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Article

Systematic Competitiveness at the Karina Water Purification Plant in División del Norte, Escárcega, Camp

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Abstract

Systemic competitiveness refers to the ability of companies to be efficient and adapt to their environment, depending on the interaction of factors at different levels: micro (the companies themselves), meso (government and local actors), macro (the regional context), and meta (the national and institutional framework). This project aims to determine the level of systemic competitiveness of *Purificadora de Agua Karina*, located in División del Norte, Escárcega, Campeche, in order to identify its strengths, weaknesses, and areas of opportunity that contribute to improving its performance in the local market. The research will be conducted under a qualitative approach, descriptive and explanatory, as it seeks to understand the perceptions and experiences of the actors involved and to interpret the factors that influence the company's competitiveness. For this purpose, interviews will be conducted with both the owner and the employees, allowing the collection of direct and detailed information about the processes and conditions that impact competitiveness. The expected results will indicate a favorable level of competitiveness in the company, but they will also reveal limitations that may affect its development. These findings will allow a more precise understanding of the factors that strengthen performance and those that hinder it, providing a comprehensive diagnosis of the current situation. In this way, the results will serve as a solid basis for designing improvement proposals aimed at optimizing administrative processes, strengthening strategic planning, and enhancing both product quality and home delivery service efficiency, thus contributing to consolidating the competitive position of *Purificadora de Agua Karina* in the local market. In conclusion, this study seeks not only to diagnose the current situation of *Purificadora de Agua Karina* but also to provide practical recommendations that boost its competitiveness and serve as a reference for other water purification companies in the region.

Keywords: systemic competitiveness; companies; qualitative approach; interviews; water purification plant; strategies

Introduction

Research on systemic competitiveness in companies involves the study of a series of internal factors that organizations must analyze, integrate, and interconnect to produce results that allow them to achieve competitive advantages in the short, medium, and long term.

Thus, the main functional areas of companies—marketing, human resources, finance, production, quality, IT, environmental management—as well as the administrative process, planning, organization, management, and control—are considered elements of interest in the study of systemic competitiveness, which views the company as an integrated whole that produces results capable of differentiating it from its competitors. As Sánchez and Zapata (2020) argue, these factors, being internal, can be controlled by companies, and the level of competitiveness they desire will depend on the level of effectiveness achieved in each of them.

In this sense, this research was developed with the objective of determining the level of competitiveness of the Karina Water Purification Plant in División del Norte, taking into account the results of the interview conducted with the company's employees. The study also identifies the internal factors that most impact competitiveness and can influence performance within the local market.

Problem

The main problem facing Karina Water Purification is its home delivery service, which has become increasingly important since the COVID-19 pandemic. Growing competition in the area, coupled with more demanding customers who demand fast, safe, and efficient deliveries, has put pressure on the company's internal processes. Currently, its challenge is to maintain product quality while offering a differentiated service that allows it to stand out from other purifiers in the area.

An analysis using the Ishikawa diagram identifies the main causes of the problem as "Low competitiveness in its home delivery service." It also identified the main causes of the problem:

1. **Human resources:** lack of customer service training, shortage of delivery drivers, and work overload.

2. **Logistics processes:** poorly optimized routes, delays due to lack of coordination, and lack of order control.

3. **Technology and infrastructure:** lack of digital tools, worn-out or limited transportation, and lack of automated records.

4. **Customers/Market:** High competition, more demanding consumers, and a preference for companies with promotions or greater coverage.

Management/Strategy: Lack of planning, limited innovation, and weak loyalty campaigns.

External Factors: Increased local competitors and stricter health regulations.

This outlook reflects the need to rethink strategies to strengthen competitive positioning.

Conceptual Framework

- *Competitiveness:*

Competitiveness is understood as an organization's ability to achieve goals, adapt to the environment, and sustain itself in the market (Raffino, 2025).

Its importance lies in the fact that it drives socioeconomic growth and compels companies to design strategies that generate added value to differentiate themselves from their competitors (Muñoz & Díaz, 2021).

- *Systematic competitiveness:*

Systematic competitiveness refers to the ability of companies to be efficient and adapt to their environment, which depends on the interaction of factors at different levels: micro (the companies themselves), meso (the government and local actors), macro (the regional context) and meta (the national and institutional framework), (Ferrer J., 2005).

The importance of this model is that it allows the company's operations to be improved and production chains to be efficiently integrated, leading to better performance in a globalized environment (Delgado, Oyola, & Padilla, 2012).

- *Water purification plants:*

Purification plants are facilities designed to eliminate microorganisms and contaminants from water, ensuring its potability (López, 2020).

Nowadays, this type of company is gaining greater importance due to society's awareness of consuming purified water and receiving reliable service (Dirié, 2019).

Its competitive advantages include product quality, customer satisfaction and the ability to differentiate itself from competitors with deficiencies in service (Porter, 1985).

Methodology

This research will be conducted using a qualitative approach, as it seeks to understand the phenomena in their real-life context from the perspective of the participants (Hernández, 2014).

The type of study is classified as descriptive or explanatory. The descriptive type will detail the experiences and perceptions of the participants, while the explanatory type will provide an analysis of the causes and factors that generate the problem (Martínez, 2012).

The data collection instrument will be an interview, based on a previously designed question guide with the flexibility to delve deeper into the participants' responses. According to Kvale (2011), this type of interview allows for detailed and meaningful descriptions, focusing on aspects relevant to the research, while the researcher guides the conversation toward the topics of interest.

The study population corresponds to one company in class 222112 (collection, treatment, and supply), focused solely on the employees of the Karina Water Purification Plant, located in División del Norte, Escárcega, Campeche. The total population consists of four purification plants, and a sample size of three was determined. Therefore, the research instrument (DENUE, 2025) will be randomly administered to three companies.

Sample

$$n = \frac{\sigma^2 N * p * q}{e^2(N - 1) + \sigma^2 * p * q}$$

Data:

N = Population size = 4

σ = Confidence level (94%) = 1.88

q = Success rate (50%) = 0.5

q = Estimated failure rate = 0.5

he = Estimated error between the actual rate and the sample rate (6%) = 0.06

$$n = \frac{(1.88)^2 (4)(0.5)(0.5)}{(0.06)^2(4 - 1) + (1.88)^2(0.5)(0.5)}$$

$$n = \frac{3.5344}{0.8944} = 3.9516 = 3$$

Schedule of Activities

The schedule of activities establishes in an organized manner the stages to be carried out during the investigation:

Table 1. Activity program.

N	Name of the activity	Activity description	Deliverable	End date	Weeks															
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Identification of the	The study idea is chosen by observing	Title of research to be	5/09/2025																

	study idea.	the environment.	carried out																
2	Preliminary investigation.	The review article is prepared by consulting various bibliographic sources of information on the systemic competitiveness of companies.	Document review report.	5/09/2025															
3	Preparation of interview guide.	The guide is designed with open-ended questions to obtain qualitative information on the company's competitiveness.	Interview guide.	5/09/2025															
4	Interview application.	The interview will be conducted in person with the company participants.	Cronograma de entrevistas.	5/09/2025															
5	Analysis and interpretation of results	The responses obtained are analyzed, identifying patterns, categories and key factors.	Preliminary results report.	5/09/2025															
6	Make a report.	The report is prepared and developed with the help	Project report.	5/09/2025															

- Castañeda, D. (2008). Competitiveness under review. Current Accounting News FACES. Retrieved from <https://www.redalyc.org/pdf/257/25701604.pdf>
- CDMX, I. (2022). Types of business competitiveness. Retrieved from <https://cdmx.imef.org.mx/blog/crecimiento-economico-en-mexico/tipos-de-competitividad-empresarial/>
- Chunke, D. G. (2024). Retrieved from What are the main types of water treatment plants?: <https://www.chunkerowaterplant.com/news/water-treatment-plant#>
- Cih, D. (2019). Study of systemic competitiveness. Retrieved from <https://www.eumed.net/actas/19/trans-organizaciones/08-estudio-de-la-competitividad-sistematica.pdf>
- Delgado, M., Oyola, A., & Padilla, L. (2012). The challenge of globalization: competitiveness from a systemic approach. *Gestión & Desarrollo*. Retrieved from <https://revistas.usb.edu.co/index.php/GD/article/view/639/439>
- DENUE. (September 16, 2025). National Statistical Directory of Economic Units. Retrieved from INEGI: <https://inegi.org.mx/app/mapa/denue/default.aspx>
- Díaz, D. (2018). Introduction to systemic competitiveness and the influence of the real exchange rate on exports. *E-KÓ Divulgando Journal*. Retrieved from <https://hdl.handle.net/20.500.12219/4955>
- Dirié, J. S. (2019). Water Purification and Bottling Plant Project. Paraná. Retrieved from <https://ri.unsam.edu.ar/bitstream/123456789/1114/1/TFPP%20EEYN%202019%20DJS.pdf>
- Ferrer, J. (2005). Systemic Competitiveness. Analytical levels for strengthening economic activity sectors. *Journal of Social Sciences*. Retrieved from https://ve.scielo.org/scielo.php?script=sci_arttext&pid=S1315-95182005000100010
- Gómez, A. M. (2004). *The Systematic Competitiveness Approach*. Costa Rica.
- González Morera, I. (2002). *Purchasing and Storage*. Mexico City: EUNED.
- Hernández, R. (2014). *Research Methodology* (6th ed.). Mexico City: McGraw-Hill Education.
- Hernández, R., & Mendoza, C. (2018). *Research Methodology*. Mexico City: McGraw-Hill Education.
- Kvale, S. (2011). *Interviews in Qualitative Research*. Ediciones Morata. Retrieved from https://books.google.com.mx/books?id=BZojEAAAQBAJ&printsec=frontcover&dq=las+entrevistas+cualitativas&hl=es&newbks=1&newbks_redir=0&sa=X&redir_esc=y#v=onepage&q&f=false
- López, I. (2020). Implementation of a Water Purification System. *Journal of Business and Entrepreneurship*. Retrieved from <http://journalbusinesses.com/index.php/revista>.
- Martínez, H. (2012). *Research Methodology*. Mexico City: CENGAGE Learning. Retrieved from https://drive.google.com/drive/folders/1Lec448u6KmBF4BbdN8_8IBs-VHuN-udP?usp=drive_link
- Muñoz, G., & Díaz, A. (2021). Competitiveness as a Growth Factor for Organizations. *INNOVA Research*. doi: <https://doi.org/10.33890/innova.v6.n1.2021.1465>
- Naghi Namakforoosh, M. (2005). *Research Methodology*. Mexico City: LIMUSA.
- Pacheco, M. (2005). *Competitive Advantage: Management at the Firm Level*. *Markets and Business*. Retrieved from <https://www.redalyc.org/pdf/5718/571864037007.pdf>
- Porter, M. E. (1985). *Competitive Advantage: Creating and Sustaining Superior Performance*. New York: Free Press.
- Raffino, E. e. (2025). Competitiveness. Retrieved from <https://concepto.de/competitividad/>
- Redro Nel Ráez, W. G. (2022). *Theories of Competitiveness: A Synthesis*. Republicana.
- Sánchez-Leyva, J. L., Zapata-Lara, H. D. C., & Sánchez-Zeferino, D. E. (2020). Systemic Competitiveness of Firms in Mexico. *Vinculatégica EFAN*, 6(1), 597–611. <https://doi.org/10.29105/vtga6.1-611>
- Tuset, S. (2025). History of drinking water treatment. Retrieved from <https://condorchem.com/es/blog/historia-sobre-el-tratamiento-del-agua-potable/>

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