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Presentation of Content

In a first article we present, *The Influence of the Socioeconomic Environment on the Financial Culture of the Child Population in Southern Sonora*, by Partida-Enríquez, Edgar, Vázquez-Jiménez, Imelda Lorena, Duarte-Gil, Kevin and Landazuri-Aguilera, Yara with adscription at Instituto Tecnológico de Sonora, in the next article we present, *Public debt, voter turnout, and political affiliation as determinants of state competitiveness in Mexico [2022–2024]*, by Galván Zavala, Karina & Quiroga Juárez, Christian Arturo, with adscription at Universidad de Guanajuato and Instituto Tecnológico Superior de Guanajuato, in the next article we present *Design of a behavioral economics measurement instrument for university students at the Technological Institute of Sonora*, by Ruiz-Pérez, Roberto, López-Padilla, Frida Camila, Landazuri-Aguilera, Yara and Acosta-Mellado, Erika Ivett, with adscription at Instituto Tecnológico de Sonora, in the last article we present, *Strengthening operational excellence in Mexican SMEs: a model based on change management and continuous improvement*, by Torres-Gutiérrez, Arturo, Lino-Gamiño, Juan Alfredo, Luis-Octavio, Ríos Silva and Mora-del Toro, Cuahutémoc, with adscription at Universidad Internacional de la Rioja and Universidad de Colima.


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The Influence of the Socioeconomic Environment on the Financial Culture of the Child Population in Southern Sonora





Influencia del entorno socio económico en la cultura financiera en la población infantil en el Sur de Sonora.

Partida-Enríquez, Edgar ^a, Vázquez-Jiménez, Imelda Lorena* ^b, Duarte-Gil, Kevin ^c and Landazuri-Aguilera, Yara ^d

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



Abstract

This research analyzes the influence of socioeconomic environment on financial knowledge and savings intentions among children in Southern Sonora. Using a descriptive-correlational, cross-sectional quantitative approach, the sample comprised 231 children between 10 and 11 years of age from five elementary schools in Southern Sonora. The independent variable was socioeconomic environment [EE], and the dependent variables were basic financial knowledge [BFK] and personal financial practice [PFP], using a Likert-scale questionnaire. The results showed no statistically significant correlations using Spearman's correlation between economic environment and basic financial knowledge and personal financial practice. The lack of significant p-values reflects this lack of significance in the data. The results of this research are valuable because they indicate that the relationship between the variables considered is not as simple or direct as previously thought. In science, finding that there is no significant relationship is as important as finding one, as it helps rule out hypotheses and redirect research in new directions.

Resumen:

Esta investigación es para analizar la influencia del entorno socioeconómico en los conocimientos financieros y la intención de ahorro de la población infantil del Sur de Sonora. Con enfoque cuantitativo corte descriptivo-correlacional, transversal, muestra de 5 escuelas primarias del sur de Sonora, 231 participantes, niños[as] entre 10-11 años de edad. Variable independiente entorno socioeconómico [EE], las variables dependientes conocimientos básicos sobre finanzas [CBF] y práctica de finanzas personales [PFP] con un cuestionario con escala de Likert. Con resultados donde no existen correlaciones estadísticamente significativas bajo la correlación de Spearman, entre el entorno económico y los conocimientos básicos de finanzas y la práctica de finanzas personales, la carencia de p-valores significativos refleja esta falta de significancia de los datos. Los resultados de esta investigación son valiosos porque indican que la relación entre las variables que se consideró no es tan simple o directa como se pensaba. En la ciencia, encontrar que no hay una relación significativa es tan importante como encontrarla, ya que ayuda a descartar hipótesis y a reorientar la investigación hacia nuevos caminos.

| | | | |
|---------------------|---|--|--|
| Objective | Analyze the influence of socioeconomic environment on financial knowledge and savings intentions among children in Southern Sonora. | | |
| Method | Collection  | Analysis  | Conclusions  |
| Findings |  | No statistically significant correlations using Spearman's correlation between economic environment and basic financial knowledge and personal financial practice. | |
| Contribution | The relationship between the variables considered is not as simple or direct as previously thought. | | |

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| Objetivo | analizar la influencia del entorno socioeconómico en los conocimientos financieros y la intención de ahorro de la población infantil del Sur de Sonora | | |
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| Contribution | La relación entre las variables que se consideró no es tan simple o directa como se pensaba. | | |

Socioeconomic Environment, Financial Education, Child Population.

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Introduction

Since ancient times, the ability to manage resources efficiently has been important in the life of the individual, as survival has depended on these resources [food, water, and shelter].

That is why, throughout history, the acquisition and management of resources has evolved, but the essence remains the same: the survival of the individual.

It is important to understand that all financial matters began with a principle in the markets, which are places where sellers and buyers meet, with buyers providing a commodity [money] in exchange for goods from sellers. This gave rise to supply and demand, with the price being what is paid [Sampedro Sáez, 2002].

Little by little, this principle of exchange has expanded to the present day, where a large number of financial instruments are available to most people. Due to the large number of financial instruments that surround us today, the concept of personal finance has taken on greater importance.

According to [López García, 2016], the subject of personal finance describes the individual's relationship with money management, which is essential because it is reflected in financial, psychological and family life. Likewise, for [Rodríguez Raga, 2017], the topic of personal finance concerns everyone, as it is something that arises in daily life, and having a good understanding and application of these concepts can be the difference between fulfilling one's dreams or not.

According to [Olmedo Figueroa Delgado, 2009], there are two objectives in personal finance. One seeks a high standard of living with luxuries, while the other objective is to create wealth by seeking sustainability through one's own actions supported by financial planning, through which financial freedom is obtained.

That is why financial education plays a very important role in an individual's life.

In order to understand financial education correctly, it is important to know the context that encompasses this concept.

In this sense, it is defined as follows by the [OECD, 2005, as cited in Ferrada and Montaña, 2022] as 'the process by which consumers/financial investors improve their knowledge of financial products, concepts and risks and, through information, instruction and/or objective advice, develop the skills and confidence to become more aware of financial risks and opportunities, to make informed decisions, to know where to go for help and to take other effective measures to improve their financial well-being'.

Thus, the objective is not only to be informed about the various financial instruments and products, but also to develop the ability to make better financial decisions based on the knowledge acquired.

It is important to understand in depth the benefits that financial education can bring to individuals. [García et al., 2013] mention that: "The benefits of financial education can also extend to the economy as a whole. Financial education can promote the skills necessary to make informed and appropriate decisions, as well as provide tools for people to defend their rights as financial consumers. Furthermore, financially literate citizens will have a greater ability to understand the economic and social policies adopted in their economies" [p. 16].

It is necessary for such financial education to be a reality in the management of personal finances. Today, the growth of technology and its reach is even greater than it was 10 or 20 years ago, which is why the concept of *financial inclusion* has emerged. According to the [World Bank, 2018], 'the access that individuals and businesses have to a range of useful and affordable financial products and services that meet their needs—transactions, payments, savings, credit, and insurance—and that are provided in a responsible and sustainable manner.'

According to [INEGI, 2024], a study conducted in Mexico to determine the extent of financial inclusion in the country found that in 2018, 68.3% of the Mexican population had at least one financial product, in 2021, 67.8% had at least one financial product, and in 2024, 76.5% had at least one financial product.

It was also found that 47.1% of the Mexican population had at least one bank account in 2018, 49.1% in 2021, and 63% in 2024. By 2024, 35.2% will have a formal payroll account, 24% will have a savings account, and 3.4% will have a fixed-term deposit account. Finally, by 2024, 37.3% of the Mexican population will have a bank loan, 22.9% will have insurance with a financial institution, and 42.2% will have an AFORE account.

Access to financial instruments is financing that allows people to obtain goods or experiences without having the money to pay for them, which can be very beneficial, but also very dangerous, as without proper control, it can lead to insolvency.

Governments and economic organisations are addressing the issue from childhood, i.e. educating children in the correct and efficient use of personal finance techniques so that when they reach working age, they have the ability to save, budget and, above all, plan for a secure and stable future.

Financial education can help children understand the value of money and teach them how to budget and save. It can also give students and young people in general important preparation for living independently, for example, when it comes to managing and repaying student loans, and it can also help adults plan for important events, such as buying a home or deciding to become parents [Aguilar Sinche et al., 2019].

According to the [European Economic and Social Committee, 2017], work is being done in Europe to instil financial education from an early age. Countries such as Spain, Germany, France, Italy, Slovakia and the United Kingdom have adapted different strategies ranging from websites to raise awareness of saving and budget simulations to compulsory subjects in basic education.

The level of debt experienced by people today is increasing, one of the main reasons being that most citizens do not have proper control over their finances. Much of this problem is caused by poor financial literacy and low discipline in asset management.

Considering that this project focuses on the influence of the socio-economic environment on the financial literacy of children in southern Sonora, the following research question arises: To what extent does the socio-economic environment influence the financial knowledge and savings intentions of children in southern Sonora?

Likewise, the following hypotheses are established:

Research Hypothesis [H1]: The socio-economic environment of children in southern Sonora has a significant and positive impact on their basic financial knowledge and their intention to save.

Null Hypothesis [H0]: The socioeconomic environment of children in southern Sonora does not have a significant impact on their basic financial knowledge or their intention to save.

The aim is to analyse how the economic environment impacts two key variables in children:

1. Basic financial knowledge: What children know about concepts such as money, budgeting, saving, among other concepts.
2. Personal finance practices: The intention to save, spend consciously, etc.

Therefore, the project variables are as follows:

Independent Variable [Y]: Socioeconomic environment: This includes factors such as the family's economic situation, the parents' level of education, access to financial services, availability of information, among other points.

Dependent Variables [X1]: Basic financial knowledge: This will be measured through a questionnaire to assess the level of understanding of financial concepts.

[X2]: Personal finance practices: This will be measured through questions about children's propensity or desire to save money for a specific purpose.

The overall objective is to analyse the influence of the socio-economic environment on the financial knowledge and savings intentions of children in southern Sonora.

Considering the following specific objectives

Describe the socio-economic profile: Characterise the socio-economic environment [family income, parents' education] of a sample of the child population in the region.

Assess financial knowledge: Determine the level of knowledge of basic financial concepts among the children in the sample.

Measure savings intentions: Understand children's propensity or intention to save and how they do so.

Establish the relationship: Determine whether there is a correlation between children's socioeconomic environment and their level of financial knowledge and savings intentions.

The important thing is to create a tool that is capable of capturing the child's knowledge and is also simple enough to understand. The study of personal finance in childhood is a relatively new topic. Due to increased financial inclusion, people have access to a greater number of financial instruments from an early age, which is why various organisations have promoted a culture of finance at an early age in recent years. Some countries have accepted the challenge, while others consider it a good plan to implement in the future.

For Higuera Torres and Serrano [2009], as cited in [Rodríguez González and Arias Ballesteros, 2018], financial literacy is defined as a set of knowledge, skills, attitudes, ideas, perceptions, customs and rules that are shared as a society in relation to the financial environment and the institutions that are part of it.

[Montoya Coronado, 2005] asserts that culture is a result, while education is a learning process. Because CONDUSEF is responsible for imparting financial literacy, it cannot do its job optimally if the learning process is not carried out, as one is a consequence of the other. It is interesting to note that when analysing the concept of financial literacy, we start from a social environment that leads a person to think or act in a certain way, which is ultimately reflected back in that same society.

For [Merino González, 2023], young people must have adequate financial knowledge, as this helps them to use financial products more responsibly and avoid falling into debt problems from an early age. [Ruiz Ramírez, 2011] reinforces this point by mentioning that the more complex the financial system becomes, the more necessary it will be to access financial education.

It is important to acquire greater knowledge and understand the environment and the individual themselves. This is why financial education in childhood aims to prepare children in a comprehensive manner, enabling them to adapt to the financial society that awaits them in the future through the necessary skills and knowledge.

[García Gómez, 2011] also emphasises that it is very important for the learning that children obtain from their parents to be reinforced in schools, since, although children imitate their parents' good financial habits, as they grow older, these saving habits usually disappear. It is also essential that concepts are well understood and assimilated by people from an early age, as over time there is a risk of losing this valuable information and making poor financial decisions.

Regarding the importance of financial education for children, [Wright et al., 2009] mention that learning begins from the moment a child is born and that investing in quality care and development for children in their early years can improve their chances of educational performance and learning for the rest of their lives. Because financial education should begin at an early age, it is important to understand the social environment surrounding a child and the impact it has on early learning.

According to [Daros, 1997], a society is a group of human beings who form a system that is self-sufficient and capable of existing in a period of time, with a common and not individual goal; this goal may be material, cultural, moral, or intellectual. Likewise, the author asserts that education always implies, more or less implicitly, an idea of what man is or can be and what society is or can be; because, in effect, education is considered a process, a passage, a development of what human beings and society are and can be.

Teachers, then, without being sociologists or philosophers, must take on some ideas about these issues, because without them their work lacks meaning and motivation.

This reinforces the importance of teachers in education, as they are professionals in the art of facilitating learning and are also people with ideals and hope for human growth. [Guerrero Jaimes et al., 2018] conducted research with the aim of identifying the knowledge that young people in basic education in grades six to eight in Colombia had about personal finance, specifically about money management and saving. It was descriptive in nature with a non-experimental, cross-sectional design.

They considered a population of 96 students from schools in the municipalities of the province of Pamplona, Colombia. In the research, they used a questionnaire as a method of collecting information. This instrument consisted of five questions, which were presented with descriptive statistics, in addition to the analysis and discussion of the results obtained. The results obtained in the research led to the conclusion that young people in basic education in the city of Pamplona do not have sufficient knowledge about personal finance, citing as causes the lack of guidance on the subject at home, as well as in schools.

Methodology

According to [Hernández Sampieri et al., 2014], this study falls within a quantitative descriptive-correlational approach. It is quantitative, as it was based on the collection and analysis of numerical data to measure the variables and test the hypothesis. It is also non-experimental, because the variables were not manipulated; instead, they were observed as they manifest themselves in their natural context. It is cross-sectional, because data collection was carried out at a single point in time to describe the variables and analyse their interrelationships.

The sample included five primary schools in different locations in southern Sonora, with a total participation of 231 fifth-grade primary school pupils, 67% of whom were girls and 33% boys. The collaboration of the respective school authorities was obtained at all times.

The variables for the study were considered independent of the socioeconomic environment [SE], which was measured using an 8-item questionnaire designed for children to learn about their home situations and basic services. Dependent variables included basic financial knowledge [BFK], which was also assessed using an 8-item questionnaire designed for children, with multiple-choice questions specifically on concepts such as saving, budgeting, spending and money. Another dependent variable was personal finance practice, measured using a Likert scale included in the questionnaire for children, who were asked to indicate their level of agreement or disagreement with statements related to the habit and intention to save, with a total of eight items.

It is important to mention that the questionnaire was adapted to the language and age of the participants, and questions were considered to assess financial knowledge and saving intentions. The 24-item instrument was validated by experts and pilot tested to ensure its reliability and comprehensibility.

The procedure was divided into three phases:

1. Preliminary Phase: Request for permission from the principals and teachers of the selected schools.
2. Data Collection Phase: The administration of the questionnaires was coordinated with the schools in a controlled environment and with the informed consent of parents or guardians. The questionnaires for children were administered in groups, under the supervision of the researcher and/or project collaborators.
3. Data Analysis Phase: Once collected, the data were coded and processed using SPSS V.21 statistical software.

For data analysis, statistical tests were performed to evaluate the hypothesis. Spearman's correlation analysis was used because the data did not show statistical normality [Rodríguez Salazar, 2000].

Results

Table 1 shows the normality analysis of the collected data. According to [Hair et al., 2017], for a sample to be considered normal, it must reflect asymmetry and kurtosis values between -1 and 1.

As can be seen, some values exceeding this range were obtained in the analysed data, so it is possible to state that, overall, the data obtained are not statistically normal.

Box 1

Table 1

Skewness and kurtosis of the study variables

| Variable | Dimension | Skewness | | Kurtosis | |
|----------------------|----------------------------|----------|----------------|----------|----------------|
| | | Value | Standard error | Value | Standard error |
| Economic environment | Economic environment | 0.368 | 0.16 | 1.999 | 0.319 |
| Financial Culture | Basic financial knowledge | -0.044 | 0.16 | - | 0.319 |
| | Personal finance practices | -2.01 | 0.16 | 3.32 | 0.319 |

Source: Own elaboration

Under the assumption of non-normality of the data, the correlation of the study variables was assessed using Spearman's correlation. The results of this analysis are shown in Table 2.

Box 2

Table 2

Correlation of study variables

| | Entorno económico | Conocimientos básicos de finanzas | Práctica de finanzas personales |
|-----------------------------------|-------------------|-----------------------------------|---------------------------------|
| Entorno económico | 1 | -0.093 | 0.102 |
| Conocimientos básicos de finanzas | -0.093 | 1 | -0.059 |
| Práctica de finanzas personales | 0.102 | -0.059 | 1 |

Source: Own elaboration

According to the results obtained, there are no statistically significant correlations in the sample collected between the economic environment and basic financial knowledge, or with personal finance practices. The lack of significant p-values reflects this lack of significance in the data.

Conclusions

In this project, the research hypothesis [H1] established that there is a significant and positive relationship between children's socioeconomic environment and their basic financial knowledge and intention to save.

In other words, it was expected that as children's socioeconomic environment improves, so too will their financial knowledge and willingness to save. On the other hand, the null hypothesis [H0] is the opposite statement: that there is no significant impact of the socioeconomic environment on children's financial knowledge or intention to save. The results showed that the data do not follow a normal distribution.

The asymmetry and kurtosis values are outside the acceptable range of -1 to 1 for the variables. With regard to the asymmetry in the personal finance practice variable of -2.01, this indicates that most of the responses were concentrated at the upper end of the scale, i.e., there was a greater tendency for children to have a high level of personal finance practice. Likewise, with regard to kurtosis, a value of 3.32 for personal finance practice suggested a distribution with more data concentrated around the mean. The non-normality of the data necessitates the use of a non-parametric correlation test, such as Spearman's correlation coefficient, as it is more robust and does not require the data to have a normal distribution.

The result that there are no statistically significant correlations between the economic environment and basic financial knowledge, as well as personal finance practices, with the data collected, does not demonstrate that the economic environment is related to financial knowledge or personal finance practices among children in southern Sonora.

The results are interesting because they challenge the initial assumption of the hypothesis, opening the door to new questions and future research. Other variables can be explored. These results suggest that the socioeconomic environment, as measured, is not a determining factor. The questionnaire was aimed at children, so it could be considered to be aimed at parents to determine their own financial attitudes, perhaps access to technology such as savings apps, school education, or even the influence of their classmates.

Partida-Enríquez, Edgar, Vázquez-Jiménez, Imelda Lorena, Duarte-Gil, Kevin and Landazuri-Aguilera, Yara. [2025]. The Influence of the Socioeconomic Environment on the Financial Culture of the Child Population in Southern Sonora. Journal-Macroeconomics and Monetary Economy. 9[15]1-8: e1915108.

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A qualitative approach could be considered, conducting in-depth interviews with a select group of children and their parents could reveal nuances that quantitative analysis could not capture. This could help to understand the underlying reasons why the relationship does not exist or is more complex.

In summary, the results of this research are valuable because they indicate that the relationship between the variables considered is not as simple or straightforward as previously thought. In science, finding that there is no significant relationship is as important as finding one, as it helps to rule out hypotheses and reorient research in new directions.

Teaching children about finance goes beyond giving them pocket money; it helps them understand the value of money and develop saving and budgeting habits. This training is equally essential for young people, as it prepares them for the challenges of adulthood, such as managing loans.

Even for adults, financial education is key, enabling them to make important decisions and plan for life milestones such as buying a home or having children.

Conflict of interest

The authors declare that they have no conflict of interest. They have no known competing financial interests or personal relationships that could appear to influence the article reported in this paper.

Contribution of the authors

Partida – Enríquez, Edgar: Contributes project idea and research development.

Vazquez-Jimenez, Imelda Lorena: Collaborated on the development of the research, the research method, and data analysis.

Duarte-Gil, Kevin: Contributed to the development of the theoretical framework, data analysis, review, and editing.

Landazuri-Aguilera, Yara: Contributed to the review and editing of the document.

Availability of data and materials.

The data sets used or analysed during the current study are available from the corresponding author upon reasonable request.

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Public debt, voter turnout, and political affiliation as determinants of state competitiveness in Mexico [2022–2024]**Deuda pública, participación electoral y signo político como determinantes de la competitividad estatal en México [2022–2024]**Galván Zavala, Karina *^a & Quiroga Juárez, Christian Arturo^b.^a ROR Universidad de Guanajuato  0000-0001-5759-8814 •  273545^b ROR Instituto Tecnológico Superior de Guanajuato,  0000-0002-8905-670X •  514254**Classification:**Area: Social Sciences
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* ✉ [\[k.galvan@ugto.mx\]](mailto:k.galvan@ugto.mx)**Abstract**

The objective of this research is to analyze, using the ordinal logistic regression method, the influence of the variables of public debt, citizen participation and political sign, with respect to regional competitiveness in Mexico. The results show that citizen participation and the adequate management of indebtedness are significant in modeling the performance of state competitiveness, in addition, there are differentiated results according to the political sign that governs the states, which suggests that the political sign can modulate the quality of spending and its effect on regional economic development. This work contributes to the understanding of the conditions under which governance and sustainable public finances can be a tool for boosting state competitiveness.

Resumen

El objetivo de esta investigación es analizar mediante el método de regresión logística ordinal, la influencia que tienen las variables de deuda pública, participación ciudadana y signo político del partido gobernante, respecto a la competitividad estatal en México. Fue usado el análisis de regresión logística ordinal. Los resultados muestran que la participación ciudadana, el adecuado manejo del endeudamiento son significativos para modelar el desempeño de la competitividad estatal, además hay resultados diferenciados en función del signo político que gobierna en las entidades federativas, lo que sugiere que el signo político puede modular la calidad del gasto y su efecto en el desarrollo económico regional. Este trabajo contribuye al entendimiento de las condiciones bajo las cuales la gobernanza y las finanzas públicas sostenibles puede ser una herramienta para el impulso competitivo de los estados.

| Public debt, voter turnout, and political affiliation as determinants of state competitiveness in Mexico [2022–2024] | | |
|---|--------------------------------------|---|
| Objective | Methodology | Contribution |
| The objective of this research is to analyze, using the ordinal logistic regression method, the influence of the variables of public debt, citizen participation and political sign, with respect to regional competitiveness in Mexico | Ordinal logistic regression analysis | This work contributes to the understanding of the conditions under which governance and sustainable public finances can be a tool for boosting state competitiveness. |

State competitiveness; Public debt; Political affiliation.

| Public debt, voter turnout, and political affiliation as determinants of state competitiveness in Mexico [2022–2024] | | |
|--|-----------------------------|--|
| Objetivo | Metodología | Contribución |
| Analizar mediante el método de regresión logística ordinal, la influencia que tienen las variables de deuda pública, participación ciudadana y signo político del partido gobernante, respecto a la competitividad estatal en México | Regresión logística ordinal | Contribuye al entendimiento de las condiciones bajo las cuales la gobernanza y las finanzas públicas sostenibles puede ser una herramienta para el impulso competitivo de los estados. |

Competitividad estatal; Deuda pública; signo político**Area:** Advocacy and attention to national problems

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1702902 **SECIHTI**

Introduction

The concept of economic competitiveness is crucial to understanding why some states attract greater investment, generate more employment, and have better living conditions than others. In the case of Mexico, the State Competitiveness Index [ICE] is published periodically, allowing for comparisons between highly competitive regions and those that are not. This raises an important question: what impact do factors such as public debt, citizen participation, and political affiliation have in explaining these gaps?

This research is based on the premise that competitiveness does not depend solely on structural or geographical conditions, but also on other variables such as the level of debt, citizen participation, and the ruling political party. These variables could be directly influencing the quality of public spending.

In Mexico, when we study the last three years [2022 to 2024], we find that not all states evolve in the same way. For example, those governed by the National Action Party [PAN] are more likely to achieve high ICE levels, while those led by the National Regeneration Movement [MORENA] or by coalitions with this party tend to rank at the lowest levels.

Based on a review of the literature, it is possible to state that there is still a knowledge gap, considering that few studies analyse the combined impact of the PARTY, state DEBT and CITIZEN PARTICIPATION on economic competitiveness. This leads to a problem rooted in a lack of knowledge about the impact of the variables under study on competitiveness, which prevents the contribution of these variables to a possible public action strategy that would favour less competitive states from being assessed. That is why this article, using ordinal logistic regression, quantifies how DEBT, CITIZEN PARTICIPATION and the state government's PARTY are related to competitiveness in the time window from 2022 to 2024.

The results are significant because they allow us to elucidate differentiated results based on political affiliation, level of indebtedness, and citizen participation. This contributes both to the theoretical corpus for understanding the dynamics of these variables and to possible political and public action strategies.

The structure of the article is as follows: it begins with a theoretical overview. Next, the state of the art is presented, focusing on the Mexican context. Then, the methodological aspects, the variables analysed and the model used are detailed. In the results section, the main findings are discussed and, finally, the conclusions, some limitations of the study and possible future lines of research are presented.

Regional competitiveness

Numerous studies have explored the factors that explain competitiveness, considering its importance for both the economy and development [Squalli et al., 2008; Rusu and Roman, 2018; Simionescu, 2021] as well as its evolution in some contexts [Zhang et al., 2020; Borsekova et al., 2022; Bardey et al., 2022 Amato et al., 2023; Gutiérrez-Hita, 2025].

According to Aramayo et al. [2012], regional competitiveness is the ability of regions to trigger economic growth relative to other regions while maintaining social cohesion and sustainability. At a theoretical level, economic crises have sparked interest in regional economic studies, although little attention has been paid to the Latin American context [Delgado et al., 2023].

The determining factors of regional competitiveness are varied and go beyond economic growth alone; to mention a few, the environment, social aspects and infrastructure are decisive factors [Qi et al., 2024]. Furthermore, according to Villalobos et al. [2024], Ríos [2023] and Guedes et al. [2023], there is a relationship between competitiveness and innovation. For Latin America, according to Catalán [2021], social welfare is associated with the competitive capacities of different regions.

Aramayo and Vokoun [2012] argue that economic aspects such as GDP, foreign direct investment, social aspects such as migration and technology, as well as institutional aspects, are determinants of regional competitiveness. They conclude that high levels of corruption, low investment in R&D, poor institutions and high migration are inversely correlated with competitiveness.

Brown et al. [2020] analyse competitiveness from a neo-institutional approach, considering the institutional framework from the perspective of laws, norms, and formal and informal rules. The authors refer to competitiveness as a capacity that enables sustainable growth in countries.

According to the World Economic Forum, six pillars are identified in relation to the institutional framework: institutions, infrastructure, macroeconomic environment, goods market efficiency, labour market efficiency, and financial market. In this vein, Amann and Figueroa [2024] mention that some of the factors explaining the competitiveness of Latin American countries include education, innovation, high institutional quality, and the attraction of investment, as well as social stability.

These authors conclude that regional competitiveness improves the well-being of the population thanks to increased productivity. Governance and electoral participation

From Acharya's work [2024], it can be said that governance is a very broad concept that goes beyond simply government; it is the way of governing, how power and public resources are managed. In the literature, governance refers to the way in which formal and informal institutions are organised. It also refers to a cycle in which policies are formulated, and governance is related to interests that influence institutional design [Muñoz et al., 2024; Córdova, 2024; Aguilar, 2024; Quintero et al., 2023].

With regard to electoral participation, Arum [2024] mentions that electoral participation is not only the act of voting, but is also related to active and civic participation in the monitoring, prevention and supervision of electoral processes. Additionally, voting processes must be accessible to persons with disabilities and religious organisations. In this regard, some authors have studied the factors that explain the level of voting in certain population groups [Gonzalez et al., 2020; Arriagada, 2021; Cuesta, 2023; Pérez et al., 2024; Buquet et al., 2024; Hernández and Recuero, 2024] as well as the relationship with other components of citizenship [Díaz and Moreno, 2024].

Based on the above, voting is the basic form of participation, which is a necessary component of democratic governance. We can therefore say that there is a relationship between electoral participation and governance.

Subnational public debt

Some studies have focused on the effect of fiscal rules on subnational debt growth [Gregori, 2018; Astudillo et al., 2017]. In the case of Mexico, Del Castillo and Cabral [2024] found significant reductions in debt levels and per capita debt following the introduction of the fiscal alert system. Ávila [2024] reports improvements in budget balances and debt costs, although there has been no change in the total volume of obligations. Both studies agree that the Financial Discipline Law has strengthened fiscal discipline in states and municipalities. In this regard, Astudillo et al. [2019] share the idea of the importance of accountability in Mexican subnational debt.

For their part, Ruelas and Izquierdo [2021] found that Mexican states have reduced fiscal space for debt, which is even necessary in some cases. Mendoza et al. [2023] argue that there is a direct relationship between certain levels and types of subnational debt and regional economic growth. Vera et al. [2023] found a direct relationship between subnational debt and investment. Cabral et al. [2022] analysed the level of debt and its relationship with certain political factors, identifying that vertical political affinity is not a determining factor in the approval of debt.

Sánchez and García [2016] argue that there is a positive relationship between public debt and public investment, while investment correlates with economic growth, but the marginal effect is small. A 1% increase in the interaction of the investment-debt variables generates an increase of only 0.0005% of GDP. For their part, Galván et al. [2023] mention that although public debt is useful for financing public investment, this is only the case if it is managed correctly.

Simionescu and Cifuentes-Faura [2023] mention that public debt in Mexican states shows a significant spatial correlation, with poverty being the main determinant of debt. According to García and Sánchez [2024], there is a relationship between state public debt and economic growth in Mexico.

These authors emphasised that, in the context of the post-2008 crisis, high levels of debt in certain states can have a negative impact on their competitiveness. For their part, Martínez et al. [2021] identified that public debt in Mexico, when driven by social spending and financial bailouts, has negative implications for competitiveness, leading to low investment and unemployment.

Based on the above studies, it can be proposed that public debt in Mexico has implications for state economic competitiveness. Although the functional relationships between public debt and economic growth depend on multiple factors, it is possible to say that public debt can facilitate investment, but if not managed correctly, it can also limit growth and competitiveness.

Political orientation and state performance

Starting from an international context, Facchini and Melki [2012] state that, from an ideological perspective, left-wing governments in France have promoted redistributive policies, while right-wing parties favour economic performance. Brumm and Hörisch [2025] identified that Christian Democratic governments prioritised universities, while left-wing and Free Democrat governments prioritised the expansion of public nurseries. Kolios [2019] mentions that left-wing parties typically favour fiscal expansion, prioritising social programmes over inflation. For his part, Camyar [2014] argues, based on his study of 21 advanced industrialised countries from 1989 to 2008, that the interventionist strategies of left-wing parties are more beneficial to business results than the market-oriented strategies of right-wing parties.

State of the art

The Mexican Institute for Competitiveness [IMCO] has defined state competitiveness as the ability of a state to generate, attract, and retain talent and investment. Thus, a competitive state is one where people have the opportunity to work and be entrepreneurial because they find opportunities, security, and quality of life. This definition considers not only economic growth, although this is very important, but also aspects such as education, health, innovation, the rule of law and the environment.

The idea is that economic growth alone is not enough: it is about ensuring that this growth translates into well-being for citizens.

With regard to citizen participation and its effect on competitiveness, some authors limit it to legal frameworks, social dynamics and the role of youth participation.

With regard to the influence of the political affiliation of the ruling party at the state level on competitiveness, although studies have been identified that report a strategic use of public spending to favour political alignment [Gámez & Ibarra, 2007; Ibarra, 2013; Sánchez, 2017; Simpser et al., 2016; Timmons & Broid, 2013], no studies have been identified that directly link political affiliation to state economic competitiveness performance.

Table 1 shows studies that reflect the influence of public debt, citizen participation, and the ruling party on state competitiveness. Some studies state that the influence of public debt on Mexico's competitiveness is multifaceted and reflects both positive and negative implications for economic growth and investment. Research indicates that while public debt can facilitate public investment, excessive levels can hinder economic performance.

Despite finding positive correlations between debt, investment, and GDP per capita, debt grows faster than the effects of investment, putting the sustainability of public finances at risk. Meanwhile, the governance variable requires active citizen participation in issues that are not exclusively electoral, while there is a largely clientelistic risk of citizen participation.

Box 1

Table 1
Literature review

| Author | Target | Method | Results |
|--------------------------|--|--|--|
| García [2019]. | To analyse whether subnational public debt in Mexico is effectively allocated to productive public investment, as well as to examine how debt, public investment, impacts economic growth in Mexican states during the period 2003-2016. | Panel data with random effects. | Public debt has a significant negative effect on public investment. |
| Sánchez y García [2016]. | Determine whether the increase in state public debt has boosted public investment. | Dynamic panel data models. | There is a positive relationship between public debt and public investment. That is, when states borrow, part of these resources are channelled to investment. Public investment is also positively related to economic growth, but the effect is very small. Despite the positive correlations, debt grows faster than investment and GDP per capita, which raises doubts about its sustainability. |
| Estrella [2005]. | To analyse how in Mexico's Federal District political citizenship - translated as participation - does not conform to an ideal definition of the concept, but operates through clientelistic and corporative structures. | Qualitative historical and normative analysis. | In Mexico City, participation has historically been limited by a centralist and presidentialist political regime, and mediated by clientelistic and corporative practices. |
| Cleary [2007]. | Analyse whether the performance of municipal governments in Mexico is improved more by electoral competition or by non-electoral citizen participation. | OLS regression models with log-odds transformation and random effects models [GLS] for analysing local incomes | The article downplays the importance of purely electoral participation as a driver of good local governance and highlights the value of active and daily citizen participation in achieving better municipal results. |

Source: own elaboration

Methodology

The data used in this research were obtained from the Mexican Institute for Competitiveness [IMCO], in particular the State Competitiveness Index, ICE, corresponding to the year 2024.

From the index, the ordinal position of each of the states and Mexico City was taken as the explained variable. The performance indicators of State debt and state bodies, Debt, Ruling party in the state, Party, Citizen participation in elections and Citizen participation were considered as explanatory variables [see Table 2].

Box 2

Table 2
Definition of variables

| Variable | Type | Definition | Expected sign | Categories | Source |
|----------------|-------------|---|--|---|--------|
| Shop assistant | | | | | |
| ICE | Categorical | This is the ordinal position obtained by each state during the year 2024 with respect to the State Competitiveness Index. | NA | The variable takes the ordinal categories 1,2,3,4,5,6 corresponding to the levels, Very high, High, Medium high, Medium low, Low, Very low. | IMCO. |
| Independencia | | | | | |
| Deuda | Categorical | This is the indicator for Government and government agency debt [Percentage of total revenue], belonging to the Political system and governments dimension. | Mexican states with higher debt have lower competitiveness indices if investment spending is low. | The original state debt level consisted of six categories. For ease of analysis they were recoded into a four-level ordinal scale, grouping categories with similar characteristics. 1: Very high/high debt 2: Medium high debt 3: Medium-low debt 4: Low/very low debt | IMCO. |
| PARTY | Categorical | This variable identifies the political party in power in each state.. | The ideology of the ruling party influences state competitiveness. Parties with a technocratic or pro-market orientation favour conditions that boost competitiveness. In particular, right-wing or centre-right parties might prioritise investment, infrastructure and a | The variable identifying the ruling party in the state was coded as an ordinal variable with four categories: 1: MORENA 2: PAN 3: Coalition with the ruling party 4: Other parties | IMCO. |

Box 2**Table 2**
Definition of variables

| Variable | Type | Definition | Expected sign | Categories | Source |
|-----------------------|-------------|--|---|---|--------|
| | | | business-friendly environment; left-wing parties might focus on social spending or redistribution. | | |
| CITIZEN PARTICIPATION | Categorical | This variable measures the number of votes cast as a percentage of the nominal list. | States with higher citizen participation in elections would be expected to have higher participation in all spheres, including the economic sphere, which would be related to higher competitiveness. | The original citizen participation variable, comprised of six categories, was recoded into three levels: 1 High: Includes the categories Very High Participation and High Participation. 2 Medium: Groups together the categories Medium High Participation and Medium Low Participation. 3 Low: Groups together the categories Low Participation and Very Low Participation. | IMCO. |

Source: Own elaboration

Dependent variable

The dependent variable [ICE] represents the ordinal position obtained by Mexico's federal entities in terms of competitiveness. In the IMCO ICE 2024 report, this variable is presented in six levels of competitiveness: very high, high, medium-high, medium-low, low, and very low.

For the purposes of this study, the variable has been reconfigured by grouping the first three levels into a single category, High, and the lower three levels into Low. It has thus been coded as High Competitiveness and Low Competitiveness.

Independent variables

The independent variables taken into account are debt, political party, and citizen participation.

The Debt variable represents the debt of the state and public bodies [percentage of total revenue], belonging to the Political System and Governments dimension. The variable takes the ordinal categories 1 equal to Very High/High Debt, 2 equal to Medium High Debt, 3 equal to Medium Low Debt, 4 equal to Low/Very Low Debt.

The Party variable identifies the political party in power in each federal entity. The variable takes the ordinal categories 1, 2, 3, 4 corresponding respectively to the MORENA, PAN, COALICION, and OTROS parties. Given that the study focuses on the year 2024, the official MORENA party, which obtained the largest number of deputies in the LXVe legislature, was ranked number 1. The PAN was the second political force, it has [Agresti, 2007 ; Hosmer et al., 2013 ; Espinoza et al., 2023].

The choice of this statistical algorithm was supplemented by a literature review in which articles in the fields of social sciences, administration, and economics that used generalized models were identified. [Swearingen & Jatkowski, 2011 ; Coffé & van den Berg, 2017 ; Olejnik, 2019 ; Ibáñez, 2020 ; Ibáñez, 2022 ; Thürk & Krauss, 2024 ; Cifuentes et Disi, 2024 ; Cuenca et Pérez, 2025 ; Pacheco et Zaldumbide, 2025]. In statistical modeling, several models were tested, varying the configuration of scales and the interaction of variables. The AIC, BIC, log-likelihood, and deviance criteria were used to evaluate model fit. In the second stage, debt, citizen participation, and party affiliation were modeled, in accordance with the models from stage 1, in order to explain the level of competitiveness of states, ICE. Rstudio software version 2024.12.1+563 was used to perform the modeling.

Results

In order to identify the most appropriate model, different configurations of the explanatory variables were tested, and a statistically significant and theoretically consistent model was identified that explains ICE as a function of DEBT and CITIZEN PARTICIPATION. In addition, it was identified that PARTY individually models ICE. The coefficients of these models are presented in Table 3. They indicate how the cumulative probability of belonging to a category greater than or equal to the ordinal variable varies.

Galván Zavala, Karina & Quiroga Juárez, Christian Arturo. [2025]. Public debt, voter turnout, and political affiliation as determinants of state competitiveness in Mexico [2022–2024]. Journal-Macroeconomics and Monetary Economy. 9[15]1-13: e2915113. <https://doi.org/10.35429/JMME.2025.9.15.2.1.13>

Box 3**Table 3**

Significant models

| | Model 1 | Model 2 |
|------------------------------|---------|---------|
| Determining factors | | |
| <i>PARTY</i> | | |
| <i>PAN</i> | - | |
| | 1.90*** | |
| | [0.55] | |
| <i>COALITION</i> | 0.79 | |
| | [0.98] | |
| <i>Others</i> | -0.46 | |
| | [0.48] | |
| Debt | | |
| <i>HIGH MEDIUM</i> | | -0.46 |
| | | [0.57] |
| <i>MEDIUM LOW</i> | | 0.20 |
| | | [0.56] |
| <i>LOW AND VERY LOW</i> | | -1.38* |
| | | [0.68] |
| CITIZEN PARTICIPATION | | |
| <i>AVERAGE</i> | | -1.03 |
| <i>PARTICIPATION</i> | | [0.55] |
| <i>LOW TURNOUT</i> | | 0.17 |
| | | [0.72] |
| Adjustment factors | | |
| AIC | 263.54 | 269.99 |
| BIC | 278.92 | 290.51 |
| Log Likelihood | -125.77 | -127.00 |
| Deviance | 251.54 | 253.99 |

Source: Own elaboration

Model 1, which explains state competitiveness in terms of the PARTY, was significant considering an alpha of less than 0.05. In the case of the multiple model, which explains ICE based on CITIZEN PARTICIPATION and state DEBT, it was significant for the first variable with an alpha less than 0.05 [p value < 0.05] and marginally significant for debt with an alpha close to 0.5 [p value < 0.055]. The individual significance of these variables was evaluated using the Wald test, using the p-values associated with each estimated coefficient.

The model coefficients represent cumulative log-odds, so that a negative coefficient means that the probability of remaining at low ICE levels increases, while a positive coefficient indicates a higher probability of being at high levels.

The probabilities of belonging to the different levels of the state competitiveness index [ICE] corresponding to models 1 and 2 are shown in Tables 4, 5 and 6.

Box 4**Table 4**

Probabilities by category Match

| ICE | MORENA | PAN | COALITION | OTHERS |
|---------------------------|--------|--------|-----------|--------|
| <i>HIGH LEVEL</i> | 0.1696 | 0.5762 | 0.0847 | 0.2437 |
| <i>HIGH AVERAGE LEVEL</i> | 0.2406 | 0.2461 | 0.1549 | 0.2795 |
| <i>LOW AVERAGE LEVEL</i> | 0.2838 | 0.1155 | 0.2673 | 0.2584 |
| <i>LOW LEVEL</i> | 0.3058 | 0.062 | 0.4930 | 0.2182 |

Source: Own elaboration

Table 4 shows the probabilities of belonging to each of the ECI levels as a function of the ruling parties in each of the 32 states. A stacked bar representation is shown in Figure 1.

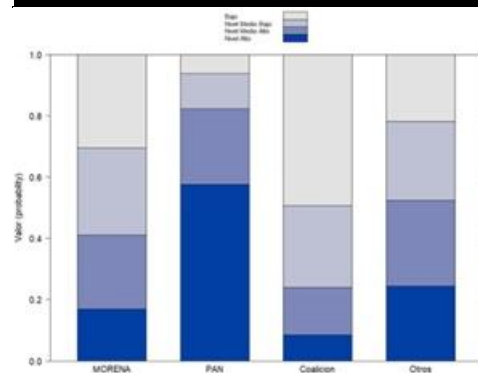
Box 5

Figure 1 comparison of probabilities of probabilities per match.

Source: Own elaboration.

The results show that states governed by the PAN have a high probability [57.62%] of being at the highest ICE level and a very low probability [6.20%] of being at the lowest level. This suggests a positive association with state competitiveness.

On the other hand, states governed by MORENA are more likely to be at the lowest ICE level [30.58%] and less likely to be at the high level [only 16.96%].

This suggests a negative association between MORENA governments and high state competitiveness. Coalition governments have a high probability [49.3%] of being in the low ICE level.

This is even lower than MORENA in this estimate, indicating a predominantly negative association [in the time window analysed, the Social Encounter Party, PES, was in coalition with MORENA and won the governorship of Morelos, although the Labour Party [PT] was also in coalition but did not win any states, therefore this coalition category represents the Social Encounter Party [PES].

In Figure 2, the probabilities obtained from the ordinal logistic model are presented in a heat map, in which the states in green represent the highest probabilities of belonging to the highest level of the state competitiveness index. These states are Coahuila, Aguascalientes, Guanajuato, Querétaro, and Yucatán. On the other hand, the region in red, Morelos, has the lowest probability of belonging to the highest level of the index.

Box 6



Figure 2

regional comparison of match probabilities.

Source: Own elaboration

The results may reflect the party's ideology and its influence on spending geared towards investment or social spending, while in the case of the alliance and its likelihood of low competitiveness, this may be due to the difficulty of reaching agreement between parties in the coalition and a lack of alignment between common objectives.

With regard to government debt, Table 5 shows the probabilities of belonging to each of the ICE levels based on government debt.

Box 8

Table 5

Probabilities by category Debt

| Debt | Very high/high | High average | Low average | Low/very low |
|-----------------------|----------------|--------------|-------------|--------------|
| HIGH LEVEL ICE | 0.1851 | 0.2647 | 0.1573 | 0.4754 |
| MEDIUM-HIGH LEVEL ICE | 0.2450 | 0.2799 | 0.2255 | 0.2753 |
| MEDIUM-LOW LEVEL ICE | 0.2790 | 0.2497 | 0.2842 | 0.1560 |
| LOW LEVEL ICE | 0.2907 | 0.2055 | 0.3328 | 0.0931 |

Source: own elaboration

A stacked bar chart representation is shown in Figure 3. The model showed that states with low/very low debt have the highest probability [47.5%] of belonging to the highest level of competitiveness. On the other hand, states with very high/high debt have only an 18.5% probability of being in this group.

Box 9

Probabilities by category Debt

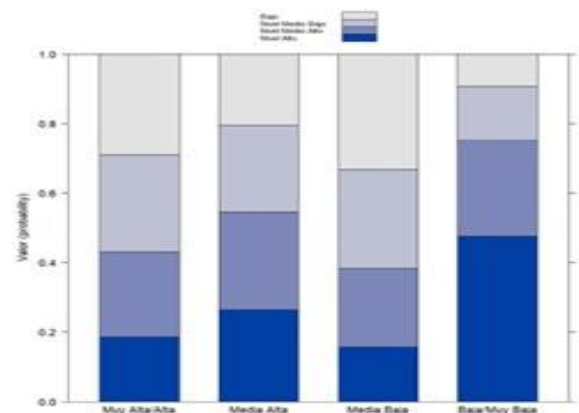


Figure 3

Comparison of probabilities of probabilities by category.

Source: Own elaboration.

With regard to Citizen Participation, Table 6 shows the probabilities of belonging to each of the ECI levels. A graphical representation is shown in Figure 4.

Box 10

Table 6

Probabilities by category Citizen participation

| DEBT | High | Media | Low |
|-----------------------|--------|--------|--------|
| HIGH LEVEL ICE | 0.1336 | 0.3013 | 0.1148 |
| MEDIUM-HIGH LEVEL ICE | 0.2052 | 0.2877 | 0.1864 |
| MEDIUM-LOW LEVEL ICE | 0.2846 | 0.2333 | 0.2808 |
| LOW LEVEL ICE | 0.3765 | 0.1775 | 0.4177 |

Source: Own elaboration

According to the statistical model, medium citizen participation has the highest probability [30.1%] of being in the high ECI. High participation is associated with lower probability [13.4%], and low participation with even less [11.5%].

Box 11

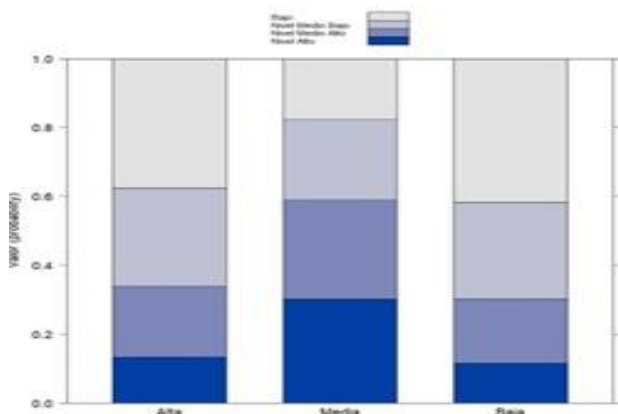


Figure 4

comparison of probabilities of probabilities by category of participation.

Source: Own elaboration.

A representation of the joint probabilities of the multiple model considering Debt and Citizen Participation is shown in Figure 5. The states in green have the highest probabilities of being in the highest level, while the states in red have the lowest probabilities of being in the top positions of the index.

Box 12

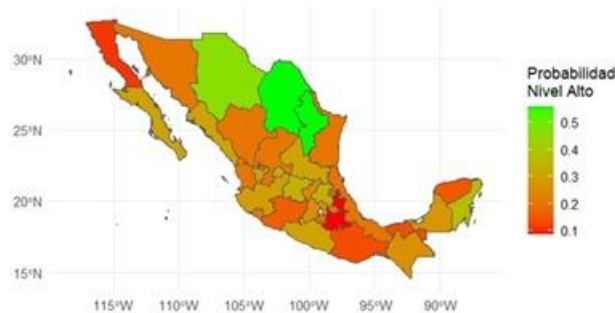


Figure 5

Regional comparison of probability probabilities by citizenship and debt.

Source: Own elaboration.

One possible interpretation of the results of the multiple model could be that average citizen participation seems to coincide more with high state competitiveness. One possible explanation could be found in balanced participation without political polarisation.

Conclusions

This article studied the influence of state debt and state agencies [percentage of total revenue], DEBT, CITIZEN PARTICIPATION, understood as votes cast as a percentage of the nominal list, as well as the PARTY variable that identifies the political party governing each federal entity, with respect to the ordinal position obtained by each federal entity in the State Competitiveness Index [ICE].

The methodological design provides originality to the research, given that a three-year time window was considered, corresponding to the ICE results for 2022, 2023, and 2024. which were observed in each of the country's 32 states, allowing us to observe the differentiated effect of being governed by MORENA, PAN, parties in COALITION with the official party, and OTHERS.

Using ordinal logistic regression analysis, it was possible to answer the question: what impact do PARTY factors, state DEBT, and CITIZEN PARTICIPATION have in explaining these gaps? The explanatory model of the ICE based on party identified that states governed by the PAN have a high probability [57.62%] of being at the highest level of the State Competitiveness Index [ICE] and a very low probability [6.20%] of being at the lowest level.

This suggests that, at least in the period analysed, PAN governments tend to be associated with more competitive states. In contrast, MORENA governments are more likely to be at the lowest level of the ICE [30.58%] and only 16.96% likely to reach the highest level, indicating a negative relationship between the party and state competitiveness. In states governed by coalitions, notably the case of the PES allied with MORENA in Morelos, the probability of being at the low ICE level is even higher [49.3%], which also reflects an unfavourable association.

This result is complementary at the country level and runs counter to the study by Camyar [2014], who studied 21 industrialised nations at the country level and found that left-wing governments produced better results for businesses. We have found that, at the regional level in Mexico, the best performances in the ICE state competitiveness index are found in PAN party governments.

In this study, we identified that the DEBT variable was significant, which is consistent with the study by García [2019], where this author correlated it with public investment, and we have identified its significance in relation to economic competitiveness.

Likewise, our finding would seem to contradict Sánchez and García [2016], who found that debt correlates positively with economic growth. States with low or very low debt are more likely [47.5%] to be at the high level of competitiveness, while those with very high or high debt barely reach 18.5%. This reinforces the idea that lower debt may be linked to better competitive performance, while controlling public finances and their sustainability.

Our study complements the results of Clearly [2007], who concluded that electoral participation was not significant as a determinant of good governance. We have identified the significance of citizen electoral participation with regard to competitiveness. In the model, it is noteworthy that average levels of participation have the highest probability [30.1%] of being associated with a high ICE, surpassing even high or low levels of participation. This could be interpreted as meaning that non-polarised participation is linked to more stable and competitive contexts, perhaps due to less political polarisation.

Although the analysis considers the years 2022, 2023 and 2024, it is limited to a short period, which prevents the establishment of historical causal relationships between the parties in power and the level of state competitiveness. However, it represents a momentous period in human history, marked by the Covid-19 health crisis. Additionally, the observed phenomenon could be influenced by specific economic and social dynamics during this three-year period.

Finally, based on the findings of this study, two future lines of research are proposed. The first is to conduct a longitudinal analysis with a longer time frame. It would be useful to extend the analysis period to a broader range of years [for example, from 2012 to 2024, so that the results could be compared across different presidential terms] to identify whether the relationships observed between the ruling party, debt, citizen participation, and state competitiveness are maintained over time or whether they respond to recent dynamics.

Likewise, it is considered that a promising line of research could be to analyse the internal dimensions of the State Competitiveness Index [ICE] separately, in order to determine in which specific areas state governments have the greatest impact, and whether certain parties tend to perform better in particular dimensions of state development.

Conflict of interest

The authors declare that they have no conflict of interest. They have no known competing financial interests or personal relationships that could have appeared to influence the article reported in this paper.

Availability of data and materials

The data will be available upon request to the authors.

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Design of a behavioral economics measurement instrument for university students at the Technological Institute of Sonora

Diseño de un instrumento de medición de la economía conductual en jóvenes universitarios del Instituto Tecnológico de Sonora

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Abstract

Objective: To develop an instrument that measures the behavioral economics [Y1] of young university students through the variables of emotions, social context, and sociocognitive biases for a better understanding of their consumption habits. **The methodology** used is mixed, since descriptive and inferential statistics are intended to test the interrelationship between the dependent variable and the three independent variables. Multivariate linear regression will be used. **Contribution:** The behavioral economics of young university students has positive impacts when correlated with emotions and social context; that is, when individuals are more euphoric or have a budget, or have friends with similar tastes, their need to acquire different products will be greater. For future research, other tests could be performed to test significance; likewise, other variables that could contribute to the model could be incorporated

Resumen

Objetivo: elaborar un instrumento que mida la economía conductual [Y1] de los jóvenes universitarios a través de las variables de las emociones, el contexto social y los sesgos sociocognitivos para la mejor comprensión de sus hábitos de consumo. **La metodología** empleada es mixta, ya que se desea utilizar estadística descriptiva e inferencial para probar interrelación entre la variable dependiente y las tres variables independientes. Se utilizará regresión lineal multivariante. **Contribución:** la economía conductual de los jóvenes universitarios, tiene impactos positivos al momento de correlacionarla con las emociones y el contexto social; es decir, cuando los individuos se encuentran con mayor euforia o presupuesto, o amigos con gustos similares, mayor será su necesidad de querer adquirir los distintos productos. Para futuras investigaciones se pudieran hacer otras pruebas, probar la significancia; así mismo se pueden incorporar otras variables que pudieran aportar al modelo.

| Design of a behavioral economics measurement instrument for university students at the Technological Institute of Sonora | | |
|--|--|--|
| Objetivo | Methodology | Contribution |
| To develop an instrument that measures the behavioral economics of university students through the variables of emotions, social context, and sociocognitive biases for a better understanding of their consumption habits | is mixed, since descriptive and inferential statistics are intended to test the interrelationship between the dependent variable and the three independent variables. Multivariate linear regression will be used. | The behavioral economics of young university students has positive impacts when correlated with emotions and social context; products will be greater. |
| | | |

Behavioral Economics, Emotions, Social Context

| Diseño de un instrumento de medición de la economía conductual en jóvenes universitarios del Instituto Tecnológico de Sonora | | |
|---|--|--|
| Objetivo | Metodología | Contribución |
| elaborar un instrumento que mida la economía conductual de los jóvenes universitarios a través de las variables de las emociones, el contexto social y los sesgos sociocognitivos para la mejor comprensión de sus hábitos de consumo | Es mixta, ya que se desea utilizar estadística descriptiva e inferencial para probar interrelación entre la variable dependiente y las tres variables independientes. Se utilizará regresión lineal multivariante. | La economía conductual de los jóvenes universitarios, tiene impactos positivos al momento de correlacionarla con las emociones y el contexto social. |
| | | |

Economía Conductual, Emociones, Contexto Social

Area: Advocacy and attention to national problems

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Peer review under the responsibility of the Scientific Committee MARVID®. in the contribution to the scientific, technological and innovation Peer Review Process through the training of Human Resources for the continuity in the Critical Analysis of International Research.



Introduction

The diverse stimuli that university students possess have encouraged companies to use different methods to attract and capture their attention to the different range of products/services they wish to offer. Based on this premise, it is necessary to create mechanisms that allow for the design of behavioural economics measurement tools, in order to determine which variables are the most decisive in terms of their individual consumption decisions [Rodríguez, 2012].

Bringing so many external and internal benefits to a country, in the 17th and 18th centuries, the need arose to understand how societies manage their limited resources to meet growing demands. This gave rise to economic theory, with thinkers such as Adam Smith, who is considered the father of modern economics, helping to introduce key concepts such as the invisible hand and the free market in his great work entitled 'The Wealth of Nations [1776]'.

This was later extended to individual decision-making, giving rise to consumer theory, which emphasises rational choice seeking to maximise benefits within a limited budget. [Muñoz, 2021].

In publications by Kahneman and Tversky [2003], they point out that behavioural economics began to gain momentum in the mid-20th century, referring to the fact that people do not behave rationally in their consumption decisions, which is precisely where the interrelationship between psychology and economics comes into play. Emotions and previous experiences have an effect on purchasing habits.

At the end of the day, although companies can take action to influence consumer decisions, each consumer has the free will to select the products that suit their needs. Research published by Marcó [2010] criticised people's 'irrationality', but found insufficient evidence to conclude that purchasing decisions are measured solely through variables such as brand advertising. This research therefore seeks to incorporate other elements of study to determine how young university students behave in terms of their finances.

The main problem that this research aims to address is to develop a measurement tool to determine the extent to which elements such as cognitive biases, emotions, and social context influence the behavioural economics of university students, specifically those at the Technological Institute of Sonora.

The importance of this type of research lies in the fact that traditional economics states that consumers make rational decisions by comparing prices and quality, among other factors [Gallegos and Taddei, 2022], which is not necessarily true.

That said, evidence has been found of consumer irrationality, which is motivated by various factors such as individual tastes and preferences, market trends, and maximisation of utility and benefits [Padilla, 2021].

Similarly, cognitive biases also lead to poor decision-making [González, 2017], as overexposure to information can cause errors in choices.

Emotions measured through impulses affect purchasing habits by around 80%, according to data from Raiteri and Ocaña [2016], and this represents a challenge, as over time, the same consumer will experience changes in their tastes and needs, which are not determined solely by price.

Similarly, Narotzky [2007] points out that the social context influences people's customs, determining the ways in which they relate to each other and in which goods are produced and distributed. The objective of the research is to develop an instrument that measures the behavioural economics of university students through the variables of socio-cognitive biases, emotions and social context for a better understanding of their consumption habits. The general research hypothesis is that socio-cognitive biases, emotions and social context have a positive impact on the behavioural economics of university students at the Technological Institute of Sonora.

This article is structured in six sections. The first section begins with an introduction, discusses the background, presents the problem statement, the general research hypothesis to be tested, and the overall objective to be achieved through the research.

The second part of the document develops the theoretical framework, presenting the study variables and the theoretical basis that other researchers have published over time.

Section three corresponds to the research methodology used; at this point, the subjects of the study, samples, and research process for testing the general hypothesis are specified. Subsequently, in section four, the main results obtained are listed, which may be useful for future decision-making.

Section five contains the main conclusions drawn from the research. This section also makes recommendations for future research, as well as possible opportunities for further study.

Finally, section six lists the main bibliographical references used in the development of the article.

Theoretical Framework

In this research, four variables were identified for study, classified as follows: the dependent variable [Y1] is behavioural economics, the first independent variable [X1] is emotions, the second independent variable [X2] is social context, and the last independent variable [X3] is cognitive bias. The classification of this model will be tested through the construction of a measurement instrument. This results in the following Figure 1:

Box 1

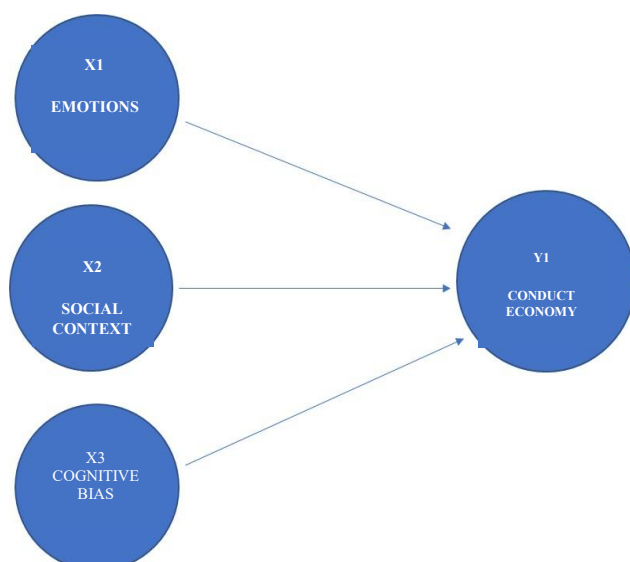


Figure 1
Graphical Model

X1- Emotions. In research conducted by Rodríguez, Arano, and Cruz [2019], they mention that people relate their consumption decisions to the emotions they feel at the moment they choose their products; someone feeling euphoric will tend to be more impulsive in their purchasing habits. They also analysed whether there was a gender difference, but found no statistically significant evidence to prove this. However, there is a slight distinction in that men tend to think a little more about their purchases than women.

One of the theories about the influence of emotions on purchasing decisions is the theory of hedonic adaptation, which states that people are not necessarily happier when they acquire long-term goods, but that there is a relationship between them [Ludeña, 2025].

Therefore, it can be said that emotions affect individuals' consumption behaviour, as many of their needs arise from their emotional states, such as acceptance, happiness, and confidence, among others [Xu Wei, 2023]. Each of these emotions triggers an impulse to consume different products.

X2 – Social context. This refers to the fact that social stimuli from different groups of people influence their consumption habits. In publications by Corredor and Mendivelso [2015], they found statistically significant evidence that the sociodemographic conditions of one group have different habits from those of other groups with other stimuli; that is, the social context has an influence on behavioural patterns.

Similarly, as time goes by, it has been shown that the social context is also affected by interaction on social media, which can use AI [artificial intelligence] to post opinions about certain products or mislead consumers with different technologies distributed through various platforms such as X, Facebook, YouTube, Pinterest, Instagram, among others. These stimuli also influence the context of the users who consume them [De Bordóns and González, 2021].

X3 - Cognitive biases. This variable refers to the fact that when an individual has an impulse to make a decision, several factors arise that affect the optimisation of that decision. Some of these are confidence itself, uncertainty, and consumer expectations [De Kohan, 2006].

Similarly, evidence has been found that people randomly choose their levels of well-being, and this causes cognitive biases, since their interaction with the social environment and how they interpret personal happiness influence their personal choices [Concha, Ramírez, Cuadra, Rovira, and Rodríguez, 2012]. Several authors have attempted to demonstrate that events occurring in an uncertain environment are not affected by the number of times they are repeated. In other words, if a coin is tossed and eventually comes up heads five times and tails only three times, intuition would suggest that the next toss will be tails; however, this assumption is incorrect. This is known as the law of small numbers bias [Tversky and Kahneman, 1973], whereby as more events occur, the probabilities decrease.

Similarly, judgements of uncertainty, choice in the face of risk exposure, expectation theory, overconfidence, among others, have a biased effect on the information available for making appropriate choices [de Kohan, 2008].

Y1 – Behavioural Economics. This refers to how individuals try to make decisions in a rational manner, adding variables such as utility maximisation, the use of logic, emotions, cognitive biases, among others [Nacipucha and Bayón, 2024].

People try to base their consumption habits on information that allows them to decide between the different options available to them, but even so, they face cognitive limitations. According to publications by Kahneman [2003], Nobel Prize winner in Economics, individuals act more intuitively than rationally; similarly, if goods are more accessible, there is a greater predisposition towards consumption. A very important factor in behavioural economics is individual constraints, which can range from morality to monetary considerations. Taking the latter constraint, which has to do with the economic side, as a reference, these can be divided into three main categories: a) those related to income, b) those related to access to substitute goods, and c) those related to price level [Montgomery, 2011].

Methodology

The methodology used is mixed, as we wish to use descriptive statistics to characterise the subjects under study and inferential statistics to test the interrelationship between the dependent variable and the three independent variables.

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The subjects of the study are university students from the Department of Accounting and Finance at the Technological Institute of Sonora. The information was collected through surveys conducted using Google Forms.

Various databases were used to collect the information sources, including EBSCO, Google Scholar, and Dialnet, among others. Excel spreadsheets were used to process the information. To verify the significance tests, a pilot study of thirty surveys was conducted in SMART PLS using multivariate regression.

Results

The main results of the instrument's development are as follows: A sample of 31 students was used for the pilot study, of which 65% were female and the rest were male. The ages of the respondents ranged from 18 to 25, as shown in the following.

Box 2

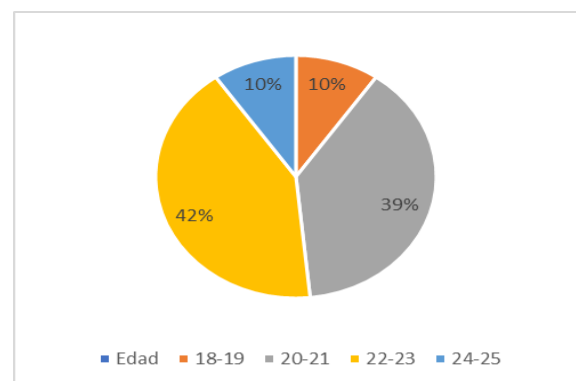


Figure 2

Age Range

Source: Own elaboration 2025

The SMARTPLS statistical software was used to determine the reliability tests of the constructs in which the following was found: from the dependent variable X1 Emotions, item two was eliminated; from the dependent variable X2 Social Context, items two and four were eliminated; from the dependent variable X3 Cognitive Biases, the entire variable was eliminated [since the Cronbach's Alpha value was less than 0.7], while from the independent variable Y1 Behavioural Economics, no construct was eliminated because it met the quality criteria of 0.7. 7], while from the independent variable Y1 Behavioural Economics no construct was dropped because it met the quality criteria of 0.7. The results are listed in Table 1 below.

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Box 3**Table 1**

Cronbach's Alpha Reliability Test

| Variable | Cronbach's alpha |
|--------------------------|------------------|
| X1 Emotions | 0.8 |
| X2 Social Context | 0.7 |
| X3 Cognitive Bias | Deleted |
| Y1 Behavioural Economics | 0.8 |

Source: Own elaboration with SMARTPLS 2025

The R2 is 0.43, which indicates that it has a moderate predictive capacity, i.e. there are 57% of variables that are not included in the proposed model. The Betas for emotions [X1] are 0.5 and for social context 0.3. Given these results, it is expected that emotions influence behavioural economics more than social context.

As for the AVE test of Average Variance Extracted, the constructs meet the acceptance criterion as X1- Emotions had a value of 0.7; X2 - Social Context had a value of 0.6 and Y1 - Behavioural Economics 0.6. This means that each construct explains more than 50% of each variable under study.

Box 4**Table 2**

Collinearity test [VIF]

| Item | Vif |
|---------|-------|
| Consoc1 | 1.78 |
| Consoc3 | 1.09 |
| Consco5 | 1.07 |
| Ecocon1 | 1.72 |
| Ecocon2 | 1.91 |
| Ecocon3 | 2.17 |
| Ecocon4 | 2.52 |
| Ecocon5 | 1.87 |
| Emo1 | 2.43 |
| Emo3 | 1.59 |
| Emo4 | 1.67 |
| Emo5 | 2.352 |

Source: Own elaboration with SMARTPLS 2025

Regarding the collinearity test, it was found that the instrument does not have this problem, since the value of each item is less than 5, as shown in the figure.

Conclusions

The research carried out led to certain preliminary conclusions derived from the pilot study for the development of the research.

First of all, it was found that the cognitive bias variable did not meet Cronbach's alpha quality criterion, so it was removed from the proposed model. In the same vein, evidence was found that the emotions variable has the greatest influence on behavioural economics, as it has a beta of 0.5 compared to the beta of the X2 variable.

Regarding the predictive capacity of the model, other variables should be incorporated, since the proposed model only predicts 43%. Although it is a good indicator for research purposes, other variables that could have a greater influence or expand the sample must be added.

The quality criterion of the Mean Extracted Variance was positive for the research, as all values were above 0.5, indicating that the measurement of constructs through Variance is adequate for the study. Similarly, with the Collinearity [VIF] statistics, it was found that the proposed model does not have this type of problem.

In conclusion, the behavioural economics of young university students has positive impacts when correlated with emotions and social context; that is, when individuals experience greater euphoria or have a larger budget, or have friends with similar tastes, their need to acquire different products will be greater. For future research, other tests could be carried out, expanding the sample to determine the significance of each variable; likewise, other variables that could contribute to the model could be incorporated.

Declarations**Conflict of interest**

The authors declare that they have no conflict of interest. They have no known competing financial interests or personal relationships that could have appeared to influence the article reported in this article.

Authors' contribution

Ruiz-Perez, Roberto: Wrote 40% of the paper overall, *López-Padilla, Frida Camila*: Contributed 30% of the document, providing guidance on the Development themes, measurement strategies and interpretation of the results.

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Article

Landazuri-Aguilera, Yara: Contributed 15% supporting the methodology.

Acosta-Mellado, Erika: Contributed 15% to the overall writing of the document and the discussion of the results obtained.

Availability of data and materials

The data obtained are kept on file. If you would like to see the pilot database, please send an email to roberto.ruiz@itson.edu.mx.

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Abbreviations

| | |
|-------|--------------------------------|
| AVE | Average Variance Extracted |
| FIV | Variance Inflation Factor |
| ITSON | Sonora Institute of Technology |

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Strengthening operational excellence in Mexican SMEs: a model based on change management and continuous improvement

Fortalecimiento de la excelencia operacional en PYMES mexicanas: un modelo basado en gestión del cambio y mejora continua

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Abstract

This study proposes a strategic perspective aimed at strengthening operational excellence management in any SME company. The proposal is based on organizational culture and corporate values, integrating best practices and key competencies as central pillars. The main objective is to develop an operational excellence proposal that allows measuring its level of maturity and aligning continuous improvement processes with the company's guiding principles and changing management. To this end, a qualitative methodology was applied based on semi-structured interviews with five managers from strategic areas of SME companies located in the state of Colima. This approach facilitated the identification of critical needs and development opportunities aimed at consolidating operational excellence and ensuring robust organizational performance in dynamic environments. The findings show that practices such as effective leadership, cross-functional communication, and ongoing training are crucial for achieving organizational success.

Resumen

Este estudio plantea una perspectiva estratégica orientada a fortalecer la gestión de la excelencia operacional en cualquier empresa PYME. La propuesta se fundamenta en la cultura organizacional y en los valores corporativos, integrando mejores prácticas y competencias clave como ejes centrales. El objetivo principal consiste en desarrollar una propuesta de excelencia operacional que permita medir su nivel de madurez y articular los procesos de mejora continua con los principios rectores de la empresa y con la gestión del cambio. Para ello, se aplicó una metodología cualitativa basada en entrevistas semiestructuradas realizadas a cinco directivos de áreas estratégicas de empresas PYME ubicadas en el Estado de Colima. Este enfoque facilitó la identificación de necesidades críticas y oportunidades de desarrollo, orientadas a consolidar la excelencia operacional y asegurar un desempeño organizacional robusto en entornos dinámicos. Los hallazgos evidencian que prácticas como, el liderazgo efectivo, la comunicación transversal y la capacitación continua resultan determinantes para alcanzar el éxito organizacional. Las propuestas que se plantean en este artículo contribuyen a mejorar la comunicación interna, reducir la resistencia al cambio y fomentar una cultura de mejora continua, al tiempo que alinea la estrategia con la operación.

| Objective | Methodologic | Contribution |
|--|--|---|
| Proponer y validar un modelo de excelencia operativa para PYMES mexicanas, basado en gestión del cambio y mejora continua, que permita medir el nivel de madurez organizacional y orientar la toma de decisiones estratégicas. | Este estudio se fundamenta en un enfoque cualitativo-descriptivo, cuyo propósito es comprender en profundidad las percepciones y experiencias de directivos de PYMES respecto a la excelencia operacional y su vinculación con la gestión del cambio y la mejora continua. | Las propuestas que se plantean en este artículo contribuyen a mejorar la comunicación interna, reducir la resistencia al cambio y fomentar una cultura de mejora continua, al tiempo que alinea la estrategia con la operación. |

Business Administration, Business Strategy, Technological Change, Operational Excellence, Continuous Improvement, SMEs, Change Management

| Objetivo | Metodología | Contribución |
|--|---|--|
| Propose and validate a model of operational excellence for Mexican SMEs, based on change management and continuous improvement, which allows for measuring the level of organizational maturity and guiding strategic decision-making. | This study is based on a qualitative-descriptive approach, whose purpose is to gain an in-depth understanding of the perceptions and experiences of SME managers regarding operational excellence and its link to change management and continuous improvement. | The proposals put forward in this article contribute to improving internal communication, reducing resistance to change, and fostering a culture of continuous improvement, while aligning strategy with operations. |

Administración de empresas, Estrategia de la empresa, Cambio tecnológico, Excelencia operacional, Mejora continua, PYMES, Gestión del cambio

Area: Development of strategic leading-edge technologies and open innovation for social transformation

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Introduction

Today's organisations face highly changeable environments that test their strength, maturity and adaptability. In this context, achieving strategic objectives and sustaining continuous improvement processes becomes a determining factor in ensuring long-term competitiveness and sustainability [McKinsey, 2024].

The central problem lies in the fact that many SMEs lack a comprehensive model that allows them to strengthen operational excellence [OE], articulate change management, and develop key competencies in a sustained manner. This situation limits their organisational resilience and hinders the consolidation of innovative processes that prepare them to face dynamic scenarios.

The literature points out that operational excellence is not limited to process optimisation, but requires an organisational culture aligned with strategic values and committed leadership. Authors such as Paris [2004] highlight the Kaizen philosophy as the basis for continuous improvement through the integration of people, processes, technologies, and resources. Complementarily, Rusev and Salonitis [2016] emphasise the need for training plans, disruptive technologies, and self-assessment systems to strengthen operational efficiency.

Despite these advances, there remains a gap in the literature regarding how Mexican SMEs integrate operational excellence with sustainable practices and change management approaches. Recent studies [Sá et al., 2022; Shingo, 2022] show effective models in other contexts, but their application in smaller companies and emerging markets remains limited.

In this regard, the present study aims to propose and validate a model of operational excellence for Mexican SMEs, based on change management and continuous improvement, which allows for measuring the level of organisational maturity and guiding strategic decision-making. The hypothesis guiding this research argues that the integration of effective leadership, organisational culture, cross-functional training, and innovative technologies constitutes a set of determining factors for consolidating operational excellence and improving the resilience of SMEs in dynamic scenarios.

Theoretical framework

Strengthening operational excellence in dynamic scenarios

In this real-world environment, it is possible to ask the following question: What are the key factors that drive the maturity of operational excellence [OE] in the industry, ensuring its sustainability over time?

Currently, some organisations do not have a clear and defined map of the capabilities needed to implement and maintain operational excellence over time, in which quality and cost optimisation are prioritised.

This makes it difficult to continuously adopt best practices in the various operations within the organisation, limiting its efficiency, effectiveness and adaptability in the face of new and changing scenarios. Overcoming this challenge requires fostering a key culture, highlighting key competencies and aligning the company's strategies with its operational management.

What is operational excellence?

It is a comprehensive and systematic approach that seeks continuous improvement of processes within the organisation to offer added value that satisfies the customer, i.e., going beyond customer expectations, as it is essential that the organisation focuses all its processes on the customer.

Process innovation and commitment to customer satisfaction are key components of this strategy, which drives both growth and long-term sustainability. Operational excellence responds effectively to the needs of the market and, therefore, the customer, enabling the organisation to strengthen its culture and focus on success.

How is operational excellence viewed in other cultural regions?

Each region of the world has its own business tools and strategies for implementing models to create diverse open and collaborative ecosystems, which is quite a challenge given the cultural diversity in each region of the world.

That is why each country creates different models with different pillars, but these are related to global business dynamics, such as those applied by China: the disintegration of the traditional hierarchical structure, the transformation of employees into a system called micro-entrepreneurs, and the implementation of open platforms for co-creation.

Methodology

Methodological proposal

This study is based on a qualitative-descriptive approach, the purpose of which is to gain an in-depth understanding of the perceptions and experiences of SME managers regarding operational excellence and its link to change management and continuous improvement.

As Braikie [2007] and Saunders [2009] point out, this type of methodology allows for the capture of holistic views that integrate both the technical and human dimensions of the phenomenon under study.

Population and sample

The research was carried out in the state of Colima, Mexico, with an intentional and convenience sample of 20 SME entrepreneurs and managers who hold key positions in areas such as operations, continuous improvement, human resources, and supply chain.

The inclusion criteria were that participants had at least three years of experience in the organisation and a maximum of 30 years of work experience. This delimitation ensures the participation of informants with sufficient knowledge of the internal functioning of their organisations and with the ability to provide information relevant to the study.

Instrument

The data collection instrument consisted of semi-structured interviews conducted in three stages, with a total of ten open-ended questions. These were designed to explore organisational maturity, change management and the factors that influence the sustainability of operational excellence.

The interview was administered using the Google Forms platform, which allowed for immediate digital recording of the responses.

The questions focused on topics such as: definition of operational excellence, existing organisational capabilities, areas for improvement, change communication processes, strategic alignment, barriers to continuous improvement, required competencies, available resources, and determining factors for adaptation in dynamic scenarios.

The structure and content of this instrument are detailed below.

1. How do you define operational excellence in your organisation?
2. Which of your organisation's existing capabilities contribute to operational excellence?
3. Do you think that your organisation's existing capabilities need to be improved?
4. How are changes implemented and communicated within the organisation?
5. How does the organisation ensure that its operational excellence strategy is aligned with its strategic objectives?
6. What are the possible factors that hinder the sustainability of continuous improvement in the organisation in the long term?
7. What capabilities does the organisation need to develop to improve its operational excellence?
8. What competencies should employees have to contribute to operational excellence?
9. What resources and tools should be implemented or improved in the organisation to facilitate the development of new competencies and thus ensure operational excellence?
10. What could be the determining factors that enable the organisation to adapt to dynamic changes and maintain the new model of operational excellence?

Data analysis plan

The analysis of the information was carried out in several phases. First, following the principles of Grounded Theory [Strauss & Corbin, 1998], an open coding process was carried out to fragment the responses and group them into meaningful conceptual categories. Subsequently, a cross-analysis [Yin, 1994] was performed to compare findings between different cases and categories. Although the main approach was qualitative, SPSS software was used to organise and present the results using tables and frequency graphs, in order to reinforce the systematisation of the information and facilitate interpretation. In this way, qualitative techniques [coding and categorisation] were integrated with basic quantitative resources [frequencies and percentages] to offer a more complete view of the phenomenon.

Ethical considerations

All participants were explained the purpose of the research before their participation, guaranteeing the confidentiality of the data and the voluntary nature of their collaboration. The interviews were transcribed and reviewed manually to preserve the accuracy of the information [Rodríguez Gómez & Valldeoriola Roquet, 2014]. The data will be used solely for academic purposes, maintaining objectivity and neutrality at all stages of the research process.

Question 1: How do you define operational excellence in your organisation?

When reviewing the results for the first question of the questionnaire presented in Table No. 1, SPSS software shows that 44% associate operational excellence directly with continuous improvement [Kaisen] models and tools, which is evident in opinions such as: "It is a mature, comprehensive model of operational excellence for business organisations to strengthen strategic excellence in dynamic scenarios, offering a holistic and integrated model, mainly focused on eliminating everything that generates waste within the organisation. The operational excellence model is based on four fundamental pillars and uses performance management models, as well as various continuous improvement methodologies [Kaisen], which are integrated into the various processes within the organisation to improve performance and manage deviations."

Thirty-six per cent of companies associate operational excellence with strategic objectives. They implement PDCA cycles, continuous training, and process optimisation in production and customer service, which are included in strategic planning, i.e., the long-term goals that an organisation sets out to achieve in order to realise its vision and mission.

They establish the overall direction of the company and serve as a guide for decision-making and aligning efforts at all levels of the organisation. However, this does not always translate into consistent operational practices.

Finally, 20% of the companies interviewed associate operational excellence with management models and tools, the use of ISO 9001, Lean Manufacturing, and Balanced Scorecard, which are more common in companies with international certifications.

The operational excellence model includes within its management the resources that organisations use to plan, organise, direct and control their operations and resources, i.e. on the one hand, the conceptualisations of how the organisation works, while the tools are the specific instruments that enable it to carry out its management functions. In practice, they are less widely used due to certification costs and a lack of specialised personnel.

Table No. 1 below shows the results of the first question in the questionnaire.

Box 1

Table 1

Results of question 1

| Definition option | Average adoption rate | Example applications of Mexican SMEs |
|--------------------------------------|-----------------------|--|
| a) Strategic objective | 36% | They link excellence to their corporate vision and long-term goals, especially in the manufacturing and professional services sectors. |
| b) Continuous improvement [Kaizen] | 44% | They implement PDCA cycles, continuous training, and process optimization in production and customer service. |
| c) Modelo de herramientas de gestión | 20% | Use of ISO 9001, Lean Manufacturing, Balanced Scorecard, more frequent in companies with international certifications |

Box 2



Figure 1
Sample results of question 1

Question 2: Which of your organisation's existing capabilities contribute to operational excellence?

When analysing the results generated by SPSS for the second question in the questionnaire presented in Table 1, it was found that 34% of managers are involved in improvement projects, clear communication of objectives, and participatory leadership. Respondents highlight the positive influence of strong leadership and commitment from senior management, motivating employees and promoting operational excellence through clear commitment.

Twenty-eight per cent value shared practices, organisational learning, and retention of know-how in key processes related to organisational culture and accumulated knowledge. Senior and middle management agree on the solid organisational culture, technical knowledge accumulated over the years, and the use of practices to manage and share knowledge.

Twenty-five per cent value the existence of a formal structure for continuous improvement, with structured processes that enable sustainable improvements to be implemented, documented procedures, quality committees, and the use of performance indicators.

However, 13% highlight the availability of more investment in resources and technical training, which allows the organisation to train staff [specialisation], acquire technology and tools to optimise processes.

Table No. 2 below shows the results of the second question in the questionnaire.

Box 3

Table 2

Results of question 2

| Existing capacity in the organization | Average adoption rate | Example applications of Mexican SMEs |
|---|-----------------------|---|
| a] Leadership and commitment | 34% | Managers involved in improvement projects, clear communication of objectives, participative leadership. |
| b] Formal structure for continuous improvement | 25% | Documented procedures, quality committees, use of performance indicators. |
| c] Organizational culture and accumulated knowledge | 28% | Shared practices, organizational learning, retention of know-how in key processes. |
| d] Investment in resources and technical training | 13% | Staff training, acquisition of technology and tools to optimize processes. |

Box 4

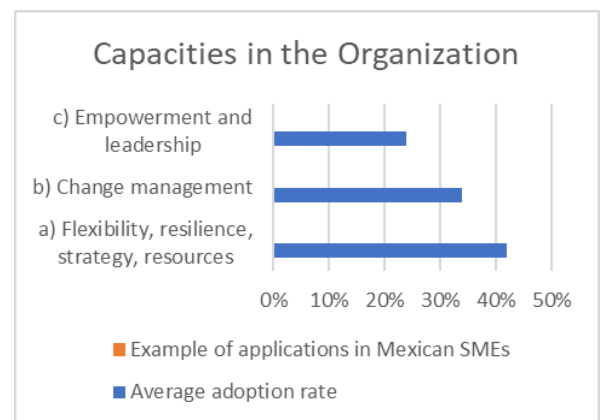


Figure 2
Sample results of question 2

Question 3: Do you think that the capacity that already exists in your organisation needs to be improved?

When examining the overall results of the third question in the questionnaire presented in Table 1, it can be seen that 46% of the companies interviewed report deficiencies in structured training and education, including a lack of refresher programmes, a lack of specialised technical skills, and insufficient leadership training, limiting the preparation and development of critical skills.

Thirty-two per cent stated that there is organisational disconnection and limited alignment between areas, a lack of cohesion between them, unshared objectives, and poor interdepartmental communication, which affects the integration of efforts and generates disparities in performance and low operational maturity, leading to the development of dysfunctional silos. The main weakness lies in the fact that some programmes, although well started, are lost over time, especially when there are changes in leadership.

Only 22% highlight limitations in change management and communication, which hinders the adoption of new processes, changes in priorities, high staff turnover, and abandonment of initiatives before they are consolidated.

Table No. 3 below shows the results of the third question in the questionnaire.

Box 5

Table 3

Results of question 3

| Area that needs improvement | Average adoption rate | Example of applications in Mexican SMEs |
|---|-----------------------|---|
| a] Deficiencies in training and education | 46% | Lack of refresher programs, lack of specialized technical skills, and insufficient leadership training. |
| b] Limited alignment, organizational link | 32% | Lack of cohesion between areas, unshared objectives, poor interdepartmental communication. |
| c] Conflict in the continuation of the projects | 22% | Changes in priorities, high staff turnover, abandonment of initiatives before they are consolidated. |

Box 6

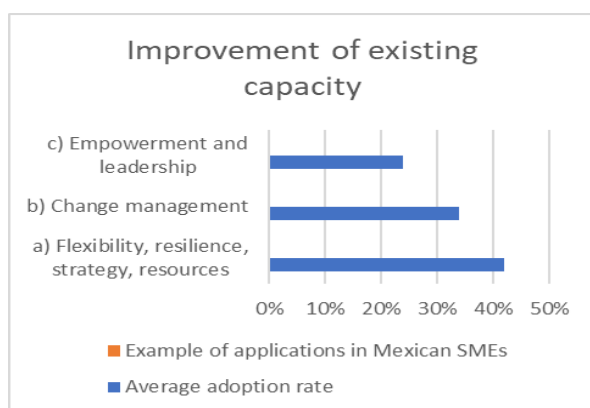


Figure 3

Sample results of question 3

Question 4: How are changes in the organization implemented and communicated? An analysis of the overall results of the fourth question in the questionnaire in Table 1 shows that 39% of respondents say there are significant challenges in communication and employee involvement in change management and that horizontal communication must be strengthened and front-line employees must be integrated to foster a culture of adoption and commitment at all levels, enabling the organization's objectives to be met and complied with. Changes within the organization do not follow a pattern of order, i.e. in a structured manner; they tend to be isolated without being properly integrated throughout the organization.

On the other hand, 34% of those involved in adaptive change management show an advanced understanding of the need for adaptive change management that is tailored to the culture and particularities of each team, with prior training and direct consultation before and during the change process.

However, 27% of those interviewed highlight a structured approach and cascading participation and emphasize well-structured, cascading change communication, which ensures that planned downward communication channels and organisational strategies, defined roles, and formal implementation plans reach all employees from senior management.

Table No. 4 below shows the results of the fourth question in the questionnaire.

Box 7

Table 4

Results of question 4

| Method of implementing and communicating the change | Average adoption rate | Example of applications in Mexican SMEs |
|--|-----------------------|---|
| a] Inadequate communication channels and limited staff involvement | 39% | Fragmented information, delayed communication, resistance to change due to lack of knowledge. |
| b] Cascading participation and structured vision | 27% | Planned downward communication, defined roles, formal implementation plans. |
| c] Active involvement of staff in change management | 34% | Working groups, prior training, direct consultation before and during the change process. |

Box 8

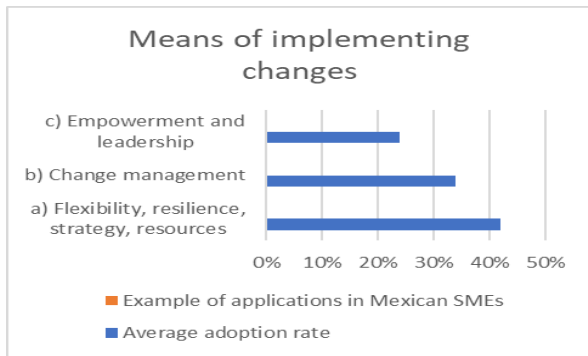


Figure 4

Sample results of question 4

Question 5: How does the organization ensure that its operational excellence strategy is aligned with its strategic objectives?

Considering the aggregate results of the fifth question in the questionnaire presented in question 1, it can be seen that 41% of respondents affirm that continuous measurement and evaluation is the most frequent practice, as it allows for agile adjustments in dynamic scenarios with limited resources.

The literature indicates that this approach responds to the volatility of the Mexican competitive environment. The identification of employees with values and organizational culture, from senior management to the lowest-ranking worker, is part of the performance evaluation of senior managers, who are responsible for continuously improving indicators related to the adoption of organizational values. Action plans are developed and evaluated after each measurement to ensure that values are integrated into the behavior of all hierarchical levels within the organization.

Thirty-six per cent of respondents argue that there are variations in the degree of integration of organizational values and areas where values have not yet been fully integrated. Some employees identify with the company's values, but many only see them as part of their daily activities and do not adopt the culture as part of their identity. However, only 23% highlight the strategic and cross-cutting integration of values at all hierarchical levels, with a structured and methodical approach. Employees are evaluated not only on achieving the organization's objectives but also on how they apply the company's values in their daily work.

The objective of the performance evaluation includes both the achievement of goals and alignment with corporate values, which are constantly reinforced through a series of development, training, and leadership plans.

Table No. 5 below shows the results of the fifth question in the questionnaire.

Box 9

Table 5

Results of question 5

| Alignment mechanism | Average adoption rate | Example applications of in Mexican SMEs |
|---|-----------------------|---|
| a) Long-term goals and measurable plans | 36% | Use of 3–5-year strategic plans, defined key performance indicators [KPIs], although they often lack continuity in their execution. |
| b) Continuous monitoring and evaluation | 41% | Internal audits, quarterly reviews, management control systems, and periodic reports. |
| c) Alignment with the strategic pillars | 23% | They focus on values, mission and vision, although in practice it usually remains at a more declarative than operational level. |

Box 10

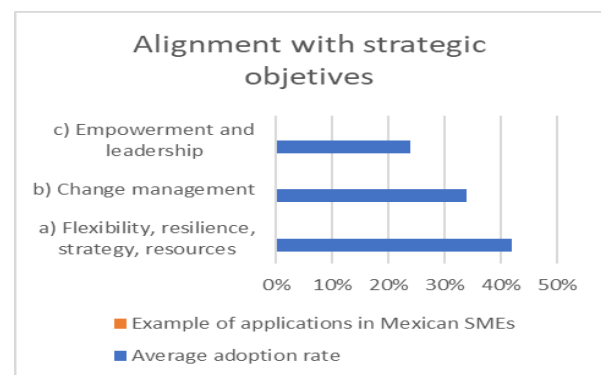


Figure 5

Sample results of question 5

Question 6: What are the possible factors that make it difficult to sustain continuous improvement in the organization in the long term?

44% of respondents highlight the clearly defined use of master plans and long-term objectives as a key mechanism for aligning the operational excellence strategy with the organization's strategic objectives, i.e. that the operational excellence strategy is aligned with its long-term strategic objectives through long-term strategic plans that establish specific goals and actions to maintain alignment.

With 29% agreement, respondents attribute high value to training, evaluation and continuous monitoring programmes as essential methods for ensuring that the operational excellence strategy remains in line with strategic objectives, through periodic reviews and adjustments based on results.

On the other hand, only 27% of respondents highlight the relevance of alignment through the organization’s strategic pillars, such as cost control, safety and staff development, as well as communication of these pillars through meetings.

Table 6 below shows the results of the sixth question in the questionnaire.

Box 11

Table 6

Results of question 6

| Factor that hinders the sustainability of continuous improvement | Average adoption rate | Example applications of in Mexican SMEs |
|--|-----------------------|---|
| a] Commitment and leadership throughout the organization | 44% | High managerial turnover, lack of transformational leadership, and poor coherence between discourse and action. |
| b] Training programs | 29% | Limited investment in training, reactive and unplanned training, lack of performance impact metrics. |
| c] Efficiency in management with a strategic approach | 27% | Disjointed processes, low technological integration, absence of clear strategic indicators. |

Box 12

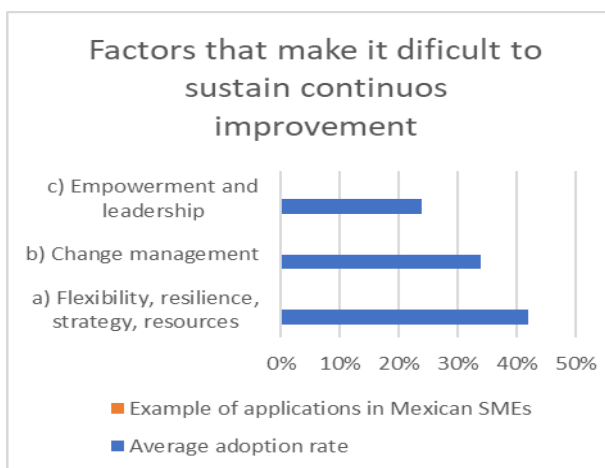


Figure 6

Sample results of question 6

Question 7: What are the capacities of the organization that need to be developed to improve its operational excellence?

Examining the results obtained for this seventh question in the questionnaire presented in Table 1, it can be seen that 42% highlight a high level of commitment and leadership at all levels, especially senior management and middle management. The involvement of all hierarchical levels within the organizational structure is important for continued success and compliance with the objectives defined in the strategic plans. This can be achieved through continuous training plans and leadership training, which should be included in the strategic plan.

Thirty per cent of respondents highlighted support structures and training programmes dedicated to continuous improvement, with a focus on training and capacity building and infrastructure improvement to strengthen innovation through skills development. Establish recognition for innovative collaborators in the implementation of continuous improvement, in initiatives and formal training programmes. These elements motivate the team and encourage staff development. However, 28% of respondents highlight the focus on efficient management and strategic planning with clear and achievable objectives, managing the use of strategic planning tools that enable informed and sustainable decision-making.

Table No. 7 below shows the results of the seventh question in the questionnaire.

Box 13

Table 7

Results of question 7

| Ability to develop | Average adoption rate | Example applications of in Mexican SMEs |
|------------------------------|-----------------------|---|
| a] Staff development | 42% | Continuous training, leadership, digital and technical education. |
| b] Infrastructure investment | 28% | Acquisition of machinery, technological improvement, digitization of processes. |
| c] Innovation | 30% | New business models, product diversification, innovation in processes and services. |

Box 14

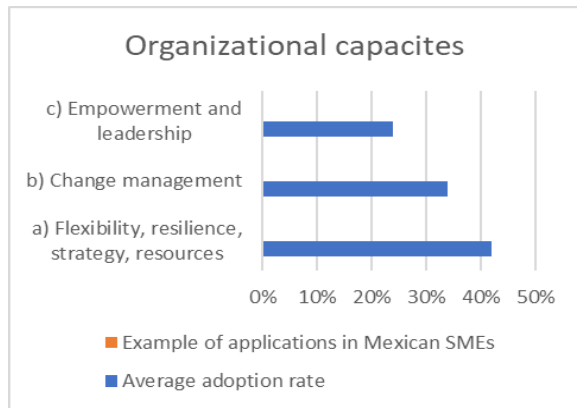


Figure 7

Sample results of question 7

Question 8: What competencies should employees have to contribute to operational excellence?

When analyzing the overall results of the eighth question in the questionnaire presented in Table No. 1, 36% of respondents refer to technical skills, inconsistency and lack of discipline in project monitoring, especially when the expected results are not achieved in the short term, affecting the sustainability of continuous improvement projects. Training is fundamental to achieving operational excellence in specialized knowledge tools, use of technologies, and quality process management.

This result of 34%, referring to organizational disconnection and lack of operational alignment warns of the lack of integration of operational staff in continuous improvement processes, as well as the lack of coordination in the assignment of responsibilities, which hinders effective implementation at all levels of the organization.

Lack of project coordination and lack of conflict resolution skills are reasons for poor leadership within the company. The lack of continuous improvement and training in work skills to foster effective, efficient relationships throughout the organization's structure hinders the achievement of the company's objectives.

Likewise, the remaining 30% of respondents recognize deficiencies in the education and training of new leaders and technology, reflecting the lack of structured training programs and limited access to modern technology, especially for new leaders and supervisors.

This limits the preparation of future leaders and technological training to sustain continuous improvement.

Table No. 8 below shows the results of the first question in the questionnaire.

Box 15

Table 8

Results of question 8

| Priority competence | Average adoption rate | Example applications of Mexican SMEs |
|-----------------------------------|-----------------------|--|
| a) Technical skills | 36% | Specialized knowledge, use of technologies, management of quality processes. |
| b) Teamwork and leadership skills | 34% | Project coordination, conflict resolution, participative leadership. |
| c) Training | 30% | Refresher programs, continuing education, development of new skills. |

Box 16

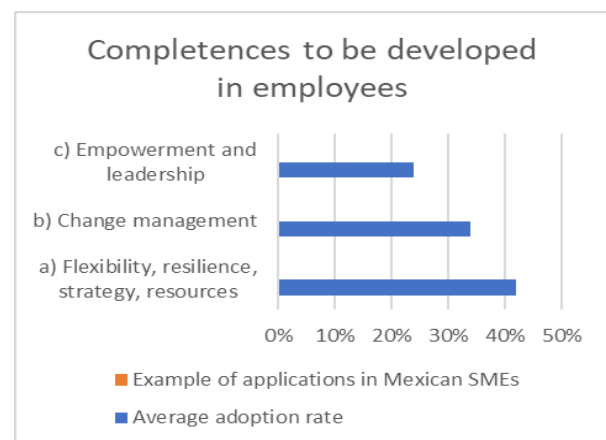


Figure 8

Sample results of question 8

Question 9: What resources and tools should be implemented or improved in the organization to facilitate the development of new competencies to ensure operational excellence?

When evaluating the overall results of the ninth question in the questionnaire presented in Table No. 1, we find that 38% of respondents emphasise competence, staff development, strengthening leadership and fostering employee autonomy to improve and maintain operational excellence.

Thirty-four per cent of respondents noted the need to strengthen work skills, reinforce technological capabilities, and establish more integrated data systems to increase efficiency, which will facilitate continuous improvement and foster the development of people, leadership, autonomy, and empowerment.

On the other hand, with 30% of respondents referring to technical training and methodologies that enable continuous training to strengthen the development of new skills, which allows the organization to meet new demands to improve and maintain operational excellence, the organization must develop technical and leadership skills in continuous improvement, as well as formalize employee training.

Table No. 9 below shows the results of the first question in the questionnaire.

Box 17

Table 9

Results of question 9

Table No. 10. Results of question 9.

| Priority resources and tools | Average adoption rate | Example of applications in Mexican SMEs |
|---|-----------------------|--|
| a] Competencies, staff development, management | 38% | Leadership programs, digital upskilling, change management methodologies. |
| b] Use of technology and data systems | 35% | ERP, CRM, data analytics, process automation. |
| c] Strengthen current technological capabilities + training | 27% | Gradual digitization, adoption of new software versions, training in existing tools. |

Source: Own elaboration.

Box 18



Figure 9

Shows the results of question 9

Question 10: What could be the determining factors that allow the organization to adapt to dynamic changes and maintain the new model of operational excellence?

Evaluating the general data corresponding to the tenth question of the questionnaire presented in Table No. 1, it is identified that 42% of the companies interviewed consider that employees must establish technical skills and the use of advanced data, in addition to analytical skills and the ability to accurately interpret and analyze data in order to adjust business models, strategies and resources, which is key in volatile environments.

This contributes to dealing with any situation within the environment, and the continuous training of staff is an important factor in strengthening effective decision-making and the need to strengthen empathy at work.

Thirty-four per cent of those interviewed also agree on the importance of enhancing skills in the adoption of change management methodologies, which report greater adaptation in the face of crises, and promoting the continuous development of employees to align their skills with organisational objectives and operational excellence.

To this end, it is necessary for the company to have experts and employees willing to undergo training. Everyone, from senior management to areas such as human resources and marketing, needs to share a minimum common knowledge base in order to move to the next level.

Meanwhile, the remaining 24% of respondents focus on the importance of

empowerment and leadership, creating environments in which employees can develop their skills to align their competencies with organizational objectives and operational excellence, and having a workforce that is willing to take training courses.

Table No. 11 below shows the results of the tenth question in the questionnaire.

Box 19

Table 10

Results of question 10

| Determining factors | Average adoption rate | Example applications of in Mexican SMEs |
|---|-----------------------|---|
| a) Flexibility, resilience, strategy, resources | 42% | Manufacturing and service SMEs emphasize that their survival depends on their ability to reorganize processes and quickly reallocate resources. |
| b) Change management | 34% | Companies that have adopted change management methodologies [Kotter, ADKAR, Kaizen] report greater adaptation to crises and digitalization. |
| c) Empowerment and leadership | 24% | It is observed that transformational leadership and employee participation are relevant, but less prioritized compared to structural pressures. |

Box 20

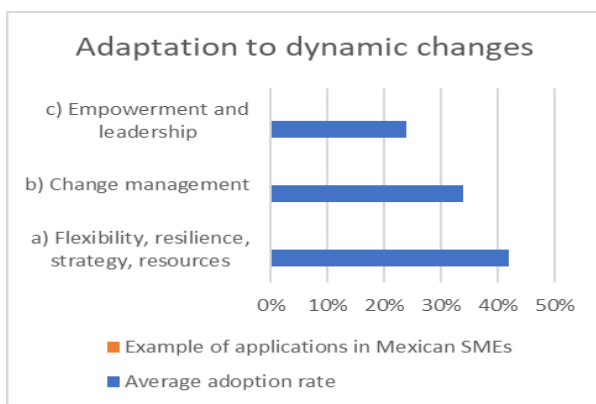


Figure 10

Shows the results of question 10

Results

Below, we present the results for each of the 10 questions, including only data that provides relevant information for this article.

The categories associated with each question are summarised in Table 1.

Analysis of qualitative data

The overall results show that the lack of cross-cutting standardisation in operational excellence [OE] practices leads to distortions in the adoption of key methodologies, which reduces consistency and limits the strategic impact of improvement initiatives.

This finding coincides with that of Carvalho et al. [2023], who highlight that the absence of comprehensive evaluation mechanisms compromises organisational maturity.

Although continuous improvement is recognised as an essential factor in reducing waste and improving operational efficiency, its application is limited in administrative and supply chain management areas. According to the evidence gathered, 35% of respondents link EO with models and tools [e.g., Kaizen, Lean, ISO 9001]; however, in many cases, its implementation is restricted to the production sphere, confirming Shingo's [2022] assertion about the difficulty of expanding excellence practices beyond operations.

For their part, 24% of respondents consider continuous improvement to be essential, although they face difficulties in terms of scope and sustainability. Only 36% highlighted the integration of long-term strategic objectives, reflecting a lag in strategic alignment, a situation also reported by McKinsey [2024] in highly volatile environments.

In terms of organisational capabilities, two determining factors were identified: support structures—such as areas for continuous improvement and strategic meetings [34%]—and committed leadership [27%], both of which promote alignment between strategy and operations. However, the results reveal deficiencies in internal communication and change management, which leads to partial integration of employees in strategic processes.

This finding coincides with Hiatt [2024], who emphasises that the sustainability of change depends on a balanced combination of technical and human dimensions.

Likewise, limited assimilation of organisational values is detected, which affects cultural cohesion and reduces collective commitment. The inconsistency in project sustainability is linked to a lack of discipline in monitoring, the absence of continuous evaluation mechanisms, and weak interdepartmental coordination. These elements reflect the problem of 'organisational silos,' widely described in the literature on operational excellence [Rusev & Saloniitis, 2016].

Finally, it is observed that the current technological infrastructure is insufficient to support predictive monitoring and agile decision-making, which underscores the need to invest in modern technologies and advanced analytical capabilities. This coincides with the approaches of [15], who highlight that the integration of digital tools and sustainability principles strengthens both the resilience and efficiency of organisations.

Figure 1 summarises the critical aspects identified in the ten dimensions analysed, highlighting the gaps between installed capacities, implemented practices and future needs of SMEs.

Box 21

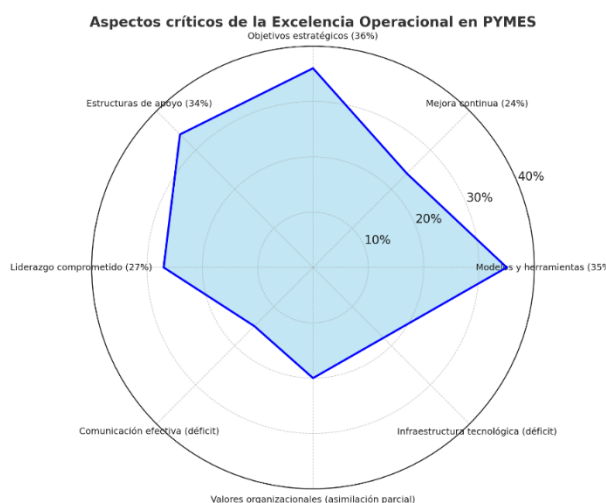


Figure 11

Breakdown of critical aspects for operational excellence

As mentioned, operational excellence [OE] must be strategic, sustainable, and cross-cutting. Although significant progress has been made in leadership and tools, challenges remain, such as a lack of standardisation, culturally limited leadership, a restricted operational focus, insufficient communication, and weak or, in some cases, absent project sustainability.

Conclusion

The results of this study show that the determining factors of maturity in operational excellence [OE] are effective leadership, continuous improvement, alignment with strategic objectives, and the strengthening of technical and analytical skills.

These elements form the basis for consolidating a resilient and adaptable organisational culture capable of articulating operations, corporate values, and change management oriented towards sustainability.

It is confirmed that practices such as systematic evaluation, transformational leadership, and structured training enhance the capacity of SMEs to sustain continuous improvement processes, overcome resistance to change, and achieve optimal performance in critical areas.

The main contribution of this study lies in offering a holistic approach, where the integration of leadership, advanced competencies, and strategic management allows for maintaining high performance standards in dynamic contexts.

Practical implications

This study provides empirical evidence applicable to Mexican SMEs, highlighting the need to:

Standardise processes of operational excellence in all areas, not just operations, to ensure consistency and sustainability.

Strengthen internal communication and change management in order to actively integrate all employees.

Invest in digital technologies and analytical capabilities that enable predictive monitoring and agile decision-making.

Consolidate cross-cutting competencies through continuous training programmes and transformational leadership development focused on consolidating motivation, commitment and organisational cohesion around the principles of operational excellence.

These programmes should be applied at all hierarchical levels and areas of the organisation, promoting a shared sense of purpose and collective responsibility.

Design and implement a comprehensive model of operational excellence that allows for the standardisation of processes throughout the organisation, establishing a regulatory framework applicable to all areas, including human resources, administration and other strategic departments.

This model should ensure that staff understand and apply organisational standards uniformly, through clear procedures, ongoing training programmes, internal audits, technological integration and continuous improvement practices. This approach not only promotes sustainability and consistency in management, but also stimulates innovation aimed at responding quickly to changing market demands.

Develop a strategic plan to ensure the sustainability of continuous improvement projects, supported by solid organisational structures and effective strategies based on international best practices.

This plan should minimise dependence on individuals by standardising processes, implementing continuous training programmes and developing digital platforms that centralise information, thus promoting operational continuity and the sustained success of projects in the long term.

Promote interdepartmental improvement teams, focused on identifying, analysing, and prioritising opportunities for process optimisation. These teams should foster effective collaboration between areas and ensure consistency with the organisation's strategic objectives. It is also essential to establish regular meetings to evaluate progress, define action plans, and adjust strategies based on the results achieved.

Define institutional policies that consolidate change management as a central focus of the organisation. These policies should ensure that all employees clearly understand their role in transformation initiatives, linking their individual objectives to the corporate strategic vision.

To achieve this, it is essential to design an internal communication system that transcends hierarchical barriers, promotes interdepartmental collaboration, and strengthens an organisational culture based on transparency and trust.

These practices promote more sustainable and competitive management that is aligned with the demands of the dynamic markets in which Mexican SMEs operate.

Limitations and future lines of research

This study has some limitations that should be acknowledged. First, the sample focused on SMEs in a specific state of Mexico [Colima], which limits the generalisation of the findings. Second, the research relied mainly on qualitative interviews, which limits the quantitative scope of the conclusions.

Therefore, it is suggested that future research:

Expand the sample to the national level and to different industrial sectors.

Integrate mixed methods [qualitative and quantitative] to validate the results and generate predictive models of operational excellence.

Explore in greater depth the role of digital transformation and sustainability as cross-cutting factors in the maturity of operational excellence.

Declarations

Conflict of interest

The authors declare that they have no conflict of interest. They have no conflicting financial interests or personal relationships that could have influenced the article presented in this paper.

Contribution of the authors

Torres-Gutiérrez, Arturo: Contributed to the project idea and the development of the research.

Lino-Gamiño, Juan Alfredo: Contributed to the development of research, data analysis, review and editing.

Availability of data and materials

The data sets used or analysed during the current study are available upon request from the corresponding author.

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Abbreviations

EO – Operational excellence.

PYME – Small and medium-sized enterprises.

SMEs– Small and medium-sized enterprises.

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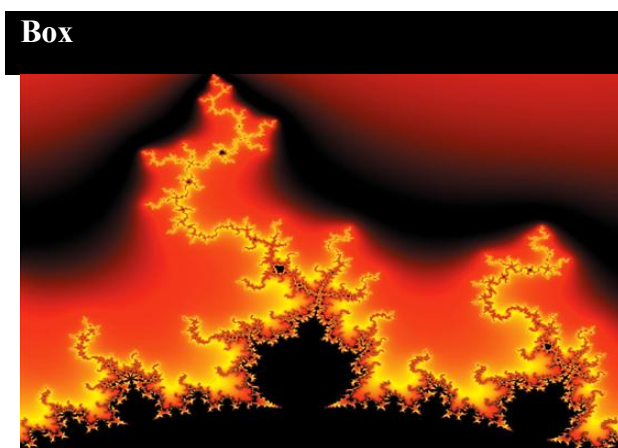


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