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## **Presentation of the Content**

In the first article we present, *Promoting scientific and technological vocations through educational electronics and robotics for vulnerable communities*, by Villalobos-Alonzo, María de los Ángeles, Cabrera-Villaseñor, Héctor Ulises and Hernández Martínez, Marcelo Alberto, with adscription in the Universidad Tecnológica de Jalisco, as the next article we present, *The use of the Fiscal Agenda to improve the teaching-learning process in the Accounting career*, by Castillo-Cira, Alfredo, Medina-Ocampo, Francisco José and Martínez-Mena, Elda Verónica, with adscription in the Universidad Tecnológica de Cancún as the next article we present, *Artificial intelligence in financial forecasting and investment management*, by Azamar-Encinas, Ana Lourdes, Landazuri-Aguilera, Yara and Baez-Lugo, Edwin Alexis, with adscription in the Instituto Tecnológico de Sonora, as the last article we present, *Design of an instrument for measuring factors influencing organizational performance in companies in the industrial sector*, by Acosta-Mellado, Erika Ivett, Hinojos-Castro, Mariana, Ruíz-Pérez, Roberto and Valenzuela-Reynaga, Rodolfo, with adscription in the Instituto Tecnológico de Sonora.

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## Promoting scientific and technological vocations through educational electronics and robotics for vulnerable communities

### Fomento de vocaciones científicas y tecnológica mediante la electrónica y robótica educativa para comunidades vulnerables

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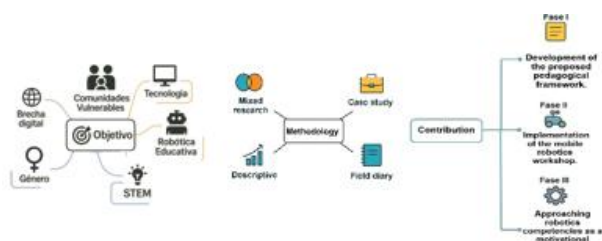


#### Abstract

This research presents the documentation and design of a project that seeks to collaborate with socially vulnerable institutions at the basic education level to enable children and adolescents to interact with technology through educational robotics [STEM knowledge]. It is approached using a mixed methodology, with case studies and field diary data collection instruments. Three phases of the project are described: the pedagogical framework for the educational robotics workshop, sample mobile robotics classes for elementary schools, and the introduction of robotics competitions as a motivational strategy. It concludes that the children who attended RoboMatrix saw themselves reflected in the children from the participating elementary schools, and the challenge of competing in upcoming events with their own robots becomes more familiar to them and a challenge to overcome. It was an important experience for approaching technology through robotics.

#### Resumen

En esta investigación se presenta la documentación y diseño del proyecto que busca colaborar con instituciones con características de vulnerabilidad social del nivel de educación básica, para que los niños y adolescentes interactúen con la tecnología a través de la Robótica educativa [conocimiento STEM]. Se aborda desde una metodología mixta, con estudio de caso e instrumentos de recogida de datos el diario campo. Se describen tres fases del proyecto; planteamiento del marco pedagógico del taller de robótica educativa, clases muestras a primarias de robótica móvil y acercamiento a competencias de robótica como estrategia de motivación. Concluyendo que los niños que asistieron a RoboMatrix se vieron reflejados en los niños de las primarias participantes, el desafío de competir en los próximos eventos con sus propios robots se vuelve más cercano para ellos y un reto a lograr. Fue una experiencia importante para acercarse a la tecnología mediante la robótica de concurso.



#### Project, Educational robotics, Scientific and technological vocations and Vulnerable communities



#### Proyecto, Robótica educativa, Vocaciones científicas y tecnológicas y comunidades vulnerables.

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## Introduction

The binomial humanity and technology has become a natural tendency, since it is present in most of the activities of the human being. Technology has become necessary, since we create it from the reflection of our own needs. It is important to point out the inseparable relationship that exists between culture, society and technology. The latter is essential to reach the majority of society in a more egalitarian way, not only to improve general welfare, but also to avoid awakening a potential social rejection of those who are deprived of such approaches or technological advances, thus building a more equitable society.

Technology is useful to solve problems of a social and environmental nature, with an orientation under social responsibility, social technology will contribute to meeting the Sustainable Development Goals [SDGs] promoted by the United Nations for 2030: Goal

4: Ensure inclusive, equitable and quality education and promote lifelong learning opportunities for all. I mean; "When people can obtain a quality education, they can break the cycle of poverty" [[Naciones Unidas, 2018](#)].

In this context, the contribution of Higher Education Institutions [HEIs] in México is aligned with the General Framework of the Higher Education Evaluation and Accreditation System of the Higher Education Evaluation and Accreditation System [SEAES], [[Pérez, et al., 2023](#)] under the approach of the National Policy for the Evaluation and Accreditation of Higher Education [PNEAES] in the criterion of commitment to social responsibility where:

"The institution Assumes his responsibility and social leadership in their own context and problems more sensitive communities in nearby communities, with the purpose of contributing to the formation of a more just, free, inclusive and peaceful society, as well as to sustainable development and care for the environment, at the local, regional and national levels; and to the preservation, enrichment and dissemination of the goods and values of the various cultures and with the internationalization of solidarity" [p. 42].

With the intention of contribute the democratization of access to technology-based knowledge through educational robotics This project was designed to support schools and associations close to our university, with a fundamental mission of responsibility and social leadership to contribute to a better sustainable future for those who are in a situation of economic and social inequality, in turn, develop STEM [Science, Technology, Engineering and Mathematics] knowledge.

These efforts are based on the line of research with RAIIT1168 registration in the Special Program of Science, Technology and Innovation of the General Directorate of Technological and Polytechnic Universities [DGUTyP].

The objective of this project is to collaborate with educational and social institutions in marginalized areas, with socioeconomic problems and in conditions of vulnerability, so that boys and girls interact with technology through educational robotics [STEM knowledge], to reduce the digital divide and democratize access to technology-based knowledge and empower girls, to reduce the gender gap in technological vocations. Therefore, it is important to define the conceptual contexts with which this research is approached for a greater understanding of the reader:

### 1. Educacional Robotics.

Educational robotics is considered as "a means of learning based on the design and construction of objects controlled through algorithmic systems, transforming itself into a scenario where creative capacity is stimulated [[Guillén, 2019 cited by Calabrés, 2025, p. 115](#)].

From the most forceful impacts of the combination of educational robotics with a pedagogical orientation and the teaching of electronics, significant learning, leadership and shared values are obtained with a collaborative approach in the participants.

As these are areas related to engineering and technology, they contribute to the development of STEM [Science, Technology, Engineering and Mathematics] knowledge and skills that range from a conceptualization that will end up being applied to the development of tangible products; as mobile robots of competition.

## Article

Contributing to scientific, mathematical and technological training from inclusion.

## 2. Scientific and technological vocations

Although vocational choices are complex and influenced by multiple social factors, career decisions in engineering seem to be associated with different motivations according to gender. According to [Alemay, 1992] whose research needs to be updated, men tend to show an earlier and more direct vocational interest, while women "report a later and more rational choice, after seeking information and advice or by excluding other alternatives".

It is important to note that this perspective may not reflect the diversity of current experiences and motivations, so further research is required to better understand the career choices of women in engineering in the contemporary context.

The participation of women and men in Science and Technology [S&T], especially in engineering such as Robotics, is favored by school curricula that promote the appreciation of S&T from basic and upper secondary education. Activities such as science fairs, robotics competitions and STEM [Science, Technology, Engineering and Mathematics] Challenges, combined with the promotion of curiosity, interest and taste for science, can generate a personal inclination towards these areas.

In contrast, the lack of positive experiences in childhood or adolescence, characterized by the difficulty, failure, boredom, or stress associated with S&T, can deter students from approaching science. Likewise, gender stereotypes, which attribute supposed innate deficiencies to women in these areas, can limit their vocational options, impacting their choice of scientific and technological studies at an early age.

Since "girls receive less academic and professional guidance to choose STEM studies and careers, with a strong technological component, than their male peers from tutors, primary and secondary school teachers and guidance service from secondary schools [Sainz, Arroyo and Castaño, 2020: 29-30 cited by Casado, 2025, p.60].

With the proposal of this research, it is intended to reduce the gender gap and influence through the robotics workshop in children and adolescents so that they preferentially select in the future careers in the field of Engineering and technology.

## 3. Technology and its impact on social change

Technological development "understood as the use and exploitation of scientific knowledge towards new goods, products, services or processes, has had and continues to have a clear and decisive impact on society. This impact affects all dimensions of society, whether economic, social, political or cultural. On many occasions, this technological development is linked to the progress that every society pursues to achieve a situation of greater well-being and, ultimately, an improvement in its living conditions" [Sancho-García, et al., 2022, p. 22]."

Given this changing nature of environments, it is essential to identify both the social environment and the digital divide" [López, et al., 2025, p.92]. Therefore, the technology used with purpose plays an important role in inclusion and equity projects. Through education, it becomes a means to help children to leave the poverty line.

Therefore, this project aims to have desirable effects that favor the most vulnerable, providing a means for social integration that improves the quality of life of children and adolescents, helping to reduce differences and inequalities.

This is done through University Social Responsibility [RIU], which according to [Urdapilleta, 2019, p. 175]: "RIU is a term coined since 2000 by authors such as François Vallaeys, [2013], who defines it as "the capacity of the university as an institution to disseminate and put into practice a set of principles and values, through four key processes: management, teaching, research and extension" [Universidad Construye País, 2006: 96]".

In this context, it is necessary to reflect on the responsibility of each of the members who collaborate in the HEIs, "to question whether we promote, validate or allow the chronic problems of our society and to generate awareness of the power of our influence in the social environment [Villalobos-Alonzo, et al., 2024, p. 21].

## Article

**Methodology**

It is an investigation with a mixed approach; from the qualitative paradigm with which "it is sought to carry out phenomenological or constructivist narrative studies, which seek to describe the subjective representations that emerge in a human group about a certain phenomenon" [Galarza, 2020]. By documenting the learning processes and results of participation in competition competitions based on the units of analysis that "represent the segments of the content of the messages that are characterized and Individualized for subsequently categorize them, relate them and establish inferences from them [Hernández, 2014].

Through the "unit of record" or "the unit of significant content within the document that will serve to extract results" [Briones, 1990] from the units of analysis:

- Motivation and volition.
- Collaborative work.
- Interaction with technology.
- Perceptions of one's own learning.
- Conflict resolution.
- Participation by gender.
- Perceptions of challenges and benefits by the various participants.
- Experiences lived by the participants.

A case study will be applied since it is a methodological procedure to approach an inter/subject/object as a research modality. By taking the individual unit as a universe of research – to sectors with vulnerable conditions such as the " Casa Hogar".

The instruments for data collection to be used will be the field diary, according to [Bonilla y Rodríguez, 1997] "the field diary must allow the researcher to permanently monitor the observation process. Where the researcher takes notes related to aspects related to the research, to later organize, analyze and interpret the information he has collected.

The research had a quantitative approach, of a descriptive type, according to [Ramos, 2020], "the characteristics of the phenomenon under study are known and what is aspired to be sought is the exposure and description of the aspects present in a certain group of people" [p.95].

It will be used to record the learning processes and results of participation in competition competitions.

**4. Context of the research**

Jalisco is a state with inequality gaps, characterized by social differences, where poverty and extreme poverty constitute a cross-cutting problem in all the municipalities of the center [Figure 1-2], north and south of the state.

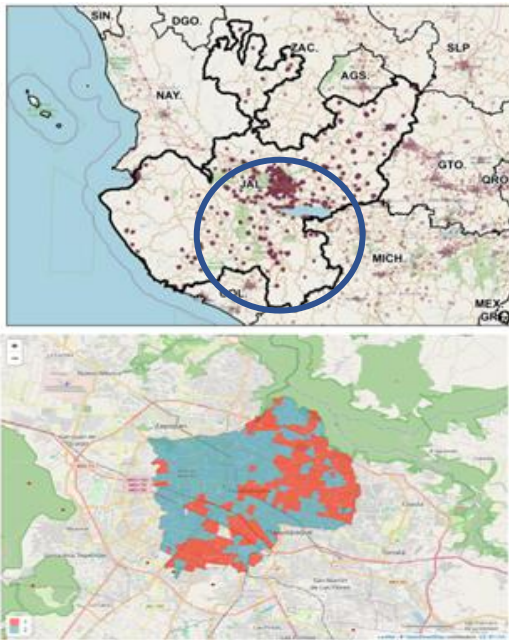
The lack or precariousness of access to drinking water, food insecurity, educational backwardness, environmental problems, and the low income that affect a large number of the jaliscienses, make the socioeconomic impact even more worrying.

ZAP is defined as areas or regions, whether predominantly rural or urban, whose population registers indices of poverty, marginalization indicative of the existence of marked insufficiencies and lags in the exercise of rights for social development. Guadalajara is located in the ZAP areas, as can be seen in Figures 1-2, this locality belonging to the center is where the greatest inequality and poverty are found, which according to CONEVAL in recent years, the population under 18 years of age in the state, increased in the proportion of minors in poverty to 39.7%.

Regarding the incidence in each of the social deprivations in Jalisco, between 2018 and 2020 the proportion of children and adolescents in educational lag increased by 3.4%, from 11.9% to 12.3%.

It is important to mention that the Technological University of Jalisco is located in the center of the state in the municipality of Guadalajara, adjacent to the neighborhoods 5 de mayo, Echeverría, Lomas de Polanco, Miravalle, La Mezquitera, Buenos Aires, El Manantial, El Rastro, La Nogalera, Barrio 5, Las Juntas, El Vergel and Dr. Valentín Gómez Farías, to mention a few.

The socioeconomic status of the population belongs to the lower-middle to lower class, they work as workers in companies and informal commerce, with a high rate of women heads of household, poverty and social deprivation such as; access to social security, health services and educational lag. With serious public safety problems due to robbery, family violence and homicides.

**Box 1****Figure 1-2**

Population registers poverty and marginalization rates in Jalisco.

*Source [Prepared by the Directorate General for Beneficiary Registries [DGPB], Ministry of Welfare, based on the Decree by which it is formulated the Declaration of Priority Attention Zones for 2023, Official Gazette of the Federation. [Atlas of inequality in Jalisco, 2025]].*

The project "Promotion of scientific and technological vocations through electronics and educational robotics for vulnerable communities" will be carried out in a CasaHogar.la which is located in the area of influence of the campus.

## 5. Context of the support institution.

The Casa Hogar, is a space designated by the state family system for the protection and special attention for children and adolescents who are victims of mistreatment, abuse and exploitation, referred by the Prosecutor's Office of the State of Jalisco, through a preliminary investigation and/or investigation file, the referral to the respective delegation of the Attorney General's

Office for children and adolescents, who require temporary and/or permanent protection in closed spaces classified according to the type of treatment assigned and the needs of attention required for each of them. Likewise, they are received and attended by the Delegation of the Office of the Attorney General of the Republic when they are direct or indirect victims of the commission of some criminal conduct, in which their legal situation is resolved, seeking reintegration into their family of origin or a substitute family.

Therefore, with the firm intention of contributing to the improvement of our community and based on our social duty as central actors of one Institution of Education Superior we respond to the challenges from our local level through a committed and active involvement to impact the promotion of social transformation through this project.

## Results

The project was divided into four phases, for the purposes of this research.

Phase I. Approach to the pedagogical framework of the intervention of the Social Responsibility Project and the first approach in the application of the educational robotics workshop, which integrates the approach of the proposal.

Implement an educational robotics workshop for a total of fifteen children and adolescents between 9 and 14 years of age, distributed as follows: eight girls and seven boys from the Children's Home.

Two scheduled sessions; Tue and Thursday from 3:30 p.m. to 5:00 p.m. at the facilities of the Technological University of Jalisco in building "D" of the Mechatronics Division in the space destined for the Robotics Laboratory.

The workshop is divided into seven modules:

- Module 1. Introduction to robotics and mobile robotics.
- Module 2. Robot morphology [Architecture].
- Module 3. Basic electronics oriented to robotics.
  - 3.1 Electrical circuit, electrical quantities.
  - 3.2 Resistance.
  - 3.3 The diode
  - 3.4 The Transistor
  - 3.5 The Integrated Circuit
- Module 4. Physical and/or digital design of the construction plan of a mobile robot.
- Module 5. Programming oriented to mobile robotics.
- Module 6. Prototype construction.
- Module 7. Preparation for competition.

## Expected impacts of the project

A. Impact on the social sphere:

## Article

1. To support children belonging to educational and social institutions in marginalized areas with socioeconomic problems and in conditions of vulnerability.
2. To get children to interact with technology through educational robotics.
3. Reducing the digital divide with vulnerable living conditions.
4. Support access to technology-based knowledge through the training workshop in electronics and robotics.
5. Empower girls, to reduce the gender gap in technological vocations.

B. Impact in the scientific field:

1. To promote scientific vocations in children in the conditions already mentioned.
2. To strengthen the knowledge that contributes to STEM subjects.

C. Impacts in the technological field:

1. Manufacture of robotics prototypes according to the needs identified by the children in their context and solve a need.
2. Construction of a robot for participation in robotics competitions and competitions for primary and secondary school children.
3. Children's participation in RoboRave robotics competitions.

Expected results in the following areas:

- Social: To achieve a significant and positive life experience for children and adolescents by approaching technology through educational robotics.
- Academic: Training of teachers in educational robotics [Training of the staff of the Home to continue with the project in its facilities].
- Science: Participation in the dissemination of knowledge in conferences, the publication of articles and book chapters.
- Technology: Manufacture of prototypes of competing mobile robotics.

Phase II. Sample classes, "a diagnosis was carried out in the participants on the previous knowledge and interests, the application and possible social problems that can be solved with robotics, as well as the demonstration of the construction and functioning of mobile robotics and the characteristics of the prototypes that participate in competitions" [Villalobos-Alonzo, et al., 2024, p. 22].

Phase III Approach to robotics competencies as a motivational strategy for the children and adolescents participating in the workshop.

**Box**



**Figure 3**

RovoMatrix West Competition.

Source [RovoMatrix, 2025.]

On June 28, they attended the RovoMatrix Occident event within the framework of the XV Latin American Robotics Competition League [Figure 3], which took place at the Tlaquepaque Educational Center, where the fifteen girls and boys, had an approach to the competition guidelines, to the robots built by the children and to the personalized advice of the accompanying teachers, inspiring and motivating the children to manufacture their prototypes.

We highlight the great interest shown by the children and we can say that it was an important experience to approach technology through competition robotics. By seeing and recognizing themselves as the children who participated in this competition, the challenge of participating in the next competitions with their own robots, becomes closer to them, accepting this challenge.

## Conclusions

Society and the new education demand different ways of dealing with socio-economic and cultural problems, based on active and participatory action, even if it is in a leisurely way and sometimes under storms.

## Article

It is of utmost importance as Higher Education Institutions "To build a model of university-society relationship that generates public value, social impact and institutional sustainability [Martínez, 2025, p. 40], through applied projects.

By it Believe firmly what with initiative, desire and the challenge of launching this project "Promotion of scientific and technological vocations through electronics and educational robotics for vulnerable communities" is what really drives and can bear great fruit when directed towards children and adolescents in vulnerable situations.

It is well known that robotics "in education prepares students for future careers in the context of technology, strengthening their creativity for problem solving and innovative thinking" [Cárdenas, et al., 2025, p. 264].

Imagine that this experience can change their lives, impact the formation of technological and scientific vocations, the development of soft skills and STEM, in an opportunity to give back to the disadvantaged with an education based on robotics.

### Declarations

### Conflict of interest

We declare that there is no conflict of interest, financial or personal relationships that have influenced the realization of this research project.

### Author contribution

*Villalobos-Alonzo, María de los Ángeles;* Contribuyó con la idea del proyecto, método y resultados.

*Cabrera-Villaseñor, Héctor Ulises;* Contribuyó con la introducción y metodología técnica.

*Hernández-Martínez, Marcelo Alberto;* Contribuyó con los abstract, grafical abstract y conclusiones.

### Availability of data and materials

The data are available upon request from the corresponding author, as the shelter did not grant permission to publicly share the project agreement for the protection of the participating minors.

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### Abbreviations

CONEVAL	National Council for the Evaluation of Social Development Policy.
DGUTyP	General Directorate of Technological and Polytechnic Universities.
IES	Institutions of Higher Education.
PNEAES	National Policy for the Evaluation and Accreditation of Higher Education.
ODS	Sustainable Development Goals.
ONU	United Nations Organization.
RAIT	Registration of Activity Records Research, Innovation and Technological Development.
RIU	University Social Responsibility.
RovoMatrix	Latin American League of Robotics competition.
STEM	An educational approach that integrates the disciplines of Science, Technology, Engineering and Mathematics.
ZAP	Priority Attention Areas.

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Article




The use of the Fiscal Agenda to improve the teaching-learning process in the Accounting career

El uso de la Agenda Fiscal para mejorar el proceso de enseñanza-aprendizaje en la carrera de Contabilidad

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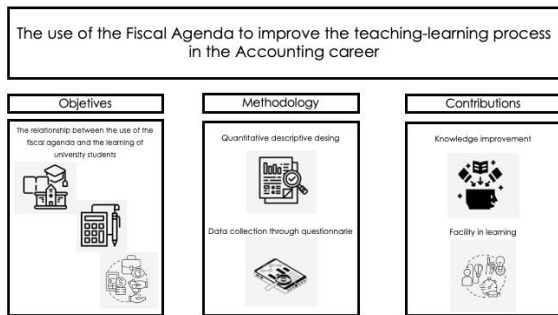
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Abstract

This study evaluates the influence of the Fiscal Agenda on the training of Accounting students at the Technological University of Cancun. It explores the role of this tool in their professional development and its relevance to the organizational field. The research adopts a quantitative and descriptive approach, with a cross-sectional design. Data were collected through a structured online survey, applied to 74 students. The results obtained were analyzed using descriptive statistical techniques and correlation analysis, to determine the relationship between the use of the Fiscal Agenda and academic performance

Resumen

El artículo analiza el uso de la Agenda Fiscal por estudiantes de la Carrera de Contabilidad de la Universidad Tecnológica de Cancún. Destaca la importancia y el impacto de la Agenda en la preparación profesional y las organizaciones. El estudio es cuantitativo y descriptivo, con un diseño transversal. Se recolectaron datos de 63 estudiantes mediante una encuesta estructurada en línea. Los resultados se analizaron con técnicas estadísticas descriptivas y análisis de correlación para explorar la relación entre el uso de la Agenda Fiscal y el desempeño académico.



Agenda, Accounting Education, Learning



Agenda Fiscal, Educación Contable y Aprendizaje

Area: Strengthening the scientific community

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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.



## Article

**Introduction**

The objective of this article is to analyse how accounting students, specifically those enrolled in the fifth semester at the Technological University of Cancún, use the Fiscal Agenda. Once the benefits of the Agenda have been identified, it will be possible to assess whether students are better prepared for their future professional careers, determining its relevance for academic training and its influence on organisations.

Reading processes allow us to develop other transdisciplinary research alternatives and generate broad cognitive skills to modify unilinear views of our environment [Valencia Lemos 2010].

The Fiscal Agenda refers to a regulatory instrument that establishes the criteria and procedures for the accounting record of public operations. Accounting Agenda [2024].

**Learning Theories: a conceptual framework for Fiscal Accounting Education***Ausubel's Meaningful Learning*

Ausubel's theory of meaningful learning [1963] posits that learning occurs when new knowledge is related in a substantive and non-arbitrary way to the student's prior knowledge. In the field of tax accounting, this involves connecting abstract concepts with practical examples and real-life situations that are relevant to students.

According to Novak [2020], the creation of concept maps and the use of advance organisers can facilitate the integration of new tax concepts into the cognitive structure of students. Wheel Piaget and Vigotsky's Constructivist Learning From a constructivist perspective, learning is an active process in which students construct their own knowledge through interaction with their environment and collaboration with others.

Piaget [1952] emphasises the importance of direct experience and problem solving for cognitive development, while Vygotsky [1978] highlights the role of social context and teacher mediation in learning.

In tax accounting education, this translates into the creation of practical activities, such as tax audit simulations or real-case analyses. In this sense, a blended learning model can improve the effectiveness of tax accounting and tax planning teaching by combining online and offline teaching methods, developing corresponding resources, and combining theory with practice. Li, X., Shu, Y., & Ang, R. [2024].

*Kolb's Experiential Learning*

Kolb's [1984] theory of experiential learning proposes that learning is a continuous cycle of concrete experience, reflective observation, abstract conceptualisation, and active experimentation. In the context of tax accounting, this involves providing students with opportunities to apply their knowledge in practical situations, reflect on their experience, draw conclusions, and plan future actions.

According to Rodgers et al. [2017], combining experiential and conceptual learning in accounting education can improve student understanding and optimise teaching methods.

*Self-Directed Learning*

Self-directed learning refers to students' ability to take initiative and responsibility for their learning. In the digital age, where tax information is available online, this skill is becoming increasingly important. Medina-Díaz [2020] points out that learning assessment involves making an informed judgement, based on appropriate and relevant information about the various learning outcomes developed and achieved.

Therefore, one of the great challenges is to collect and combine both quantitative and qualitative information gathered using multiple instruments and at different times. In tax accounting education, according to Cloyd, C. & Spilker, B. [2020], the incorporation of data analysis prepares students to search for information and evaluate its credibility, which in turn prepares them for professional tax work and tax data analysis.

**Tax Accounting and Education: An Analysis of Nature, Importance, and Pedagogical Approaches**

## Article

Tax accounting, a discipline that combines accounting principles with tax laws and regulations, presents unique challenges for students and educators. Its complex and changing nature requires an adapted pedagogical approach to ensure effective learning.

*Nature and Complexity of Tax Accounting*

Tax accounting is characterised by its constant evolution, driven by legislative changes and updates to tax regulations. This dynamic requires students to develop critical thinking skills and the ability to adapt. According to García-Casella [1999], understanding tax accounting involves not only mastering calculations and procedures, but also the ability to interpret and apply complex laws. The abstract nature of some tax concepts, coupled with the need for precision and attention to detail, can create learning difficulties for students [Amat Salas, 2020].

*Importance of Tax Education*

Tax education plays a crucial role in training competent accounting professionals and responsible citizens. A solid understanding of tax principles enables accountants to advise companies and individuals on complying with their tax obligations, avoiding penalties and optimising their tax burden. In addition, tax education contributes to transparency and fairness in the tax system, fostering a culture of compliance and combating tax evasion. According to Baporikar [2022], tax education helps with tax compliance and has a multiplier effect on tax knowledge and national development.

*Pedagogical Approaches to Teaching Tax Accounting*

Teaching tax accounting requires pedagogical approaches that encourage student participation and the practical application of knowledge. The use of case studies, simulations, and practical projects allows students to face real-life situations and develop problem-solving skills.

The incorporation of information and communication technologies [ICT], such as tax accounting software and online learning platforms, can enrich the teaching-learning process. In addition, collaboration with professionals in the tax sector and visits to companies and accounting firms can provide students with a broader view of the field of work.

According to Upegui [2002], combining different pedagogical approaches, adapted to the needs and learning styles of university students, is key to achieving meaningful learning in tax accounting.

*Studies on Accounting Education in Mexico:*

Challenges, Opportunities, and Evaluation Accounting education in Mexico faces unique challenges and opportunities, influenced by the socio-economic context, educational policies, and labour market demands. An analysis of recent studies allows us Gutiérrez to identify trends and areas for improvement.

*Challenges and Opportunities for Accounting Education in Mexico*

One of the main challenges is the gap between theory and practice, where students often lack practical experience in real-world situations, as pointed out by Hernández-Sampieri & Mendoza Torres [2021]. The lack of updated curricula and the scarcity of technological resources also limit the quality of accounting education [Díaz-Barriga, 2020].

However, there are opportunities to improve accounting education through the implementation of active methodologies, the use of information technologies, and collaboration with the business sector.

*Analysis of the Accounting Curriculum in Mexico*

The accounting curriculum in Mexico varies according to the educational institution and level of study. According to Burgos, et al. [2011], the evaluation of the relevance of educational programmes refers to the analysis of the university's ability to respond to the expectations of the community. In broader terms, it studies aspects related to the priorities established by development plans; studies of educational supply and demand; and studies of student competence and comprehensive training, as well as the mechanisms of knowledge production and distribution. The need to strengthen training in soft skills, such as teamwork, communication, and critical thinking, in addition to technical knowledge in accounting, has been identified. The integration of professional ethics and social responsibility into the curriculum is also considered essential.

## Article

*Evaluation of Accounting Education Programmes and Materials in Mexico*

The evaluation of accounting education programmes and materials is essential to ensure their quality and effectiveness. Some studies have evaluated and observed a significant gap between the skills training offered by universities and the demands of the labour market, suggesting a need to adjust educational programmes to better meet market expectations [Montoya-Del-Corte & Farías-Martínez, 2014].

Audit management in Mexico has increased tax revenues, but tax evasion remains a significant problem, suggesting that better tax education and transparency are needed to boost finances. Gutiérrez [2023]. Therefore, according to Espina [2021], university training for public accountants should include teaching programmes aimed at strengthening civic values and promoting a culture of tax compliance.

The evaluation of teaching materials, such as textbooks and educational software, is also important to ensure that they are suitable for students and up to date with the latest accounting regulations.

**Methodology and Approach of the Study**

The study is based on a quantitative and descriptive approach, with the purpose of analysing the perception and use of the 2025 Tax Agenda among accounting students. This approach allows for the collection of accurate and measurable data on the knowledge and use of the Tax Agenda, as well as its impact on students' academic performance.

**Research Design**

The research design is cross-sectional, as data was collected in the third week of March 2025, from the 17th to the 21st. It should be noted that this design is suitable for describing the characteristics of a population at a specific point in time and for identifying possible relationships between variables.

**Population and Sample**

The study population consists of accounting students at the Technological University of Cancún.

A sample of 63 students was selected using non-probabilistic convenience sampling, which allows information to be obtained quickly and efficiently.

**Data Collection Instrument**

A structured survey was used as the data collection instrument; it included the following questions:

1. Gender:
  - Male
  - Female
2. What accounting subject are you studying?
  - Taxes for individuals,
  - Taxes for legal entities,
  - Analysis and interpretation of financial statements,
  - Advanced Accounting, Corporate Accounting
3. How often do you use the Tax Agenda?
  - Daily
  - Weekly
  - Monthly
  - Rarely
  - Never
4. What type of queries do you mainly use the Tax Agenda for?
  - Tax obligation due dates
  - Tax rates and percentages
  - Legal basis for tax provisions
  - Practical examples of tax calculations
  - Other [specify] \_\_\_\_\_
5. Do you find the Tax Agenda easy to use and understand?
  - Yes, very easy
  - Yes, easy
  - Average
  - Difficult
  - Very difficult
6. Which sections of the Tax Agenda do you find most useful? [You may select more than one]
  - Tax calendar
  - Tax tables
  - Tax legislation

## Article

Practical examples  
 Glossary of tax terms

7. How useful do you find the Tax Agenda for resolving specific queries on tax matters?

Very useful  
 Useful  
 Neutral  
 Not very useful  
 Not at all useful

8. Do you consider that the Tax Agenda has improved your understanding of tax accounting matters?

Yes, significantly  
 Yes, moderately  
 It has had no impact  
 It has reduced my understanding

9. Has the Tax Agenda helped you feel more confident when performing tax calculations and procedures?

Yes, much more confident  
 Yes, more confident  
 It has not changed my level of confidence  
 I feel less confident

10. Has the Tax Agenda motivated you to study tax accounting in greater depth?

Yes, very much  
 Yes, somewhat  
 It has not motivated me

11. To what extent has the Tax Agenda facilitated your learning compared to other resources?

Much easier  
 Easier  
 Just as easy  
 More difficult  
 Much more difficult

12. Would you recommend the Fiscal Agenda to other accounting students?

Yes, definitely  
 Yes, probably  
 Maybe  
 No, probably not  
 No, definitely not

13. Has the Fiscal Agenda improved your learning process?

Yes  
 No

14. Do you think the Fiscal Agenda contributes to a better teaching process?

Yes  
 No

### Procedure

1. Questionnaire design: A questionnaire with closed-ended and multiple-choice questions was developed to facilitate quantitative data analysis.

2. Data collection: The survey was distributed to selected students via online platforms, such as Google Forms, to ensure greater participation and convenience.

3. Data analysis: The collected data was analysed using descriptive statistical techniques, such as frequencies and percentages, to summarise the students' responses. In addition, correlation analyses were performed to identify possible relationships between the use of the Fiscal Agenda and academic performance.

### Results

The results of the survey are presented below.

#### Box 1



**Figure 1**

Sex

The results obtained show that 54% are female [34 female students], while 46% are male [29 male students].

#### Box 2

2.1. What accounting course material are you studying?



**Figure 2**

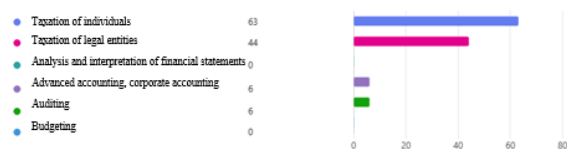
Subject studied

## Article

The results obtained show that 62 students are enrolled in Taxation of natural persons and 1 in Higher Accountancy.

**Box 3**

3. In which areas is the use of the tax agenda most required?

**Figure 3**

Area

**Box 4**

4. 1. How often do you use the Tax Calendar? (0 punto)

**Figure 4**

Frequency of diary use

Regarding the frequency of use of the fiscal diary, 70%=44 students indicated daily, 30%=19 students weekly.

**Box 5**

5. Do you consider that the Tax Agenda has improved your comprehension on tax accounting? (0 punto)

**Figure 5**

Type of consultations

On the type of queries, 86%=54 students answered Legal basis of tax provisions. 6%=4 students, Tax rates and percentages..

**Box 6**

6. 1. Do you find the tax agenda easy to use and understand? (0 punto)

**Figure 6**

Ease of use

In relation to the frequency of use, 48%=30 students answered regularly, 44%=28 students, Yes, easy, and 8%=5 students, Yes, very easy.

**Box 7**

7. Which sections of the tax agenda do you find most useful? (you can select more than one) (0 punto)

**Figure 7**

Sections used

Concerning the sections used; 37%=23 students answered Tax tables, 30%=19 students, Tax legislation, 30%=10 students, Practical examples, 10%=6 students, Tax calendar and 8%=5 students, Glossary of tax terms.

**Box 8**

8. 1. ¿Qué tan útil te resulta la Agenda Fiscal para resolver dudas específicas sobre temas fiscales? (0 punto)

**Figure 8**

Usefulness of the Agenda

For the question referring to the usefulness of the diary, 68%=46 students mentioned very useful, 29%=17 students useful.

**Box 9**

9. 1.- Do you consider that the Tax Agenda has improved your comprehension on tax accounting? (0 punto)

**Figure 9**

Improved understanding of fiscal issues

Regarding improvement in understanding of tax issues, 65%=41 students said yes, significantly, 33%=21 students, yes, moderately.

**Box 10**

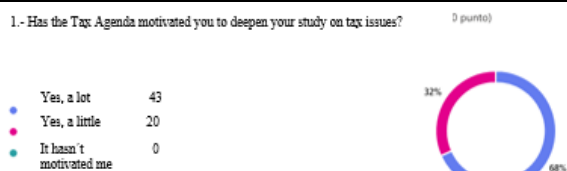
1.- Has the Tax Agenda being helpful on making you feel more confident with calculations and tax procedures? (0 punto)

**Figure 10**

Security in carrying out calculations and procedures

## Article

The result of question nine on the safety of carrying out calculations and procedures, 60% = 38 students said yes, safer, while 38% = 24 students said yes, much safer.

**Box 11****Figure 11**

Motivation for further study of accounting topics

On the question about the motivation to study accounting topics in depth, 68%= 43 students answered yes, very much, while 32%=20 students answered yes, somewhat.

**Box 12****Figure 12**

Ease of learning compared to other resources

On the question of ease of learning compared to other resources, 48%=30 students answered easier, 37%=23 students, much easier, 16%=10 students, just as easy.

**Box 13**

1.- Would you recommend the Tax Agenda to other accounting students?

**Figure 13**

Recommendation to other students

Regarding recommendation to other students, 92%=58 students said yes, definitely, and 6%=4 students, yes probably, only one student said maybe.

**Box 14**

1.- Has the Tax Agenda improved your learning process?

**Figure 14**

Improvement in the learning process

The results obtained on the question of whether the learning process has improved, 100%=63 students said yes.

**Box 15**

1.- Do you think that the Tax Agenda contributes for a better teaching process? motivated you to deepen your study on tax issues?

**Figure 15**

Perception on the contribution to the improvement of the teaching process

Regarding the perception of the contribution to the teaching process, 100%=63 students said that it does contribute to the teaching process.

**Box 16**

1.- Do you consider necessary to invest on the Tax Agenda in order to stay updated? (0 puntos)

**Figure 16**

Perception of investment in the Fiscal Agenda

Regarding the last question related to investment in the Fiscal Agenda, 100%=63 students stated that investment was necessary.

**Conclusion**

This study evaluated the perception and use of the Fiscal Agenda among accounting students at the Technological University of Cancún. The results reveal a high level of acceptance and perceived usefulness of this tool as a resource to support their academic and professional training.

**Key findings:**

**High Frequency of Use:** the majority of students [70%] use the Fiscal Agenda daily, indicating its relevance and usefulness in their academic routine.

**Importance of the Legal Basis:** A significant percentage of students [86%] consult the Fiscal Agenda mainly to understand the legal basis of tax provisions, which underscores the need for access to clear and accurate regulatory information.

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**Perceived Usefulness:** The vast majority of students [68%] consider the Fiscal Agenda to be very useful, demonstrating its value as a tool to support learning and resolve questions.

**Improved Understanding and Confidence:** Students perceive a significant improvement in their understanding of tax issues [65%] and an increase in their confidence when performing tax calculations and procedures [60%] thanks to the use of the Tax Agenda.

**Motivation and Ease of Learning:** The Tax Agenda motivates students to delve deeper into the study of accounting topics [68%] and facilitates their learning compared to other resources [48% easier, 37% much easier].

**Recommendation and Evaluation:** Almost all students [92%] would recommend the Tax Agenda to their peers, and all participants agree that it improves the learning process, contributes to the teaching process, and justifies the investment in this tool.

### Implications:

These results suggest that the Tax Agenda is a valuable resource for accounting education, contributing significantly to student learning and preparation. The continuation and improvement of this tool is recommended, as well as the exploration of its potential in other educational and professional contexts. For future research, it is envisaged to encourage second-semester students to acquire and use the Fiscal Agenda, which would provide an even more representative sample.

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## Artificial intelligence in financial forecasting and investment management

### La inteligencia artificial en la predicción financiera y la gestión de inversiones

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#### Abstract

The objective of this research was to evaluate the ability of artificial intelligence [AI] versus human financial analysis to predict short- and medium-term investment trends. The study's contribution to the financial and organizational landscape offers an updated view of the impact of artificial intelligence on investment predictions and decision-making, highlighting the complementarity between human judgment and AI-generated predictions, providing a critical perspective on the scope and limitations of both approaches. The methodology used is qualitative and documentary, oriented toward the collection, analysis, and synthesis of information from secondary sources. The results show that AI excels at condensing macroeconomic data, identifying market patterns, and rapidly generating estimates based on historical information. However, analysts' opinions vary significantly in scenarios with economic uncertainty that predictive models cannot fully capture. It is found that human experience allows for the incorporation of strategic variables, political and current risks, improving the accuracy of projections

#### Resumen

El objetivo de esta investigación fue evaluar la capacidad de la inteligencia artificial [IA] frente al análisis financiero humano en la predicción de tendencias de inversión a corto y mediano plazo, la contribución que aporta el estudio en el ámbito financiero y organizacional ofrece una visión actualizada sobre el impacto de la inteligencia artificial en las predicciones y la toma de decisiones de inversión, resaltando la complementariedad entre el juicio humano y las predicciones generadas por la IA, lo que aporta una perspectiva crítica sobre los alcances y limitaciones de ambos enfoques. La metodología utilizada es de carácter cualitativo y de tipo documental, orientada a la recopilación, análisis y síntesis de información proveniente de fuentes secundarias. Los resultados muestran que la IA destaca en la condensación de datos macroeconómicos, identificación de patrones de mercado y generación rápida de estimaciones basadas en información histórica. No obstante, las opiniones de los analistas varían significativamente en escenarios con incertidumbre económica que los modelos predictivos no pueden captar completamente. Se comprueba que la experiencia humana permite incorporar variables estratégicas, riesgos políticos y coyunturales, mejorando la precisión de las proyecciones.

#### Interaction between artificial intelligence and financial analysis for investment forecasting



Artificial intelligence, Finance, Predictions, Decision-making

#### Interacción entre la inteligencia artificial y el análisis financiero para predicción de inversiones



Inteligencia Artificial, Finanzas, Predicciones, Toma De Decision

**Area:** Promotion of frontier research and basic science in all fields of knowledge

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## Article

**Introduction**

Artificial Intelligence [AI] has transformed various sectors, particularly the financial sector.

Technologies such as machine learning, predictive analytics and advanced algorithms are significantly changing the way decisions are made in this field. From forecasting market trends and portfolio management to risk assessment, AI promises to increase the efficiency and accuracy of financial processes. However, its rapid adoption raises questions about its real effects on decision-making and its impact on the financial sector [Naranjo et al., 2024]. AI significantly influences decision-making by introducing new solutions to traditional problems [Quinto et al., 2021].

Its application in organisational management has established itself as one of the most relevant tools today [Cao et al., 2021], as it allows information and predictions to be generated from large volumes of data using machine learning algorithms [Krogh, 2018].

For decades, the use of AI in organisations has facilitated problem solving and task automation [Quinto et al., 2021], offering managers new perspectives for resource and process management [Haefner et al., 2021].

Its rapid expansion has had a complex impact on the future of work, bringing benefits such as increased productivity, process optimisation and the promotion of innovation [Ávila et al., 2020], helping companies to become more efficient and competitive.

Despite the obvious benefits, such as improved efficiency, cost reduction, and predictive analytics capabilities, its adoption also poses significant challenges. In recent years, it has become an essential tool in the financial sector, transforming risk management, investment analysis, fraud detection, and customer service processes [Herrera & Casanova, 2024].

Organisations have applied AI as a strategic tool to realise their business vision. In this sense, technology has turned various processes into more intelligent, optimised and automated systems, eliminating inefficient procedures that previously required significant resources [Wamba-Tagui Deje et al., 2020].

However, one of the main problems is the dependence on large volumes of quality data for decision-making. The presence of incomplete, outdated or biased data can lead to erroneous decisions, with significant economic consequences.

In the financial sphere, its intersection with investment decision-making has become increasingly relevant, driven by the need to face the challenges of a dynamic and complex environment. Green and Pearson [1995] highlighted its usefulness in financial markets as a strategy for improving the accuracy of predictions and investment decisions. Their study focused on the analysis of large volumes of historical and current data using AI models capable of identifying patterns that are difficult for traditional analysts to detect.

The objective of this research is to analyse the impact of artificial intelligence on financial predictions through a documentary study, in order to identify trends and recommendations derived from both financial analysts and AI systems that support short-term investment decision-making.

The ability of AI to improve the accuracy of predictions and reduce uncertainty in financial markets is a strategic advantage. In a context where reliable and timely information is essential, investors seek advanced tools that allow them to anticipate market movements with greater accuracy.

In this sense, the efficient management of complex and volatile data makes AI a key resource for optimising resource allocation and strengthening competitiveness in financial markets.

**Artificial Intelligence in finance**

Artificial Intelligence [AI] is an interdisciplinary field of computer science aimed at developing systems capable of performing tasks that, under human conditions, require cognitive skills such as reasoning, perception, learning, and decision-making [Quinto et al., 2021].

The technology applied to AI comprises the set of tools, methods and systems that enable machines to imitate or replicate human functions through algorithms, mathematical models and advanced data processing [Pereira, 2024].

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This concept ranges from the fundamentals of computational intelligence to the most advanced applications that have transformed sectors such as healthcare, automotive, finance, robotics, education and industry.

Castells [1996] defines information age technology as ‘the application of information for the generation of knowledge in a network of production, processing and distribution’ [p. 31].

This conception emphasises the structural function of technology in contemporary society, allowing information to circulate and be transformed into knowledge on a continuous basis within an interconnected global network. As a result, both individuals and institutions are increasingly dependent on access to, processing and use of information, which profoundly transforms the organisation of economic production, social relations and cultural identities.

In the financial sphere, AI has had a significant impact by transforming information management, decision-making and the operations of institutions in highly dynamic and competitive environments. For Maldonado et al. [2025], AI enables the processing of large volumes of data with high speed and accuracy, surpassing human capabilities. This advance has enabled the development of more efficient predictive models capable of identifying complex patterns in financial markets, which has improved the ability to anticipate market movements, manage investment portfolios, and optimise trading strategies.

One of the main advantages of AI in finance is automation. AI-based algorithms allow transactions to be executed autonomously, without human intervention, increasing speed and operational efficiency.

Cabanilla et al. [2024] highlight that the use of algorithmic trading systems and machine learning models has reduced operating costs by enabling thousands of transactions in fractions of a second with high precision. Furthermore, these algorithms can adjust in real time to changing market conditions, optimising asset purchase and sale decisions and improving liquidity.

### Prediction theory

Prediction theory based on machine learning refers to the use of algorithms and statistical models to generate forecasts about future data, learning from historical patterns without requiring explicit programming for each possible scenario. This approach focuses on the analysis of past data, allowing systems to learn and generalise from previous examples to anticipate results in new situations.

According to Mitchell [1997], machine learning is part of artificial intelligence and allows for the design of systems that learn from data, identify complex patterns, and make decisions without constant human intervention. In the financial context, this approach has established itself as a strategic tool for asset price estimation, risk assessment, and market trend detection.

### Methodology

This research is qualitative and documentary in nature, aimed at the collection, analysis, and synthesis of information from secondary sources. These include academic articles, specialised books, research reports, and technical documents related to the application of artificial intelligence [AI] in the field of financial forecasting. This approach is relevant because it provides a broad, systematic and objective view of the current state of knowledge on the subject, without requiring the implementation of a direct empirical study.

The subjects of analysis considered in this research correspond to financial institutions, such as banks, investment funds, brokerage firms and technology companies that have incorporated AI tools into their predictive models. The contributions of experts in AI and finance, including data analysts, fund managers, and specialists in technological innovation, are also considered as references. In addition, historical financial data, such as asset prices and market indicators, which have been used in different studies to evaluate the effectiveness of AI-based predictive models, will be reviewed and analysed.

In terms of technological tools, ChatGPT is referenced as the most widely used platform in 2024 for data analysis and prediction, and its inclusion allows for the illustration of relevant cases of practical application of AI in the financial field.

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## Results

The results of this research are qualitative and are presented in comparative tables between Artificial Intelligence [AI] and the opinion of financial analysts specialising in the subject. The data was collected at a single point in time, corresponding to the search period from January to May 2025.

The data was obtained through a series of questions strategically designed so that both artificial intelligence and the information collected by financial analysts would provide insight into the information in question, which could then be compared to issue an informed recommendation. The tables with the results obtained are presented below.

*Short-term investment outlook.*

*Objective: To analyse short-term investment prospects in order to identify the most salient scenarios through artificial intelligence recommendations and compare them with the opinions of financial analysts.*

Artificial intelligence was used to ask questions about short-term future investment prospects. Table 1 shows the information obtained from AI and a comparison.

**Box 1****Table 1**

## Short-term future investment

Artificial Intelligence	Analistes
<p>Future investment prospects in the short term [approximately 6 to 18 months] are influenced by a number of macroeconomic, political and financial factors. The main investment prospects are:</p> <ul style="list-style-type: none"> <li>- Equities</li> <li>- Bonds and fixed income</li> <li>- Foreign exchange</li> <li>- Commodities</li> </ul>	<p>Analyst Diego Carrats of kicapital mentions that due to the volatility of the peso in 2024 he recommends holding dollars as they are likely to have more upward jumps over the course of the year.</p> <p>Analysts at kicapital mention that central banks could cut interest rates, which would likely cause debt instruments such as cetes, udibonos, etc. to lower their yields.</p> <p>Analysts at Scotiabank expect Saudi Arabia to increase oil production which will increase demand until 2026, its market value will be stronger.</p>

Note: The table shows the result on short-term investment prospects among artificial intelligence and financial analysts

The investment outlook for AI is varied, with investment projections in different markets. Therefore, analysts were consulted to find information on these markets, subdivided into more specific instruments.

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*Outlook for currency investment.*

*Objective: To analyse the short-term outlook for currency investment in order to identify opportunities for investment in foreign currency through the recommendations of artificial intelligence and compare this with the opinion of financial analysts.*

Artificial intelligence was questioned about the short-term investment outlook for the US dollar and Mexican peso, and Table 2 shows a comparison of the results with what the AI says and what an analyst says in a newspaper article on forex.

**Box 2****Table 2**

## Currencies

Artificial Intelligence	Analistes
<p>The outlook for short-term currency investment [2025] is shaped by the monetary policy of major central banks, geopolitical risks and global economic growth.</p> <p>The US dollar [USD] could weaken slightly in the second half of the year if the Federal Reserve decides to cut interest rates after bringing inflation under control. A weaker dollar favours emerging market currencies and the euro, so we may see downward movements in the USD/MXN or USD/EUR pairs.</p> <p>The Mexican peso [MXN] has shown strength against the dollar due to the Bank of Mexico's restrictive monetary policy, high interest rates and steady remittance inflows. In the short term, the peso is expected to remain stable, although the June presidential elections could generate volatility.</p>	<p>Market analyst Julián Pineda indicated in a note on forex.com that the Mexican peso has now appreciated against the US dollar for more than two consecutive sessions, and the USD/MXN is currently down by around 1%, remaining in the key support zone of 19.50 pesos per dollar. Downward pressure has remained constant following the publication of the latest decision by the US Federal Reserve.</p> <p>In the long term, the situation could change. The United States maintains an aggressive outlook on rates, and the CME Group shows a 79.7% probability that the rate will remain at 4.5% at the 18 June meeting. On the other hand, Banxico has adopted a more flexible stance, with consecutive cuts, which could lead to an increasingly lower rate.</p>

Note: The table shows the result on the outlook for the value of the dollar and Mexican peso between artificial intelligence and financial analysts.

The AI mentions that the dollar could experience price drops due to decisions that the Federal Reserve could make, which would cause the peso to gain strength due to its high interest rates. In addition, analysts agree that due to the interest rates Mexico has maintained, the value of the peso is gaining strength and is not vulnerable to the dollar.

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## Article

On the other hand, in the long term, this could be reversed, and the dollar could increase its bullish outlook due to aggressive rate hikes.

#### *Outlook on commodity investment.*

*Objective: To analyse the short-term investment outlook in order to identify investment opportunities through artificial intelligence recommendations and compare them with the opinions of financial analysts.*

Artificial intelligence was asked, ‘What are the short-term projections for commodities?’ Table 3 shows the response from artificial intelligence compared with that of financial analysts at the Bank of Mexico.

### Box 3

**Table 3**

#### Commodities

Artificial Intelligence	Analistes
According to artificial intelligence, gold is expected to maintain a stable or slightly bullish trend, given its role as a safe haven in periods of economic and geopolitical uncertainty. However, a significant increase in interest rates by central banks could put downward pressure on its price.	Analysts predict a decline in commodity prices in 2026, with the World Bank forecasting an additional 4.8 per cent drop, reaching the lowest level in six years. Crude oil prices are also projected to fall by around 14 per cent in 2026. On the other hand, some analysts predict a possible increase in gold prices, with projections pointing to a peak price in 2026..
In the case of oil, prices are expected to remain volatile due to factors such as geopolitical tensions, OPEC production decisions and post-pandemic global demand recovery.	

Note: The table shows the result on future investment prospects among artificial intelligence and financial analysts.

In analysing projections for gold and oil, both artificial intelligence [AI] and conventional analysts provide complementary but different insights. For gold, AI anticipates a stable or slightly upward trend, thanks to its role as a safe haven, although an increase in interest rates could impact its price. On the other hand, analysts also foresee stability, although some predict an increase in prices by 2026. With regard to oil, AI anticipates constant instability, affected by factors such as geopolitical tensions and production decisions, accompanied by short-term price increases.

However, analysts anticipate an overall reduction in prices by 2026, including a 14% reduction in crude oil costs.

#### *Outlook for equity investment.*

*Objective: To analyse the short-term outlook for equity investment in order to identify opportunities for investment in equities through the recommendation of artificial intelligence and compare it with the opinion of financial analysts.*

Artificial intelligence was asked, ‘What is the projected share price of Nvidia and Tesla for 2026?’ Table 4 shows the response from artificial intelligence compared to that of expert financial analysts such as Gene Munster, partner, and Gil Luria of DA Davidson.

### Box 4

**Table 4**

#### Share prices of Nvidia and Tesla

Artificial Intelligence	Analistes
Various predictive models based on artificial intelligence have estimated the future price of Nvidia [NVDA] shares for 2026, reflecting a general upward trend, albeit with wide variations. Some platforms, such as StockScan, project prices close to £790, while others, such as CoinCodex and LiteFinance, offer more conservative estimates, ranging from £145 to £205.	Analyst Gil Luria of DA Davidson anticipates a slowdown in Nvidia's growth, although he acknowledges its outstanding performance. Predictions range from enthusiasm to caution.
The short-term outlook for Tesla [TSLA] in 2025 presents a mixed picture, with operational challenges and technological opportunities. The stock could experience volatility and downward pressure if there are no clear and rapid catalysts.	Gene Munster, partner at Deepwater Asset Management, anticipates a strong recovery for Tesla in 2026. Although he forecasts a 10% drop in deliveries during 2025, he believes this year will be key to preparing for future growth, projecting a 35% increase in 2026 driven by improved demand and the launch of a new model.

Note: The table shows the result on the future investment outlook for NVIDIA stock among artificial intelligence and financial analysts.

The results are a sample of what artificial intelligence, data, analysis, and the opinion of financial market specialists can identify as possible scenarios to anticipate changes in financial market scenarios, as well as short-term investment options. What is presented here is not strictly an investment recommendation. It is important to consider multiple factors such as term, liquidity, profiles, amounts, objectives and goals that must be taken into account before allocating financial resources to a particular investment.

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The comparison between financial analysts and artificial intelligence reveals fundamental similarities in currency investment outlooks. Both emphasise that the Mexican peso has strengthened against the dollar due to high interest rates from the Bank of Mexico and economic factors such as remittances. Artificial intelligence suggests that the dollar could decline if the Federal Reserve lowers its rates, benefiting the peso in the short term.

Artificial intelligence and financial experts provide similar views on the progression of gold and oil, albeit with variations in timing. Both agree that gold may remain stable or rise due to its role as a safe haven in times of uncertainty, although artificial intelligence warns that an increase in interest rates could cause its price to fall. On the other hand, analysts anticipate a potential increase in the value of gold by 2026.

## Conclusions

The purpose of this documentary study was to examine the effect of artificial intelligence on financial projections through a documentary study, with the aim of recognising the trends, advantages and limitations of its use in the financial sector, as well as offering suggestions for its effective application in financial decision-making.

This research demonstrated that, although artificial intelligence has made significant progress in optimising the efficiency and speed of predictions, on several key issues raised by AI, the opinions of expert analysts varied significantly, especially with regard to economic uncertainty or subjective elements that predictive models cannot fully anticipate.

This comparative study between the projections produced by artificial intelligence and the perspectives of financial analysts revealed both similarities and significant differences in the assessment of short- and medium-term investment prospects. Artificial intelligence, manifested in models such as ChatGPT and prediction platforms, has an outstanding ability to condense macroeconomic data, detect market behaviour patterns and provide rapid and extensive estimates.

However, its method tends to focus on general scenarios based on historical data, without taking qualitative or circumstantial variables into account in depth.

On the other hand, financial analysts provide a more detailed perspective, incorporating strategic factors, political risk factors, recent business behaviour, and accumulated experience in the sector. This is evident, for example, in the situations of Nvidia and Tesla, where analysts anticipate future changes or revivals based on structural changes in the market, beyond the current data that artificial intelligence is capable of handling.

Similarly, in the study of currencies, commodities, and fixed income, artificial intelligence provides a solid foundation for global understanding, while human specialists improve their projections by taking into account the particular effect of monetary decisions, geopolitical events, and regulatory changes.

In summary, it can be concluded that artificial intelligence is a valuable and complementary resource in financial analysis, but it does not replace specialised judgement. Its greatest value lies in exploratory research and the detection of general trends, while strategic decision-making continues to rely on the critical and contextual interpretation of expert analysts.

The combination of both methods can constitute an effective hybrid model for increasing the accuracy and depth of investment decisions in dynamic and complex contexts.

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# Design of an instrument for measuring factors influencing organizational performance in companies in the industrial sector

## Diseño de un instrumento para la medición de factores de influencia del desempeño organizacional en empresas del sector industrial

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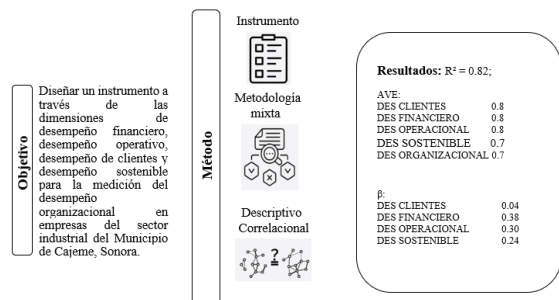
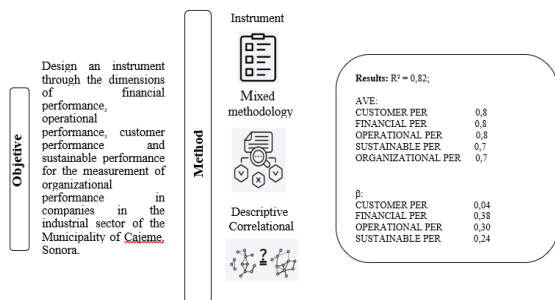
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**Abstract**

Performance measurement is key to organizational improvement; however, there is no definitive consensus among theoretical frameworks regarding its dimensions. Selecting and statistically validating variables that influence organizational performance provides a business measurement perspective that contributes to improving the competitiveness of the industrial sector in a municipality in the state of Sonora, Mexico.

**Resumen**

La medición del desempeño es clave en el mejoramiento de una organización, sin embargo, entre los referentes teóricos no existe un consenso definitivo sobre sus dimensiones. Seleccionar y validar de forma estadística variables que inciden en el desempeño organizacional, proporciona una perspectiva de medición empresarial que coadyuva a la mejora de la competitividad del sector industrial de un municipio del Estado de Sonora, México.



**Organizational Development, Measurement, Model Dimensions**

**Desarrollo Organizacional, Medición, Dimensiones del modelo**

Area: Dissemination of and universal access to science

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## Article

**Introduction**

Organisational performance arises from the need for organisations to measure the achievement of goals and success through the evaluation of their efficiency in the use of resources, the quality of their products or services, their capacity for innovation and adaptation, the satisfaction of their customers and employees, and their competitiveness in the market.

Richard [2009] indicates that organisational performance refers to the effectiveness with which an organisation achieves its objectives and goals, which can be measured in terms of financial results, operational efficiency, and employee and customer satisfaction. Other definitions, such as those by Petit et al. [2012] and Navarrete and Labelle [2023] incorporate the social and environmental context as part of the factors that organisations must consider for their development.

On the other hand, the industrial sector encompasses a wide range of activities, including production, manufacturing, construction, and mining. Kaldor [1966] defines this sector as the set of economic activities that encompass the production of goods, in which raw materials are transformed into finished products.

The companies that make up the industrial sector are the engine of a country's economic development, transforming raw materials into goods and promoting competitiveness through innovation and operational efficiency.

It is fair to say that industrialisation has brought great advances and benefits to the regions where this activity takes place, but it is not without its problems in terms of maximising productivity and meeting targets.

Porter [2008] points out that market share is an indication of whether competitors are gaining an advantage in the market or how consumer needs are changing, which affects companies' revenues and sustainability.

Cost reduction is essential in companies that produce goods or services, as long as quality is not affected. Kaplan and Norton [2008] mention that companies are under pressure to reduce costs without affecting quality, but this can also generate risks in the operational area.

A lack of liquidity in a company jeopardises its day-to-day operations, complicating the fulfilment of its short-term financial obligations and, as a result, its ability to invest in sustainable growth [Brealey et al., 2011].

On the other hand, companies that do not manage their resources efficiently may encounter difficulties because they will not be able to maintain their profit margin if their costs increase. This problem may arise from a lack of optimisation of production processes or changes in inputs [Ross et al., 2012].

Kotler and Keller [2012] emphasise that a decline in sales may indicate a decrease in demand for products due to factors such as competition or changes in consumer preferences.

This is quite common because the market is changing and is driven by trends.

Several authors emphasize that customer satisfaction should always be a priority for businesses, so that customers return and recommend them. However, not all address the problem of dissatisfaction and how it can affect the organization. Zeithaml et al. [2013] highlight how customer dissatisfaction can result in a fatal loss, since customer loyalty affects the company's reputation and, consequently, reduces its revenue. The generation of industrial waste can result in problems such as damage to the company's reputation and image, excessive recycling costs, among others [European Commission, 2014].

According to Guarnizo et al. [2021], "the main problem for many companies is the improvisation of their change strategies and the poor resolution of their problems. Most of them face competition without sufficient preparation or the necessary motivation of their associates, which increases the risk of failure. These factors impose an urgent need for planned change through collective reflection on the most pressing obstacles or problems, and consensual and timely decision-making so that the organisation can develop properly" [p.3].

The integration and analysis of the factors described facilitate strategic decision-making, which, in an increasingly dynamic and demanding environment, must be considered in the models used to measure organisational performance.

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In addition to the above, there are models for measuring organisational performance, which highlight differences in their conception and establishment of dimensions.

Gutpa and Govindarajan [1984] propose a model that seeks a comprehensive and quantitative view of how a company operates and achieves its objectives through 13 dimensions.

Venkatraman and Ramanujan [1986] presented a model whose objective is to provide a conceptual framework for analysing organisational performance. It seeks a more complete understanding of how organisations achieve positive results through three dimensions: financial performance, operational performance, and organisational performance.

Crook et al. [2005] suggest that organisational performance should offer a complete view of financial health and the ability to generate value for both the company and its shareholders, dimensioning their model in terms of accounting profitability, stock market performance, and growth.

The model by Camisón et al. [2007] shows how different competitive strategies can contribute to improving business performance and achieving organisational objectives by analysing competitive strategies and their contribution to improving business performance and achieving organisational objectives.

Robinson and Pearce [1988] attempted to build on the work developed by Dess and Davis [1984]. Their proposal allows for the identification and measurement of factors that influence the competitive strategy of companies, with a specific application in the hotel sector, considering four dimensions: efficiency; service/high price; innovation and development; brand image and influence in the channel.

Calderón et al. [2009] focus their model on human management as a driver for organisational development, suggesting that it should guide and enhance individual and collective growth within the company, using the following key dimensions: the ability to generate financial results, initiative in innovation, and operational efficiency.

Daft's [2010] model seeks to understand how organisations are structured, function and adapt to change using the dimensions of strategy, technology, structure [formal and informal] and environment to achieve business success.

Zuñiga et al. [2019] proposed a model from a rational perspective that examines the negative influence of product innovation on organisational performance using the dimensions of innovation and organisational performance.

Barradas et al. [2021] conducted exploratory and descriptive research with the aim of reviewing the literature on organisational performance, its dimensions and forms of measurement. The results show that the most commonly used dimensions for measuring performance subjectively are: customer satisfaction, quality, innovation, employee satisfaction, work climate and interpersonal conflicts, leadership style, and stakeholder perception.

Performance measurement is key to 'improving the organisation because it allows objectives to be set, evaluated and deviations to be identified' [Oliveira and Leone, 2008, p. 121]. However, there is still considerable debate about the dimensions used in organisational performance measurement.

In this regard, Menon and Mohanty [2012], cited by Singh and Gupta [2016, p. 5] identify the existence of an overlap between the dimensions. However, 'each measure must be justified on the basis of the suitability of the research framework and its reliability, convergence and discriminant validity must be verified'.

Given the above, the contribution of this research focuses on determining the dimensions of an organisational performance measurement model in the industrial sector of a municipality located in southern Sonora, Mexico.

### Central research question

Do the dimensions of financial performance, operational performance, customer performance, and sustainable performance influence the organisational performance of companies in the industrial sector of a municipality located in southern Sonora, Mexico?

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**Objective**

To design an instrument using the dimensions of financial performance, operational performance, customer performance, and sustainable performance to measure organisational performance in companies in the industrial sector of the municipality of Cajeme, Sonora.

**Hypotheses**

H1: Customer performance has a positive impact on organisational performance.

H2: Financial performance has a positive impact on organisational performance.

H3: Operational performance has a positive impact on organisational performance.

H4: Sustainable performance has a positive impact on organisational performance.

**Justification**

The industrial sector is fundamental to the global economy because it produces essential goods and services to meet the needs of other industries and end consumers [Porter, 1980]. Understanding the factors that affect the organisational performance of companies in this sector can provide a vision for measuring an organisation's progress.

In order for industry to support the recovery, growth and competitiveness of an economy, whether of a country or a sector, it is necessary to understand the factors involved in organisational performance through a model that provides the basis for this.

This comprehensive approach to performance measurement enriches the analytical capacity of the organisation, while fostering an environment where learning, commitment and competitiveness become drivers of growth and adaptability.

This research is considered relevant because, by achieving its objective, it will benefit companies in the industrial sector of the municipality of Cajeme, Sonora, providing them with a frame of reference on the variables under study.

Furthermore, the development of this paper will generate a precedent that may be useful for companies located in other regions that wish to measure their organisational performance under the proposed model.

From a theoretical point of view, this research will generate reflection and discussion on existing knowledge in the area of organisational performance. From a methodological point of view, this research contributes a new operational model that groups variables from various theories to generate knowledge in the field of strategic management.

**Theoretical framework***Origins of organisational development*

The literature review conducted for the framework of this research indicates that the origins of organisational development can be traced back to the 1920s and 1960s in the United States and England, with a complex set of ideas about man, organisation and the environment, in the sense of promoting growth and development according to their potential.

Theoretically, organisational performance is a practical and operational extension of behavioural theory on the path to a systematic approach. In this sense, the origins can be attributed to a series of factors, including:

- a. The difficulty of systematising the concepts of the various theories on organisation with different approaches.
- b. The deepening of studies on human motivation and its interference in the dynamics of organisations.
- c. The increase in the size of organisations and the growing diversification and progressive complexity of modern technology.
- d. The fusion of two trends in the study of organisations, that of structure and that of human behaviour in that context, integrated through a systematic approach.
- e. At this point, the various models of organisational development basically considered four variables: the individual, the social group, the environment and the organisation.

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The authors examined their interdependence, diagnosed the situation and intervened, either in structural or behavioural variables, so that a change would allow the organisational and individual objectives to be achieved.

Starting in the 1970s and 1980s, organisational development began to be addressed in Latin America, initially in Mexico, where new approaches focused on the organisation and the environment were proposed, seeking to maximise efficiency, quality of life, and quality of work.

In the last decade, organisational development has taken on an orientation towards the evolution of the knowledge society, leadership, sustainable development, corporate social responsibility, and different socio-economic approaches surrounding the organisation [Cardona and Hernández, 2010].

#### *Conceptualisation and evaluation of organisational development*

According to Georgopoulos and Tannenbaum [1957, p. 535], in the 1950s, performance was defined as “the degree to which organisations, viewed as a social system, met their objectives”.

This meant that during that period, evaluation focused on work, people and organisational structure.

In the late 1960s and throughout the 1970s, new ways of evaluating performance were explored, focusing on non-financial indicators linked to production and operational processes, while its conceptualisation was oriented towards ‘the ability of an organisation to exploit its environment to access and use limited resources’ [Seashore and Yuchtman, 1967, p. 379].

In the 1980s and 1990s, the importance of achieving objectives in the success of the organisation using a minimum of resources [efficiency] was recognised, so subsequent theories on the subject support the idea that an organisation is successful when it achieves its performance objectives within the constraints imposed by resources [limited measures].

Therefore, performance measures became important indicators in organisational performance measurement [Lusthaus and Adrien, 1998; Gavrea and Stegorean, 2011].

However, Bourne et al. [2003] point out that the definitions in the literature are accurate but do not convey the true meaning of the concept. They therefore propose a series of elements that characterise and allow for a clearer understanding of performance measurement:

- a. It involves using a set of multidimensional measures, including financial and non-financial indicators, as well as those related to internal and external performance factors that allow for the quantification of objectives achieved and the projection of future situations.
- b. It has an impact on the environment in which it operates. It is an integral part of the planning and control system, which requires the establishment of criteria related to measurement: what to measure, how to measure, and what the objectives will be, in terms of all the general actions that influence individuals and groups within the organisation.
- c. It is used to evaluate the impact of actions on the stakeholders of the organisation whose performance is being measured [customer satisfaction, employee satisfaction or local community satisfaction].

Given the above, organisational performance is not only related to financial indicators but also to non-financial indicators and strategic positions that provide information on the degree of achievement of objectives and results in order to ‘gain competitive advantages, react continuously and adapt to external changes’ [Waal and Kourtí, 2013, p. 447].

Similarly, it is the basis for proper business planning and management and also contributes to ‘feedback on the effectiveness of improvement interventions as part of the learning and development process’ [Phusavat et al., 2009, p. 647].

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Evaluating organisational performance is crucial for identifying areas for improvement and deploying functional strategies.

Therefore, this action is a priority for obtaining useful, relevant, and reliable information that allows for the design of strategic actions to improve business efficiency and competitiveness.

### Methodology

Taking into account the pre-existence of several models for measuring organisational development, in order to design and validate an instrument that would allow for testing a new relationship between dimensions [variables], the study was developed using a mixed approach.

In this sense, on the one hand, the qualitative method was considered to describe and define the variables based on the literature and the evaluation of experts in the field and, on the other hand, the quantitative method was considered based on the idea that these variables can be quantifiable and measurable.

In view of the above, the study was descriptive-correlational with a non-experimental cross-sectional field design, as it aims to establish a description and correlation of data to test the hypotheses proposed here without manipulating the selected variables at a single point in time.

The instrument used to collect data on the variables was structured in five sections: 1]. Research objective; 2]. Company identification data; 3]. Respondent demographic data; 4]. Measurement scale to be followed when providing answers; 5]. Questions related to each variable, with a definition of each variable provided at the beginning. The measurement levels used for the items in the questionnaire are scale-based.

Table 1 was developed to operationalise the hypotheses. It identifies the variables, the concepts chosen and the measurement units for each of the variables.

This was done to ensure that the model is consistent with regard to the measurement elements:

### Box 1

**Table 1**

#### Operationalisation of the hypotheses

Variable	Definition	Unit of Measurement
Sustainable performance	It is the ability of an organisation to balance economic growth with social responsibility and environmental protection by adopting principles of sustainability in its long-term strategy [Elkington, 1998].	Likert scale Items 1-5
Financial performance	Indicator used to estimate the level of profitability of an organisation [Prieto, 2023].	Escala Likert Items 6-10
Operational performance	It is defined as the degree of efficiency and effectiveness with which a company executes its production and service processes [Heizer & Render, 2017].	Likert scale Items 11-15
Customer performance	It refers to the evaluation of how customers interact with a company, its products or services [Kotler and Keller, 2016].	Likert scale Items 16-20
Organisational performance	It is defined as the degree to which an organisation achieves its goals in terms of effectiveness [fulfilment of objectives], efficiency [optimal use of resources] and adaptability in the face of environmental changes, integrating financial, human and process variables [Chiavenato, 2009].	Escala Likert Items 21-25

Note. Own elaboration, using the concepts of the authors cited in the table

The population corresponds to 86 companies belonging to the automotive, electronic, and agro-industrial sectors of the National Chamber of the Transformation Industry [CANACINTRA] located on Blvd.

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Circunvalación and C. Tornos at the corner of S/N Industrial Park in Cd. Obregón, Sonora. In relation to the sample, the technique used for sampling was a census. For data analysis and construct validation, the Partial Least Squares Structural Equation Modelling [PLS-SEM] approach was used, employing SMARTPLS software.

## Results

At the time of writing, the research is still ongoing, so the results presented here were determined based on the pilot test.

To determine the reliability and construct validity, the first test performed was Cronbach's alpha, as shown in Table 2, where it can be seen that all the dimensions under study passed the quality criterion, which indicates that they must have a minimum value of 0,7.

### Box 2

**Table 2**

Reliability and Construct Validity Test: Cronbach's Alpha

Variable	Cronbach's alpha
CUSTOMER PER	0,9
FINANCIAL PER	0,9
OPERATIONAL PER	0,9
SUSTAINABLE PER	0,8
ORGANISATIONAL PER	0,9

Note: Own elaboration with SMARTPLS, 2025

The second test of reliability and construct validity was the Average Variance Extracted [AVE]. In this test it was found [Table 3] that the constructs actually explain more than 50% of the variables being studied in the research, thus proving that it has good convergent validity; that is, each of the variables explain more than 70% of each of the phenomena under study [Rubia, 2019].

### Box 3

**Table 3**

Variance Extracted Mean

Variable	AVE
CUSTOMER PER	0,8
FINANCIAL PER	0,8
OPERATIONAL PER	0,8
SUSTAINABLE PER	0,7
ORGANISATIONAL PER	0,7

Note: Own elaboration with SMARTPLS, 2025

### Box 4

**Table 4**

Collinearity statistics VIF

Variable	VIF
CUSTOMER PER – ORG PER	6,1
FINANCE PER – ORG PER	6,7
OPERATIONAL PER – ORG PER	6,9
SUSTAINABLE PER – ORG PER	3,7

Note: Own elaboration with SMARTPLS, 2025

Regarding the collinearity study [Table 4] it was found that the values were less than 10, which are acceptable considering Singh [2024]: a collinearity of between 5 and 10 can be considered as moderate multicollinearity, therefore, the smaller the value the better for the model.

With regard to the Beta coefficients, it is inferred that the variable that has the greatest weight on organisational performance is the financial performance variable with a value of 0,38, and the one that contributes least to the model is the customer performance variable with a value of 0,04 as shown in Table 5.

### Box 5

**Table 5**

Beta coefficients

Variable	b
CUSTOMER PER	0,04
FINANCIAL PER	0,38
OPERATIONAL PER	0,30
SUSTAINABLE PER	0,24

Note: Own elaboration with SMARTPLS, 2025

As for R2, a value of 0,84 was obtained, indicating that the model has strong predictive power, according to Sarstedt et al. [2023], who state that values above 0,70 have high predictive power.

## Conclusions

The design of the instrument, in terms of piloting, has reliability and construct validity, since the Cronbach's alpha values exceed 0,7, which is used as the minimum acceptance criterion.

Likewise, with the AVE test, the constructs explain more than 50% of each of the dimensions to be measured. These results are consistent with the theories of confirmatory studies.

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With regard to the collinearity statistics in three correlations, moderate results were found, as they were greater than 5 but less than 10, which will have to be reviewed in more detail once all the data has been obtained.

Regarding the Beta coefficients, the four research hypotheses were tested, which state that sustainable performance, financial performance, operational performance, and customer performance have a positive impact on organisational performance.

Of the hypotheses, the variable that had the greatest impact was financial performance, which contrasts with empirical evidence, as organisations depend on the profitability they generate to remain in the market.

Finally, the R2 of the model reflects that the variables under study together have a predictive capacity of over 80%, which indicates that the model is well adjusted.

For future research, it may be analysed whether this instrument is statistically valid and reliable for other economic sectors and whether it has the same effect in different contexts.

### 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 research reported in this article.

### Contribution of the authors

*Acosta-Mellado, Erika Ivett*: Contributed to establishing the line of research, constructing the instrument, and developing the methodology for the entire study.

*Hinojos-Castro, Mariana*: Contributed to the theoretical foundation and data collection

*Ruiz-Pérez, Roberto*: Contributed to the research method and data processing

*Valenzuela-Reynaga Rodolfo*: Contributed to the discussion of the results.

### Availability of data and materials

The instrument and the results obtained are stored by the authors in the cloud associated with their institutional email accounts. The sources consulted and listed in the references are available in electronic databases outside the institutions, so their availability over time cannot be guaranteed.

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### Abbreviations

AVE: Average Extracted Variance

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#### Background

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**Justification**

Porter, M. E. [1980]. *Estrategia competitiva: Técnicas para el análisis de industrias y competidores*. Academia de Liderazgo Emprendedor de la Universidad de Illinois en Urbana-Champaign, Referencia de Investigación Histórica en Emprendimiento.

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**Theoretical framework**

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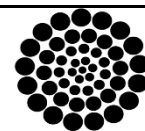
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What is your added value with respect to other techniques?

Clearly focus each of its features.

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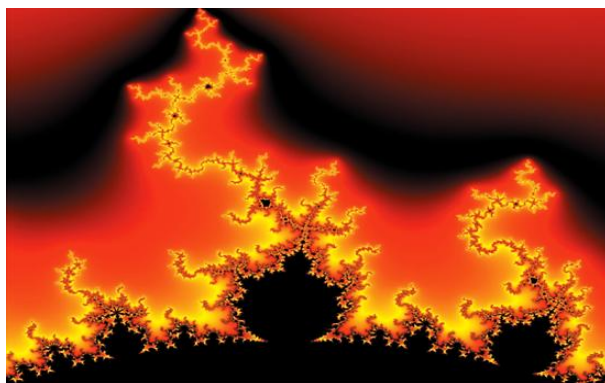
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**Figure 1**

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**The maximum number of Boxes is 10 items**

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$$Y_{ij} = \alpha + \sum_{h=1}^r \beta_h X_{hij} + u_j + e_{ij} \quad [1]$$

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### Abbreviations

List abbreviations in alphabetical order.

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ANN Artificial Neural Network

### References

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