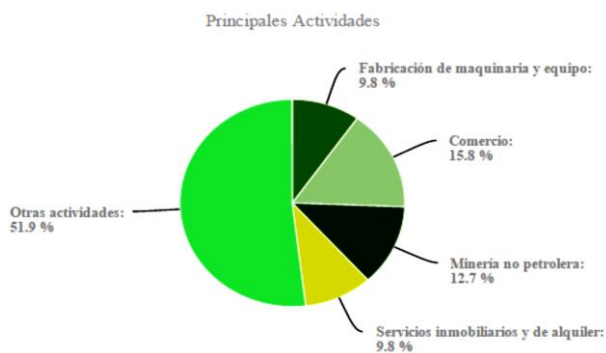


Figure 2 Economic Activities in Sonora

Source: National Institute of Statistics and Geography (INEGI) and the Ministry of Economy (SE)

Figure 2 shows the percentages of the economic sectors as follows: commerce is at 15.8%, non-oil mining at 12.7%, real estate and rental services of personal and intangible property 9.8%; manufacture of machinery and equipment 9.8%, and 51.9% in other sectors, such as agriculture and primary order activities. Together, they represent 56.1% of the Gross Domestic Product (GDP) in the state.

As a result, the participation of the industry in Sonora represents an important factor in the economy and its competitiveness will be of great help as the models related to systemic competitiveness establish.

The business factors or elements are very important in the development of competitiveness; they require structural aspects, such as: the market where they participate, the quality of their products, technology, human resource, training and qualification of its workforce, determined as the micro part of a system of competitiveness.

The neoclassical theory (Gil and Torres, 2009) calls that competitiveness is a problem that must be solved, with the intention that companies through the efficient use of resources and their management help control and alignment of their internal processes; in addition, to seek standardization where it can be established the parameters of evaluation and measurement of results in the performance of each of the industry.

This article is a further contribution to the literature on the competitiveness elements and how it is developed in the industrial sector in small and medium enterprises (SMEs), which are located in the most important cities of the state of Sonora.

For this purpose, the objective was to evaluate the competitiveness elements in the functional areas of the studied entities of the industry; thus, achieving a first advance on this study.

The methodology was based on the concept of systemic competitiveness (Esser, Hillebrand, Messner and Meyer-Stamer, 1996) as indicated by Suñol (2016) and the Economic Commission for Latin America and the Caribbean (ECLAC). They characterize it by the development of the industry achieving success.

The production of the industry and its administrative management create the elements at the (micro) level. The conditions of a macro economic environment are when the support of the government is involved, the demands of private companies for competition.

Finally, the middle level involves politics, socio-cultural factors, as well as high standards in the organizations.

Similarly, a series of bibliographic records focused on competitiveness were considered. The application of an instrument was used to evaluate the alignment of their internal processes, which start from production: acquisition of inputs, hiring of qualified labor, organizational training, use and support of technology, market research, product innovation, and other variables that support daily operations in the industry and good administrative management.

Theoretical Framework.

Sánchez, Delgado, Jimenez and Coronado (2019) mention that there is a diversity of concepts related to the topic of competitiveness; however, most authors agree that it is "a multifactorial variable that ranges from business training, management skills, innovation and development of new products based on technology" (pp: 57).

Other bibliographical references describe competitiveness in the same term as being a variable that depends on many factors, including the business culture, and the required skills in business administration, which include the micro economic part of the entities (the labor, productive, management, innovation and technology aspects), according to Sánchez, Vázquez and Mejía (2017: pp.96).

In relation to the concept of the systemic approach, the levels that are placed consist from micro (internal situations of the organization), macro (public, fiscal, market policies, and relations between companies), middle level (infrastructure, region, patents, and knowledge infrastructure), to the Meta level (which implies cultural factors, legality, strategic and political capacity).

Level	Elements
Micro	Human Resources Training Information Technology Production Finances Marketing
Macro Level	Budgetary Policy Fiscal Policy Monetary Policy Market Policy Exchange Policy Commercial Policy
Middle Level (with the region)	Material Infrastructure (Logistic capital, public service facilities) Knowledge Infrastructure (Qualified human resources)
Meta Level	Sociocultural Factors Scale of Values Basic Patterns of the Organization Strategic and political capacity

Table 2 Systemic Competitiveness elements or factors
Source: Own elaboration with the support of the Ibarra, González and Demuner (2017) study

In summary, the conceptualization of competitiveness can be known as a concept that includes different elements. It is related to the internal structure of the company (Benavidez, Muñoz and Parada 2014), and the contextual environment.

The level of the company is direct and in it will derive the competitive advantage, through the methods of production and the way in which it is organized. That is why it will certainly be reflected in the price of the products and quality.

The participation in the market (Abdel and Romo, 2014) describes the activities that are part of this level. They are associated with research and development of their products, seeking to satisfy customers and innovate to offer a better product, without forgetting the quality commitment.

As long as the income or the invoicing of its sales, the permanence of its clients will be a clear element of being competitive (Benavidez, Muñoz and Parada 2014).

The systemic competitiveness model provided by the research center of the Instituto Autonomo de México is determined in Figure 3.

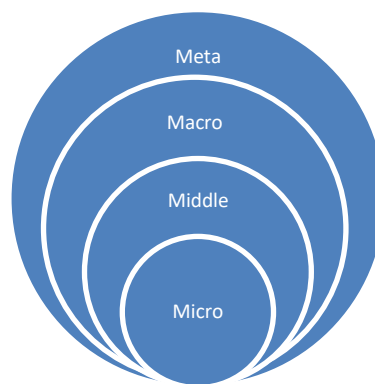


Figure 3 "Model of Systemic Competitiveness"
Source: "Centro de Estudios de Competitividad" of ITAM in Mexico

In it, the levels of measurement and/or evaluation for competitiveness are placed, being the base the micro level as the strength of the industries to achieve the alignment of their processes.

Within the issued reports by the documentary data of the industrial sector in Sonora, the government has tried to support competitiveness and innovation with actions that have allowed the attraction of investments throughout the region. That is why it has invested in infrastructure, reflected in roads, energy, partnerships with the private sector, and continuous training in skilled labor.

The achieved result in 2018 consisted in "41 investment projects in the strategic economic sectors of the entity, for an amount of 2 billion dollars, which will generate around 8,400 new jobs" (Secretary of Economy, 2018). In this sense, the micro aspect is favored in the hiring of qualified labor, and at the macro level the participation of the government and its public policies contributes to the achievement of such competition.

Another participation supported by public policy, was the development of science and technology, promoting innovation, knowledge generation, and technology transfer, through the management of support programs.

These projects benefit the Sonoran industry, creating research centers, technology parks, scholarships for students to study abroad (Sonora-Arizona) among other support, according to the 2018 government report: National Institute of Statistics and Geography (INEGI) and the Ministry of Economy (SE) (2015).

The Meta and Macro level are activated in the state of Sonora, now it is necessary to observe the small and medium companies that are in the Sonoran industry.

The strengthening of the development of the entrepreneurial culture in the state was also increased. Through linkages programs, entrepreneurs and SMEs reached different segments of the state's economy; connecting the services, products and programs that exist in the entrepreneurial ecosystem, through training for growth and strengthening in business.

The most important cities were considered as: Hermosillo, Obregon City, Navojoa, and Puerto Peñasco, Nogales with the intention to promote the enterprise competitiveness, participating 485 industrialists and thus fomenting an enterprise culture in Sonora: National institute of Statistics and Geography (INEGI) and the Secretariat of Economy (SE) (2015).

The development in the industry has been driven by government policies in the report for the 2018 fiscal year. 48 projects were invested in this sector, and it amounted to \$2,313 million dollars, generating approximately 8,770 new jobs.

The projects supported infrastructure in industrial parks, improvement to the highway that connects Sonora-Mexico with the United States and the main cities, and a new plant for the generation of electrical energy and a salting plant. Without a doubt, these contributions make it possible to support competitiveness at the Meta, Middle and Micro levels, according to the systemic model, which is why the internal strengths of each of the small and medium-sized industries must be added.

To align the processes within industrial entities, it is necessary to take into account the following elements:

- Financial management.
- Human resources and continuous training.
- Process innovation.
- Quality in production processes.
- Information systems.
- Among others.

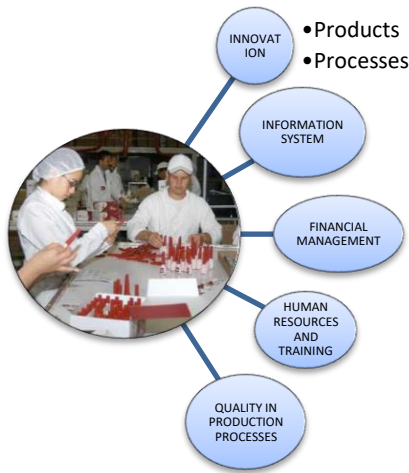


Figure 4 Competitiveness in SMEs. Micro elements of industrial entities

Source: Aragón and Rubio (2005a), Aragón and Rubio (2005b), Chablé and Aragón (2009)

By observing this figure, the key processes to be aligned in small and medium sized companies are identified so that they are correctly structured internally and can compete. First, they must focus all their strengths, and continue to pursue opportunities with the confidence that the industry, the customer, and the government will be a link to their growth and assurance in the marketplace.

Methodology

The research has been proposed at the levels of the competitiveness system, starting with the micro phase and establishing itself in the most industrialized cities in the state of Sonora. An investigation instrument was applied to evaluate the alignments of the elements of competitiveness in the participating SMEs; likewise, a procedure was established contemplating a first advance in the investigation.

Object of study: The preliminary progress presented in this article is considered 50 major industrial SMEs.

Materials: A research instrument was used, which questions are aimed at evaluating internal processes and activities in the industry: productivity, performance and marketing of their products and other aspects.

The questionnaire contains 60 items, validated in other investigations of this nature and was adapted for this state.

The application used various means of communication with the business sector and application level was manager or the responsible for the administration of small and medium enterprises.

The instrument was applied in the following ways:

- Personal visit to the manager through a previous agenda with him.
- Telephone call.
- Via e-mail.
- Interview recording.

In addition to relying on bibliographic and statistical package materials and validation of results.

The Procedure was established in various phases:

- The first stage of investigation.
- The research instrument was established by the author: Ibarra, González and Demuner (2017).
- Statistical data from the state of Sonora about the SMEs.
- Visitation to the companies, phone calls, and emails.
- Results analysis of the application of the instrument.

The essential aspect for this preliminary research was the model dimension, which was exclusively for the micro elements posed by the systemic competitiveness model in the studied entities.

During the process, the study was also limited to the most important cities in the state: Ciudad Obregon, Navojoa, Hermosillo, Nogales and Empalme. As part of the process, a variety of difficulties were faced, regarding the delivery of information by other companies that did not provide information.

Finally, it was possible to obtain a response from the industries that wished to participate and provide the requested information; however, in this preliminary phase, the following results are shown.

Results

The presented statistics in this section are the obtained results through the information provided by the surveyed entities.

Industry classification in Sonora	Frequency	Percentage
Food	17	30.4
Textile	2	3.6
Sausage and packaging	2	3.6
Pharmaceuticals	1	1.8
Technological	3	5.4
Engineering	5	8.9
Construccion	1	1.8
Electronics	1	1.8
Others	23	41.1
17	1	1.8
Total	56	100.0

Table 3 Industry Classification in Sonora
 Source: Own elaboration with the support of the study of Ibarra, González and Demuner (2017)

Figure 3. The Diversity of the Industry in the state of Sonora. The Food industry has 30.4% and 41% shows the diversity of existing industries.

Important cities of Sonora	Frequency	Percentage
Cajeme	30	23.6
Navojoa	2	3.6
Hermosillo	56	60.5
Nogales	4	7.1
San Luis Rio Colorado	1	1.8
Empalme	1	1.8
Other	12	21.4
Total		100.0

Table 4 Important State Cities with Industry
 Source: Own elaboration with the support of the study

As you can see, Hermosillo has a higher percentage of small and medium companies in the industrial sector. Nogales, despite being a border city, is characterized by the fact that industrial machinery is a big industry. Ciudad Obregon continues to be the second place at the state level.

Average years	% of industry SMEs
1 a 5 years	21.4%
6 a 10 years	19.6%
11 a 15 years	14.3%
15 and above	44.6%
Total	100%

Table 5 Evaluation of the average age of the SMEs industry
 Source: Own Elaboration

As shown in Table 5, the highest percentage is 44.6, considering that in spite of the adversities; most of the small and medium industrial companies have survived.

Likert Scale	Frequency	Cumulative %
Always	8	34.8%
Often	5	21.7%
Sometimes	9	39.1 %
Rarely	1	4.3%
Total		100%

Table 6 Evaluation of strategic planning for its improvement as an organization
 Source: Own elaboration with the support of the study of Ibarra, González and Demuner (2017)

In this table, it can be identified that 50% of the industry elaborates and plans to improve their processes, and the rest of 50% to consider them more frequently. The element of having an information system for good administrative management and supporting decision making is shown in Table 7.

Likert Scale	Frequency	Cumulative %
Excellent	16	23%
Very Good	30	65%
Good	8	12%
Fair	0	0%
Total		100%

Table 7 Evaluation of the impact level of the information system on decision making in the industry (financial, administrative and production)
 Source: Own elaboration with the support of the study of Ibarra, González and Demuner (2017)

In relation to its information elements, all industrial SMEs have support in the decision making with timely and reliable systems.

Product or process innovation element	Totally Agree	Agree	Indifferent	Not Applicable
Processes	55.4%	35.7%	7.1%	1.8%
Products Innovation	55.4%	36.1%	8.2%	1.5%

Table 8 Evaluation of product and process innovation
 Source: Own elaboration with the support of the study of Ibarra, González and Demuner (2017)

In Table 8 it can be seen that most of the industry carries out innovation and improvement in the products it offers to the market and the percentage that does not do so is very low.

Financial Management Element	High	Medium	Low
Payment to Supplier	30.4%	57.1%	12.5%
Calculation of Production Cost	42.9%	44.6%	12.5%
Taxes Payment	67.9%	28.6%	3.6%
Inventory control system	53.6%	41.1%	5.4%
Financial Strategies	35.7%	48.2%	1.6%

Table 9 Evaluation of the Financial Management Element in Industrial SMEs

Source: Own elaboration with the support of the study of Ibarra, González and Demuner (2017)

In this table, it is shown that in relation to financial management, the studied industry has a high control of operations and functions, and only a small percentage of 'SMEs' are observed to lack compliance with this element.

Conclusion

Once analyzed the results corresponding to the evaluation of the elements that compose the micro level, under the systemic model presented in the study of (Ibarra, Gonzalez and Demuner, 2017) and with attachment to the model of CENAPAL, the conclusions are generated.

The evaluation of the daily activities carried out by the industrial entities studied in this project, shows that strategic planning efforts to improve the organization with 56.5%, meaning that they are aligned and strengthening their administration.

On average, the industrial sector in the most important cities of the state of Sonora has been in existence for 15 years, which is very favorable for being in the current competition; this means that they have overcome a diversity of challenges in their business environment.

In the evaluation of the information system that the organizations have, it is of great help for the decision making. The percentage in which it is found is between 23% and 65%, where the majority aligns its information under systems, as much financial as administrative, and of production.

The human resources working in this sector are trained and everything related to this factor, i.e. the evaluation is favored, from the highest compliance to the medium, with a high percentage of industrial companies, and only a small percentage seems to lack improvement in this process.

In relation to the market study, most of these SME industries do carry out this process, and only 3% of them do not, which should be considered as a future improvement.

As far as product and process innovation is concerned, 90% of them are carried out and complied with in order to remain competitive and current in the market, thus supporting consumer preference.

Finally, as for the financial management element, undoubtedly any manager, owner or director requires good finances and cash flow since the operation of the business will depend on it, as mentioned in the Financial Reporting Standards (FRS). 88% of the companies consider having a high and medium control of such operation; however, there is a percentage of 9%, which is a concerned factor for competitiveness.

The most important findings are related to the acceptance of what the systemic competitiveness models propose. The government of the state of Sonora has developed a variety of strategies and policies at the state level that help strengthen these organizations, which in turn contribute to the GDP with interesting participation, generate direct and indirect employment, and pay taxes that translate into better infrastructure, which is a key factor for competitiveness.

Another important fact is that in the industrial sector in the most important cities such as Hermosillo, Cd Obregon, Navojoa, and Nogales there are competitive and strengthened companies in their administration and aligned with their internal processes. This base is necessary to fulfill each element described in the models of competitiveness, as indicated in the study by Ibarra, González and Demuner (2017).

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