Measuring enterprise competitiveness for territorial development

Medición de la competitividad empresarial para el desarrollo territorial

Medição da competitividade empresarial para o desenvolvimento territorial

Yoel Ramón Sarmiento Reyes[1], Mercedes Delgado Fernández[2]

[1] Universidad de Holguín "Oscar Lucero Moya". Holguín, Cuba. ORCID: https://orcid.org/0000-0003-3522-3450. Email: ysreyes@uho.edu.cu
[2] Escuela Superior de Cuadros del Estado y del Gobierno. La Habana, Cuba. ORCID: https://orcid.org/0000-0003-2556-1712. Email: mercedes@esceg.cu

ABSTRACT

In competitiveness evaluation models, there is a consensus that it is necessary to define dimensions, variables and indicators depending on the level (country, region, industry or sector and enterprises), the context and the objectives pursued. The connection between the measurement of competitiveness at the enterprise level and the results achieved in a territory contributes to improving the effectiveness of local management. The objective of this article is to define the system of indicators that allows measuring competitiveness in enterprises according to the customer-market, social, technical, economic-financial and environmental dimensions, with their respective variables and indicators for their application in Holguín Province, Cuba. The comparison of the behavior of six enterprises of two sectors (Construction and Industry) of Holguín's territory allows corroborating the usefulness for decision makers at an enterprise and territorial level, using the calculation and comparison of the established indicators. An experiment is also designed and processed with the Analysis of Variance in order to know the incidence of the dimensions and sectors in the performance index of enterprise competitiveness. The system designed to measure competitiveness is flexible, dynamic and multidimensional. It allows the analysis of the behavior of enterprises with a comprehensive approach to development at the provincial level.

Keywords: competitiveness; dimensions; experiment design; indicators; measurement; variables

Translated from the original in Spanish

RESUMEN

En los modelos de evaluación de la competitividad, existe consenso en que es necesario definir dimensiones, variables e indicadores en dependencia del nivel (país, región, industria o sector y empresas), del contexto y los objetivos que se persigan. La conexión entre la medición de la competitividad a nivel empresarial y los resultados alcanzados en un territorio contribuyen a mejorar la efectividad en la gestión local. El artículo tiene como objetivo definir el sistema de indicadores que permita la medición de la competitividad en las empresas según las dimensiones cliente-mercado, social, técnica, económico-financiera y medioambiental, con sus respectivas variables e indicadores para su aplicación en la provincia de Holguín, Cuba. La comparación del comportamiento de seis empresas de dos sectores (Construcción e Industria) del territorio holguinero permite corroborar la utilidad para los tomadores de decisiones a nivel empresarial y territorial, utilizando el cálculo y la comparación de los indicadores establecidos. También se diseña un experimento y se procesa con el Análisis de Varianza para conocer la incidencia de las dimensiones y sectores en el índice de desempeño de la competitividad empresarial. El sistema diseñado de medición de la competitividad es flexible, dinámico y multidimensional, permite analizar el comportamiento de las empresas con un enfoque integral del desarrollo a nivel provincial.

Palabras clave: competitividad; dimensiones; diseño de experimento; indicadores; medición; variables

RESUMO

Nos modelos de avaliação da competitividade, há consenso quanto à necessidade de definir dimensões, variáveis e indicadores em função do nível (país, região, indústria ou sector e empresas), do contexto e dos objetivos prosseguidos. A ligação entre a medição da competitividade a nível empresarial e os resultados alcançados num território contribui para melhorar a eficácia da gestão local. O objetivo do artigo é definir o sistema de indicadores que permite medir a competitividade das empresas de acordo com as dimensões cliente-mercado, social, técnica, econômico-financeira e ambiental, com as respectivas variáveis e indicadores para a sua aplicação na província de Holguín, Cuba. A comparação do comportamento de seis empresas em dois sectores (Construção e Indústria) no território de Holguín permite-nos corroborar a utilidade para os decisores a nível empresarial e territorial, utilizando o cálculo e a comparação dos indicadores estabelecidos. Uma experiência é também concebida e processada com a Análise de Variância para descobrir o impacto das dimensões e sectores no índice de desempenho da competitividade empresarial. O sistema concebido para medir a competitividade é flexível, dinâmico e multidimensional, permitindo a análise do comportamento das empresas com uma abordagem integral do desenvolvimento a nível provincial.

Palavras-chave: competitividade; dimensões; concepção da experiência; indicadores; medição; variáveis

INTRODUCTION

Competitiveness is a dynamic, evolutionary and multidimensional concept, which can be evaluated at different levels and dimensions (Alvarez Medina, 2008). It can be understood from four levels: country, region, industry or sector and enterprises (Alvarez Medina, 2008; Musik & Romo Murillo, 2005). Assessment at the country level (Malega et al., 2019; Porter, 1991) and territorial level (Castellanos Machado et al., 2017; Nava Rogel et al., 2017) requires the identification of indicators that respond to the dimensions and variables of economic, social and environmental development (Sarmiento Reyes, Lao León, et al., 2019) and should include systematic comparison. At the same time, a system of competitiveness indicators should be capable of measuring the capacity of the country, region, territory or enterprise, depending on the level of analysis referred to, allowing for the systematic maintenance of comparative advantages (Porter, 1991), as well as the achievement, maintenance and improvement of a certain competitive position (Ivanova et al., 2019).

The 2019 Global Competitiveness Index 4.0 identifies 103 indicators that establish a ranking among countries, through 12 "pillars": Institutions, Infrastructure, Adoption of Information and Communication Technologies (ICT), Macroeconomic Stability, Health, Skills, Product Market, Labor Market, Financial System, Market Size, Enterprise Dynamics and Innovation Capacity. The Industrial Development and Competitiveness Index measures the efficiency of processes related to industrial development and reflects multiple dimensions of competitiveness, incorporating the capacity of economies to produce and sell their products nationally and internationally, adopt advanced technologies and generate a greater share of value added. Also reported are systems for evaluating competitiveness using Porter's diamond model (Fang et al., 2018; Li & Chen, 2020), quality, financial, process and innovation indicators (Debeluck Plentz & Bernardes, 2016; Delgado Fernández, 2017), surveys that measure generic competitive strategies such as differentiation, diversification, quality, costs, leadership, market service and innovation (Delgado Fernández, 2019), sector competitive strategies (Anaya Villalpanda et al, 2018), and criteria that include production, marketing, personnel, management, technology, ecology and sales efficiency (Afanasieva et al., 2018), among many others. In addition, instruments such as competitiveness observatories are recommended for follow-up and monitoring (Sarmiento Reyes, Delgado Fernández, et al., 2019), for which a system of relevant indicators is required, depending on the objective set.

Competitiveness evaluation models are primarily used for a specific level of measurement, be it the country, region, sector or enterprise; but it is less common to find information systems that connect several levels; for example, the enterprise level with the territory is unusual. Even so, government policies at the regional or sectoral level, known as mesopolitics (Lombana & Rozas Gutiérrez, 2010) are increasingly becoming a key factor for sustainable development. On the other hand, the strengthening of territories is related to the generation of productive and innovative capacities and the increase in the competitiveness of their enterprises. In this way, competitiveness studies become a control instrument to measure the progress of strategic processes in economies, showing their main areas of development, as well as those that are weaker, which in turn could contribute to the design of policies, programs and actions by the respective authorities.

Translated from the original in Spanish

The term regional competitiveness encompasses the set of factors and policies that shape and condition a region's ability to create and maintain an environment conducive to the creation of value through its enterprises and meeting the needs of its citizens. From this perspective, competitiveness is not an end in itself, but a mechanism to achieve better standards of living and social welfare, especially in socialist countries like Cuba.

To achieve connections between indicator systems of different levels and dimensions, reliable, timely and available information from statistical reference offices is needed. Therefore, the statistical offices at regional or national levels facilitate the development of systems for measuring competitiveness, in addition to surveys that can be designed and applied in enterprises under study. The National Office of Statistics and Information of Cuba (ONEI in Spanish), produces data and promotes the harmonization of statistical methods that support decision making, research and the satisfaction of information needs of the population they represent. Its information source is the National Statistical System (SNE in Spanish), which integrates, in a coherent way, in a common methodological framework, the state statistical information of Cuba and it is structured in three Subsystems of Statistical Information: National (SIEN in Spanish), Territorial (SIET in Spanish) and Complementary (SIEC in Spanish) (ONEI, 2020).

In Cuba, the province of Holguín has 132 state enterprises, of which information is available on 19 aspects (ONEI, 2017). However, these enterprises do not have an instrument that allows them to systematically evaluate their enterprise behavior, in comparison with the rest of the province, being this the problem that is being studied. Having these instruments would allow for more comprehensive decision making, both by company directors and by the provincial government, contributing to productive linkages and a more efficient and effective use of the plan. The existing problem was corroborated in an exploratory survey, applied to 35 enterprise directors of the territory where it was found that they had little knowledge of the changes that occur in the market and its environment, lack of knowledge of the best enterprise practices, difficulty in obtaining information from the competition, lack of a database to monitor the potential and demands of their clients, difficulty in measuring the performance of the company according to the growth of the market where it operates and its level of competitiveness (Sarmiento Reyes, Lao León, et al., 2019). In the enterprises that have information systems, it was possible to verify that they focus mainly on internal information.

The objective of this article is to define the system of indicators that allows measuring competitiveness in enterprises according to the customer-market, social, technical, economic-financial and environmental dimensions, with their respective variables and indicators for their application in Holguín Province, Cuba. The competitiveness measurement system designed contributes to a better management of the provincial government, both for the territorial strategic planning and the monitoring of the adopted policies, as well as the evaluation and comparison of the enterprises of the territory.

MATERIALS AND METHODS

The methods used were induction-deduction and analysis and synthesis in establishing the system of indicators for measuring the competitiveness of enterprises; at the provincial level, it required the detailed analysis of 64 concepts of competitiveness, which for better understanding were grouped, according to the scope of their definition, in 31 national, two regional, 12 sectoral, 15 enterprise and four multiple. In this last classification, they refer to the concepts that in their conceptualization give scope to more than one of the previous classifications, with a systemic approach.

Additionally, the Delphi Method was used with round sequences, through the application of a survey to experts from academia and the Holguín enterprise environment, with a reliability of 0.717 and, in addition, the territorial statistics subsystem was taken into account. All of this was used to define the dimensions, variables and indicators of enterprise competitiveness in the Holguín territory as shown in table 1, observing the integrality of the analysis by including the client-market, economic-financial, technical, social and environmental dimensions. These dimensions contribute to the effectiveness and efficiency of the company and include the dimensions of sustainable development. They are broken down into variables and these into indicators, that is, from the most general to the most specific that can be measured.

Table 1 - Dimensions, variables and indicators of enterprise competitiveness

Dimension	Variables	Indicators
Client - Market	Suppliers Customers Customer satisfaction Level of nonconformity Insertion in the international market	- No. of suppliers
		- No. of national clients
		- Customer Satisfaction Index
		- No. of complaints and/or claims
		- No. of foreign clients
Economic - Financial	Financial indicators Productivity	- Solvency
		- Liquidity
		- Indebtedness
		- No. of investments
		- Productivity
Technical	Product and service innovation Energy Efficiency Installed capacity	- Areas that generate income from innovation
		- Types of innovation
		- Number of innovations
		- Intellectual Property
		- Energy efficiency
		- Obsolescence in technological equipment
		- Use of the installed capacity

Environmental	Environmental Culture Violations	- Environmental policy, environmental aspects, waste management, environmental license, environmental recognition
		- No. of contraventions
Social	Human Resources Social Security Contribution Support for community development Employment generation	Staff Compliance
		- Distribution by age
		- Risk identification, assessment, prevention
		- Level of fluctuation
		- No. of medical certificate
		- No. of occupational accidents
		- No. of occupational diseases
		- Level of absenteeism
		- Average salary
		- No. of places offered
		- Social Security Contribution
		- Level of contribution to ONAT

Source: Own elaboration

As can be seen, there is an intrinsic relationship between the dimensions and variables proposed with indicators that are specific to government management. In addition, the social dimension is highlighted, which includes variables such as support for community development or employment generation, as well as those related to enterprise contributions to taxes. All of this makes it possible for the government to make the right decisions and decide on policies aimed at boosting results in the territory. It should be noted that other variables and indicators could be included depending on the context and needs.

In addition, three competitiveness indexes are proposed as evaluation indicators, which will measure the evolution of the enterprises in the sector and the province, being these:

1. The Performance by Dimension Index (ID_D) to analyze the behavior of each one of them, using the following expression:

$$ID_D = \frac{V_o}{V_{Máx}} \times 100$$

$$V_o = \sum V_v$$

V_o - Value obtained
V_v - Value obtained according to scale for each variable
$V_{Máx}$ - Maximum value

The maximum value is calculated on the basis that all the indicators get a maximum score of 5 points, since three possible values are established for each one (1, 3 and 5). The resulting value coincides with the behavior levels of good practices (5), accepted practices (3) and bad practices (1). Thus, in the customer-market dimension, five indicators were set for this study, of the enterprises in the province of Holguín, so that their maximum value (denominator of the DDI) would be 25 (5 x 5). To decide which value to assign, ranges of practices were established according to the actual behavior of the enterprises in the territory. For example, for the indicator number of foreign clients of the variable insertion in the international market, it is established as a good practice (5 points) if there are more than four foreign clients; an accepted practice (3 points) is evaluated if there are one to three foreign clients and 1 point (bad practice) if there are no foreign clients. Of course, the references may change depending on the territory analyzed or the behavior of the enterprises, as well as the goals to be achieved for the indicators defined, taking into account that the maximum value of good practice is a reference to be achieved.

2. Enterprise Competitiveness Index (IC_E), which is calculated for each one of the enterprises under analysis, in order to know which one had a better performance according to the dimensions evaluated and allows making comparisons among enterprises and with itself.

$$IC_E = \frac{\sum_{(i-j)} ID_{Di} + ID_{Dj}}{D}$$

ID_{Dij} - Dimensional Performance Index
D - Total of Dimensions

3. Sector Competitiveness Index (IC_S), which is calculated for each sector under study, in order to determine which one has a better performance within the territory.

$$IC_S = \frac{\sum_{(i-j)} IC_{Ei} + IC_{Ej}}{S}$$

IC_E - Enterprise Competitiveness Index
S - Total Enterprises in the Sector

These three indexes will allow the comparison among each of the entities under analysis in a territory and will encourage, at the same time, the competitiveness between them and the continuous improvement in their indicators.

Currently, the province of Holguín has a total of 132 enterprises, 147 budgeted units and four state economic organizations, distributed in 25 sectors; of these, 11 belong to the public sector and 14 to the enterprise sector. The research shown in this article was carried out in the enterprise sector and, specifically, samples were taken from six enterprises in two sectors: Construction and Industry.

Finally, statistical methods were used with the design of experiments for the comparison of enterprises, from the two selected sectors, based on the evaluation of the performance indicator of enterprise competitiveness.

RESULTS AND DISCUSSION

In the province of Holguín, 40.2% (53 enterprises out of 132) have an improved enterprise system, with enterprises in the Energy and Mines sectors and the Hydraulic Resources sector standing out, covering 92.9% and 100% respectively. The main productive rubles in the province are the nickel industry, the generation of electric energy, the processing of cane sugar and alcoholic beverages, the production of beer and soft drinks, the derivatives of the dairy, meat and canned and vegetable industries, cigarettes and tobacco, the manufacture of agricultural implements, high-density plastic tubes and construction materials. In addition, the aquaculture activity is developed with satisfactory results in some species.

For the study, we took into account, first, the sectorial composition of the province as shown in graph 1, in order to visualize which are the most representative in the enterprise dynamics of the territory, taking into account that one of the indices to be calculated would be the sectorial competitiveness. For this purpose, the information available in the ONEI was taken as a basis, excluding for this analysis those belonging to the Revolutionary Armed Forces and the Ministry of the Interior and the enterprises of local subordination (33), fundamentally because they have an extensive variability in terms of their corporate purpose and it is difficult to group them, except for commerce and gastronomy with a significant number of 15, almost 50% of those of local subordination; but none in improvement, which constituted the second requirement for the selection of the enterprises in this study, since equal conditions are sought in it. Thus, for the analysis, the sectors of Construction and Industry are selected with six enterprises, three of each, that meet the requirements.
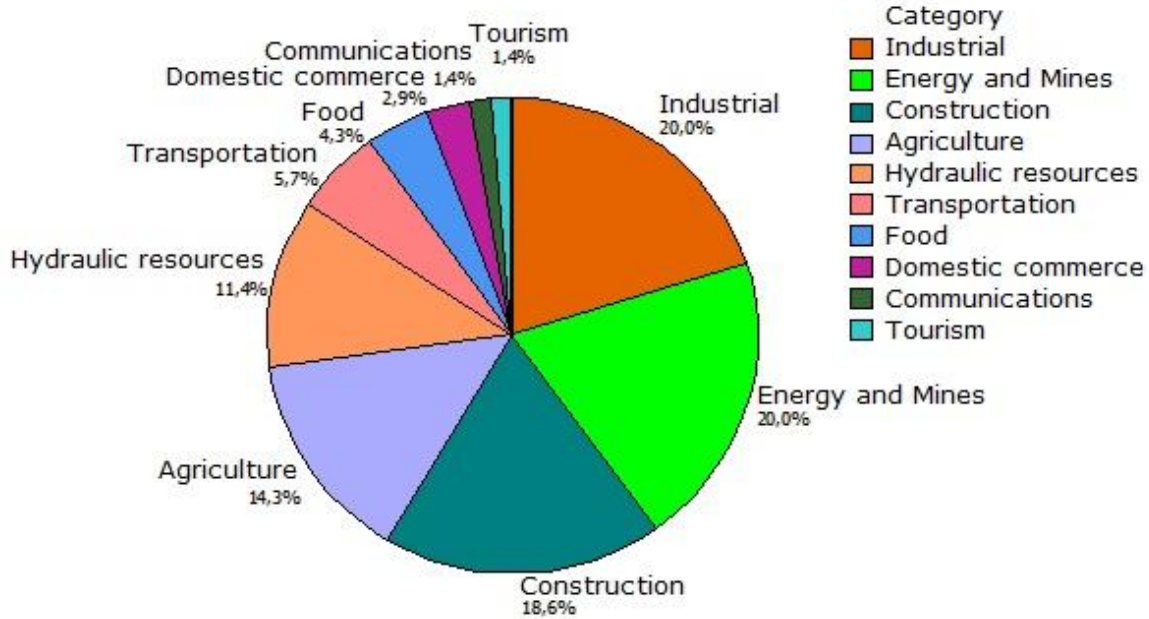
Graph 1 - Enterprise sectors in the province of Holguín
Source: Own elaboration

The exploratory study was carried out in the following enterprises: Cerámica, Materiales, Vértice of the Construction sector and Holmeca, KTP, Materia Prima of the Industry sector, which were monitored with the indicators set out in table 1. The performance indexes by enterprise and sector dimension were calculated, which are shown in graph 2.
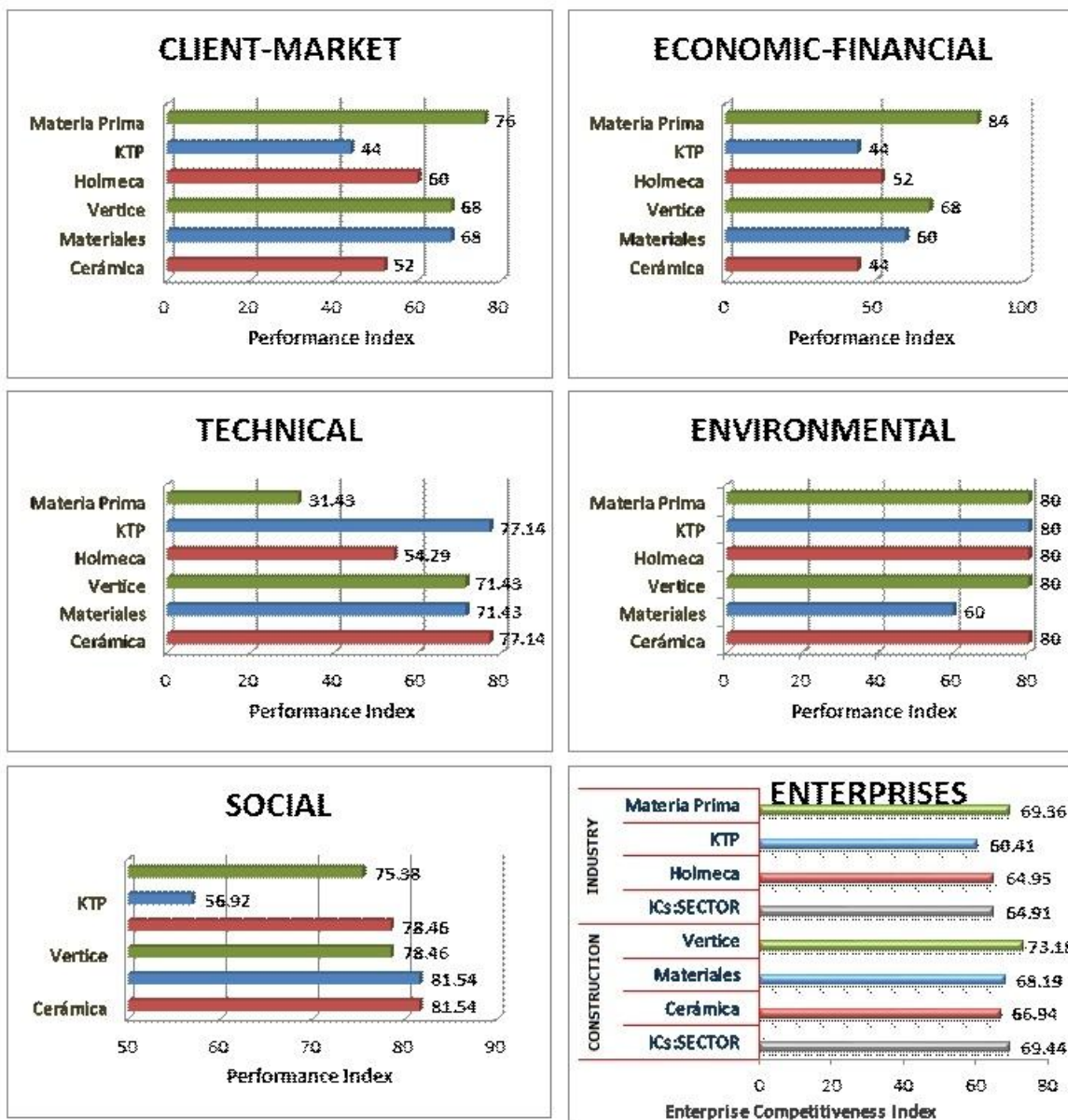
Graph 2 - Calculation of the Competitiveness Performance Index by enterprise and sector dimension
Source: Own elaboration

With the results obtained, it can be seen that there are reserves of competitiveness in the enterprises analyzed by fluctuating the value of the enterprise competitiveness index between a minimum value of 60.4 (KTP Enterprise, of Industry) and a maximum of 73.18 (Vértice Enterprise, of Construction). It is also obtained that, on average, the Construction enterprises have a better performance than the Industry enterprises, in relation to the enterprise competitiveness index. On the other hand, the dimension with the best results was the environmental one, with an average of 76.67, which would have

Translated from the original in Spanish

obtained a better result if it did not affect the performance of the Materiales enterprise (from the Construction sector), which caused the mean of this dimension to decrease due to a contravention made. The social dimension follows with a better performance with an average value of 75.38%. The dimension with the lowest performance was the economic-financial one, with an average index of 58.67%, affecting negatively the KTP and Ceramic enterprises, which did not comply with the planned investments and their financial health is not in optimal conditions. In general, the enterprise with the best performance was Vértice, with a competitiveness index of 73.18%, which can be improved by implementing improvement actions in the economic-financial and customer-market dimensions. As for the sectors, although not all of their enterprises and their study are present, a small group of them were carried out. The Construction sector achieved a better index of competitiveness with 69.44%, so the sector must draw up strategies for the Construction and Ceramics enterprises to improve their performance results and thus be able to improve the competitiveness of the sector in the Holguín territory.

In order to statistically analyze the data used, the design of experiments was used, which consists of determining which tests should be carried out and in what way to obtain data that, when statistically analyzed, provide objective evidence to answer the questions posed (Delgado Fernández, 2020), where in this circumstance it is to find out if the factors Enterprises and Dimensions influence the variable of interest Performance Index by Dimensions. Below, the response variable, the factors, the model to be used, the hypotheses raised and the results are shown.

Response variable: Performance index by dimensions

Factors:

A: Enterprises (Cerámica; Materiales; Vértice; Holmeca; KTP; Materia Prima)

B: Dimensions (Client-Market; Economic-Financial; Environmental; Social; Technical)

Replicas: The information of the performance indicators by dimensions is taken taking into account the results of the first and second semesters of 2019.

Two-factor model: with six levels for Factor A and five levels for Factor B and a total of at least 30 tests, so when the information is taken from two semesters (two replicates) it amounts to a total of 60 tests or data.

Mathematic model: $Y_{ijk} = \mu + A_i + B_j + (AB)_{ij} + e_{ijk}$

Hypothesis for the factor: Enterprises

H₀: There are not differences among Cerámica, Materiales, Vértice, Holmeca, KTP, Materia Prima enterprises

H₁: There are differences among Cerámica, Materiales, Vértice, Holmeca, KTP, Materia Prima enterprises

Hypothesis for the factor: Dimensions

H₀: There are not differences among Dimensions: Client-Market, Economic-Financial, Environmental, Social, and Technical

H₁: There are differences among Dimensions: Client-Market, Economic-Financial, Environmental, Social, and Technical

Hypothesis for the factor: Enterprises * Dimensions

H₀: There are not difference for the combination of enterprises and dimension

H₁: There are differences for the combination of enterprises and dimension

Method of Analysis of Variance

In the experiment, the analysis of variance statistical test (ANOVA) and the two-factor model are used, as shown in table 2. Table 3 shows the processing of the ANOVA, with the 60 data processed with the statistical software MINITAB.

Table 2 - Two-factor model for the analysis of enterprise competitiveness

Factor	Type	Levels	Values
Enterprises	Fixed	6	Cerámica; Materiales; Vértice; Holmeca; KTP; Materia Prima
Dimension	Fixed	5	Client-Market; Economic-Financial; Environmental; Social; Technical

Source: Own elaboration

Table 3 - Results of the ANOVA of the experiment

Source of variation	Degrees of freedom	Sum of Squares	Medium Square	F (Statistician Fisher)	P (Probability value)
Dimension	4	2643,11	660,78	8,75	0,000
Enterprise	5	1451,31	290,26	3,84	0,008
Dimension*Enterprise	20	3533,89	176,69	2,34	0,017
Error	30	2266,20		75,54	
Total	59	9894,50			

Source: Own elaboration using MINITAB software

Translated from the original in Spanish

Results analysis and interpretation

From the analysis carried out, it can be seen that the value of P is less than the level of significance (α = 0.05) or probability of rejecting H_0, when H_0 is true in the factors dimension, enterprise and in the interaction of both, so the three hypotheses H_0 are rejected.

By accepting the hypothesis of the interaction H_1, referring to the fact that there is a significant influence of the combinations of enterprises and dimensions, it is necessary to interpret the graph of combinations among the five dimensions and the six enterprises, object of study, shown in graph 3.
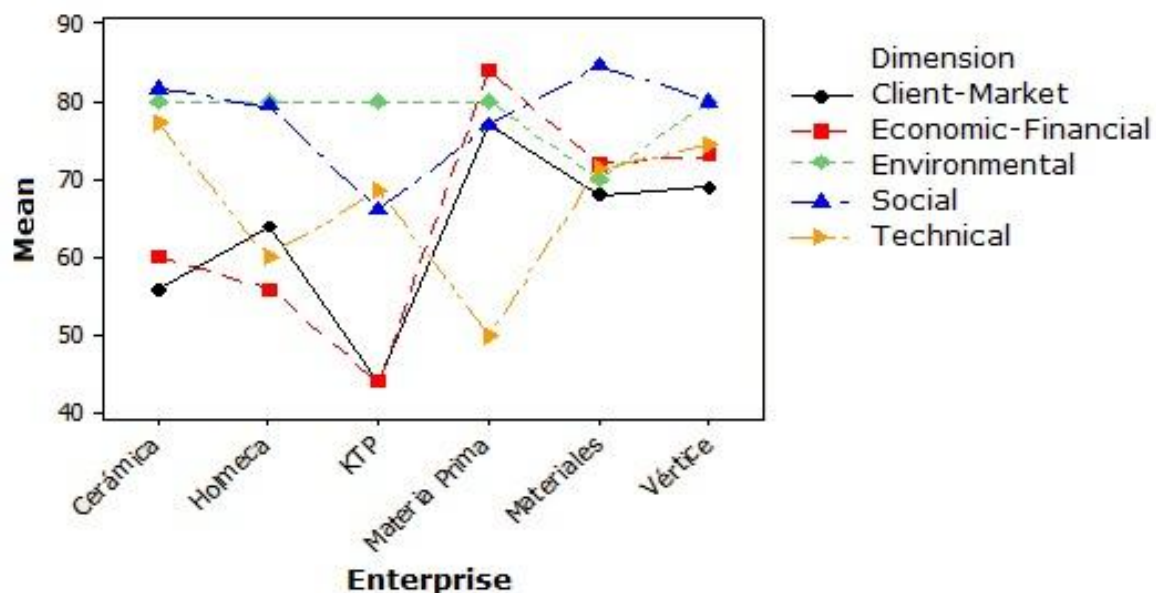
Graph 3 - Diagram of interactions of the enterprises and dimensions for the enterprise competitiveness performance indicator
Source: Own elaboration

As can be seen, the enterprise with the best performance is Vértice, where practically all the dimensions are above 70 in the performance index, except the customer-market dimension with a value of 68; then follows the company Materia Prima, which has better results than Vértice in some dimensions; but the technical dimension affects it significantly and finally the building materials dimension, where the dimension that influences this result is the customer-market and the environmental dimension, which has a significant difference between the three enterprises. It is corroborated by the design of the experiment that the dimensions with the best impact on the index are the social and environmental dimensions and, of the six enterprises studied, the best results fall to two enterprises in the construction sector and one in the industry sector, which makes a difference between them.

The evaluation of competitiveness at different levels (country, region, sector and company), through dimensions and indicators of economic, social and environmental development, favors the connection between levels and variables and constitutes an instrument for management oriented towards sustainable development.

The competitiveness measurement system designed is flexible, dynamic and multidimensional, allowing the analysis of the behavior of enterprises and their comparison with themselves for different periods of time, with others in the same sector and between sectors in the same territory, with an integral approach to development oriented to customer-market, economic-financial, technical, social and environmental dimensions.

Through this study, it was possible to verify the usefulness of the method developed to measure the competitiveness of the enterprises in the province of Holguín, by defining the information bases for decision making and the implementation of innovative public policies at the local level, to know the changes that occur in the market and its environment, to identify the best enterprise practices, to increase the capacity to obtain information from clients and enterprises, with a greater comprehensiveness and capacity of generalization to other locations.

The method of designing experiments with the use of Analysis of Variance allowed to know the incidence of factors (dimensions and sectors) in the index of performance of competitiveness and it is recommended that its use is systematic, given the existence of information and the usefulness for decision making, for the management of the territory and the enterprises analyzed.

REFERENCES

Afanasieva, N. V., Rodionov, D. G., & Vasilev, Y. N. (2018). System of Indicators of Coal Enterprise Competitiveness Assessment. *Revistas Espacios*, *39*(36), 10. https://www.revistaespacios.com/a18v39n36/a18v39n36p10.pdf

Alvarez Medina, L. (2008). Competitividad de la empresa industrial: Una reflexión metodológica. *Revista Venezolana de Gerencia*, *13*(43), 341-357. http://dx.doi.org/10.37960/revista.v13i43.10500

Anaya Villalpanda, M., Delgado Fernández, M., & Garrigó Andreu, L. (2018). Estrategia competitiva para el Grupo Empresarial de la Industria Alimentaria de Cuba. *Revista Cubana de Administración Pública y Empresarial*, *2*(1), 82-97. https://apye.esceg.cu/index.php/apye/article/view/34

Castellanos Machado, C. A., Machado Noa, N., & Castellanos Castillo, J. R. (2017). Evaluación de los factores de competitividad en la provincia de Villa Clara. *Ingeniería Industrial*, *38*(3), 298-310. https://rii.cujae.edu.cu/index.php/revistaind/article/view/590

Debeluck Plentz, N., & Bernardes, M. M. e S. (2016). Proposição de um sistema de indicadores para avaliar a competitividade através de indicadores de gestão do design. *Estudos em Design*, *24*(1), 23-44. https://doi.org/10.35522/eed.v24i1.295

Delgado Fernández, M. (2017). Innovación Empresarial. En *Temas de Gestión Empresarial: Vol. II* (p. 117). Félix Varela.

Delgado Fernández, M. (2019). Enfoque y métodos para la innovación en la Administración Pública y Empresarial. *Revista Cubana de Administración Pública y Empresarial*, *3*(2), 141-153. https://apye.esceg.cu/index.php/apye/article/view/79

Delgado Fernández, M. (2020). Uso del diseño de experimentos para la innovación empresarial. *Revista de Métodos Cuantitativos para la Economía y la Empresa*, *29*, 38-56. https://www.upo.es/revistas/index.php/RevMetCuant/article/view/2450

Fang, K., Zhou, Y., Wang, S., Ye, R., & Guo, S. (2018). Assessing national renewable energy competitiveness of the G20: A revised Porter's Diamond Model. *Renewable and Sustainable Energy Reviews*, *93*, 719-731. https://doi.org/10.1016/j.rser.2018.05.011

Ivanova, A. S., Holionko, N. G., Tverdushka, T. B., Olejarz, T., & Yakymchuk, A. Y. (2019). The Strategic Management in Terms of an Enterprise's Technological Development. *Journal of Competitiveness*, *11*(4), 40-56. https://doi.org/10.7441/joc.2019.04.03

Li, Y., & Chen, Y. (2020). Construction of Sichuan Liquor Industry Competitiveness Evaluation Model from the Perspective of Diamond Theory. *Journal of Financial Risk Management*, *9*(2), 141-154. https://doi.org/10.4236/jfrm.2020.92008

Lombana, J., & Rozas Gutiérrez, S. (2010). Marco analítico de la competitividad-Fundamentos para el estudio de la competitividad regional. *Revista científica Pensamiento y Gestión*, (26), 1-38. http://rcientificas.uninorte.edu.co/index.php/pensamiento/article/view/854

Malega, P., Kovac, J., & Kovac, J. (2019). The Competitive Market Map as the Basis for an Evaluation of the Competitiveness of the Slovak Republic on an International Scale. *Journal of Competitiveness*, *11*(4), 113-119. https://doi.org/10.7441/joc.2019.04.07

Musik, A., & Romo Murillo, D. (2005). Sobre el concepto de competitividad. *Comercio exterior*, *55*(3), 200-215. https://dialnet.unirioja.es/servlet/articulo?codigo=1127572

Nava Rogel, R. M., Cerna Ortiz, D. A., & Becerril Torres, O. U. (2017). Indicador de competitividad municipal en el Estado de México para construir un entorno

competitivo. *Economía Sociedad y Territorio*, *17*(54), 241-278. https://doi.org/10.22136/est002017635

ONEI. (2017). *Anuario estadístico de Holguín*. Oficina Nacional de Estadística e Información. http://www.onei.gob.cu/node/13628

ONEI. (2020). *Sistema Nacional de Estadística*. Oficina Nacional de Estadística e Información. http://www.onei.gob.cu/SEN

Porter, M. E. (1991). Towards a dynamic theory of strategy. *Strategic Management Journal*, *12*(S2), 95-117. https://doi.org/10.1002/smj.4250121008

Sarmiento Reyes, Y. R., Delgado Fernández, M., & Infante Abreu, M. B. (2019). Observatorios: Clasificación y concepción en el contexto iberoamericano. *Revista Cubana de Información en Ciencias de la Salud*, *30*(2), e1335. http://rcics.sld.cu/index.php/acimed/article/view/1335

Sarmiento Reyes, Y. R., Lao León, Y. O., & Delgado Fernández, M. (2019). La competitividad, premisa importante para el desarrollo empresarial. Diseño experimental sector alimenticio de Holguín. *Revista de Investigación Latinoamericana en Competitividad Organizacional*, *1*(4). https://www.eumed.net/rev/rilco/04/sector-alimenticio-holguin.html

Conflict of interest:

Authors declare not to have any conflict of interest.

Authors' contribution:

The authors have participated in the writing of the paper and the analysis of the documents.

Translated from the original in Spanish