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Knowledge Area

The works must be unpublished and refer to topics of Economy, Regional Development, Business, Management of SMEs and other topics related to Social Sciences.

Presentation of the Content

In the first article we present, *Importance of the Denomination of the Public Accounting in the Degree in the University Educational Programs of Higher Education Institutions in Irapuato*, by Martínez-Castro, José David, with adscription at the, Universidad Instituto Irapuato, as following article we present, *Market study for the marketing of organic eggs in Ciudad Obregón Sonora*, by Valenzuela-Córdova, Sergio, Valdez-Pineda, Dina Ivonne, Leyva-Osuna, Beatriz Alicia and Vázquez-Jiménez, Imelda Lorena, with adscription at the Instituto Tecnológico de Sonora, as following article we present, *Knowledge management and innovation, key to the performance of manufacturing SMEs in Mexico*, by Espinoza-Castelo, Luz Maria, Solis-Barraza, Santos, Linarez-Placencia, Gildardo and Pérez-Pompa, Alejandro, with adscription at the, Universidad Tecnológica de San Luis Río Colorado, as the last article we present, *Leveraging digital tools to improve service quality for MSMEs in the restaurant sector of Comala, Colima. Mexico* by López-Jiménez, Sergio Felipe, Cueto-Chavarín, María Enedina, Álvarez-Ochoa, Martín and Lino-Gamiño, Juan Alfredo, with adscription at the Universidad de Colima.

Content

ECORFAN-Journal Republic of Cameroon 11[19]1-11: e11119111
Article

Importance of the Denomination of the Public Accounting in the Degree in the University Educational Programs of Higher Education Institutions in Irapuato

Importancia de la Denominación de la Carrera de Contaduría Pública en los Programas Educativos Universitarios de las Instituciones de Educación Superior en Irapuato

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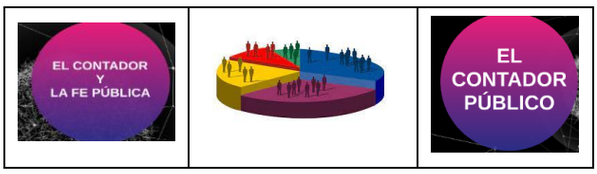
Abstract

Introduction. The study highlights the relevance for universities and for the accounting profession, to investigate how accounting university students are impacted by graduating with a degree with a different title than "Public Accountant". Aim. Describe the implications derived from titling the Public Accountant career in different ways. Participants: The population is made up of 166 professors from the Irapuato Institute along with 15 liberal arts and engineering degrees, comprising 24 different professional profiles. Of these, 50.91% are female and 40.09% are male, averaging an age of 46 years. Quota sampling was used, selecting teachers with studies in Public Accounting, which represent 10% of the population.

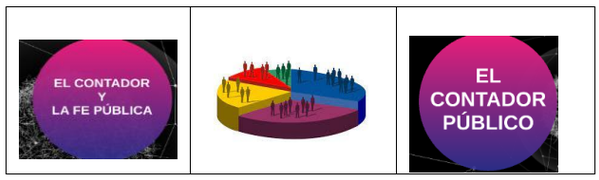


Objetivo	Metodología	Contribución
Describir las implicaciones que se derivan al denominar de distintas maneras la carrera de Contador Público.	Enfoque cuantitativo, diseño no experimental, método de encuesta, investigación descriptiva, preguntas estructuradas exprofeso, escala Likert, estadísticas descriptivas.	Análisis de las repercusiones del uso de la denominación de Contador Público en apego normativo y el desempeño profesional.

Denomination, Public Accounting, Profession, Certification, Suitability

Resumen

Introducción. El estudio destaca la relevancia para las universidades y para la profesión contable, indagar cómo afecta a los estudiantes universitarios de contabilidad, egresar con un título con denominación diferente a la de "Contador Público". Objetivo. Describir las implicaciones que se derivan al denominar de distintas maneras la carrera de Contador Público. Participantes: La población la conforman 166 profesores del Instituto Irapuato con 15 licenciaturas e ingenierías, integran 24 perfiles profesionales diferentes, el 50.91% del sexo femenino y 40.09% masculino, promedio de edad de 46 años. Se utilizó un muestreo por cuotas, seleccionando a los docentes con estudios de Contaduría Pública, que representan el 10% de la población.



Objetive	Methodology	Contributions
Identify the implications derived from the different names given to the Public Accounting.	Mainly qualitative, based in documentary review, case studies, interviews,	It was found that the names used by institutions to denominate the Public Accounting degree generate confusion both among students and employers.

Denominación, contaduría pública, profesión, certificación, idoneidad

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

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Introduction

Farias and Chapa [2014] describe in the article: 'Accounting and Finance, it's the same, but it's not the same,' as part of the Public Accounting magazine. This document highlights that there are a variety of factors that influence students' choice of career, such as intellectual ability, personal styles, employment prospects, family background, parental pressure, perceptions of different disciplines, culture, market focus, curriculum, and university options [Bourdieu, 1990; Wolk and Cates, 1994; Simons, 2004; Tan and Laswad, 2006; Hoffjan et al, 2009].

Perception of a discipline, one of the factors mentioned above, is an important element that influences decisions to study a particular degree [Holland, 1966; 1973]. The importance of perception and interest in the profession as determining factors in students' career choices has been identified [Jensen & Owen, 2000]. According to Friedlan [1995], a misguided description can result in the right people studying another career alternative instead of accounting.

Holt [1994] comments that the way accounting is perceived can even drive away students with the greatest aptitude for studying accounting and cause them to choose another career option. Most students have limited information about business careers and their different fields, forcing them to resort to other sources of information, such as their own perceptions or those of the people around them, such as family and friends [Zellweger, Sieger, & Halter, 2011].

In this regard, this research project reveals that in the city of Irapuato, Guanajuato, there are 16 higher education institutions [HEIs] offering various educational programmes. Six of them offer a degree in public accounting or equivalent terms, while the remaining 10 do not offer this professional academic activity. In this regard, we proceeded to investigate those university educational centres that offer a degree in Public

Accounting and observed that they have different names for the educational programme, as well as different periods for the completion of their study plans.

This research was initiated in order to determine the impact or importance of having a degree name that complies with certain rules and regulations that distinguish public accountants as a benchmark for the profession in accordance with their provisions.

Background

It is described that approximately 15 years ago, in response to the decline in student interest in studying for a degree in Public Accounting, some academic programmes added the word 'Finance' to the degree in 'Accounting' in order to highlight an area of professional development for accountants.

Over time, academic programmes in Finance were opened, which led to confusion in the perceptions of students, applicants, employers, and parents between what Accounting and Finance are. Although there is a very important intersection between the two disciplines, it is important to delimit the scope of each, especially in university education.

In this regard, an exploratory study was conducted on the perceptions of students in the Public Accounting and Financial Management academic programmes at the Tecnológico de Monterrey. A questionnaire was administered and interviews were conducted during the August-December 2012 academic period. Results: Public Accounting students perceive their degree programme as exact, mathematical, practical, planned, and detailed.

They do not perceive it as a people-oriented, innovative, analytical, or decision-making degree programme. Students' perceptions of Accounting and Finance have certain similarities, but also pronounced differences. They agree that both professions require mathematical and numerical skills. Finance professionals are perceived as more creative, while accountants are perceived as more methodical.

On the other hand, students in the Financial Management programme think that their programme is mathematical, prestigious, challenging, innovative, detailed, and enjoyable. Although they think that their profession is not people-oriented, they agree that the role of the financier lends itself to creativity and allows them to anticipate events.

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The study concluded that students' perceptions of accounting and finance have certain similarities, but also pronounced differences. They agree that both professions require mathematical and numerical skills. The financial professional is perceived as more creative, while the accountant is perceived as more methodical. Likewise, public accounting programmes that emphasise 'finance' may run the risk of diminishing the importance of areas exclusive to the profession, such as financial accounting, auditing, taxes and costs, and losing sight of new areas of the public accountant's field of work, such as information technology.

Therefore, higher education institutions [HEIs] should reflect on the advisability of offering specialised bachelor's degree programmes, rather than broader academic programmes that allow students to gain a comprehensive overview of the discipline and its field of work, leaving specialisation to postgraduate studies. Likewise, the contribution of universities to the correct perception of the public accounting profession should be questioned, with the aim of attracting students with the necessary talent to be accountants in the full sense of the term or, conversely, whether universities are contributing to this confusion between disciplines.

A study by Calleja [2018] of the University of the Americas Puebla [UDLAP] shows the names currently given to the profession of public accounting at some Mexican universities that offer it.

Objective

Research objective

The general objectives express what is expected at the end of the research, and from them more particular or specific objectives are extracted that make it possible to achieve the former [Gago, 1997]. Objectives should be clearly stated and specific, measurable, appropriate, and realistic [Tucker, 2004].

General objective

To describe the implications of using different names for the Public Accountant degree programme at higher education institutions in Irapuato.

Specific objectives

- To identify the regulations governing the professional practice of public accountants
- To investigate the professional names of public accountant or related degree programmes at higher education institutions in the city of Irapuato.
- Determine the degree of knowledge of the professional practice of the public accounting career.

Justification

Individuals, organisations, and nations that do not invest in education and research will be left behind, dependent, and marginalised, and education will fail to fulfil its social mission. [Bernal, 2010].

In the knowledge society, education, science and technology play a key role in nation building. Therefore, for Amaya [2000], 'knowledge is the foundation for building a country with the capacity to face the problems and challenges of the future' [p.63].

In general, according to experts in Latin American societies, the lack of competitiveness in the productive sectors of developing countries has deep roots in the absence of a culture of research, which can be explained by the weakness of the education system in this area and by society's lack of knowledge of its history in these nations.

Finally, the justification is consistent with the three substantive functions of the university: teaching, outreach and research.

However, in the knowledge society, research must be the fundamental mission of the true university.

For experts on education and development, research is the primary and fundamental mission of the university. John Paul II himself [1992] stated that 'no cultural presence can have a lasting impact on the experience of the people if it is not rooted in a rigorous effort to continually expand the horizons of knowledge in the various fields of learning' [p.9].

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Therefore, this research project is supported by the 2022 MAGIS Award for Teachers from the Universidad Instituto Irapuato [UII], which aims to present research projects on topics related to the disciplinary areas of the Universidad Instituto Irapuato [UII] in accordance with the terms established in the 2022 MAGIS Award for Teachers. [MAGIS, 2022], which aims to 'promote the development of research projects that address topics in the disciplinary areas in which they teach in order to contribute to the training and acquisition of scientific skills.'

Theoretical Framework

Public Accounting as a profession

Public accounting is a professional activity that requires a degree of this nature from a university or higher education institution. Therefore, public accounting is a professional activity carried out by public accountants, who are people who study accounting and who, through their university studies, acquire the necessary knowledge to obtain the corresponding degree and 'practice the profession'.

Legal Aspects of the Accounting Profession

In our country, Article 5 of the Constitution states: 'No person shall be prevented from engaging in any lawful profession, industry, trade or work that suits them.' Subsequently, the same section states: 'The law shall determine in each state which professions require a degree to be practised, the conditions that must be met to obtain it and the authorities that are to issue it.'

It follows from the above that professions, due to their importance, need to be controlled by the State, which has knowledge of those who practise or exercise the various areas of human knowledge, a situation that is not required for the performance of a trade or activity.

The official recognition that the State gives to people who will practise a profession is: the Professional Degree and, where applicable, the corresponding Certificate, which constitute the culmination of the future professional's academic preparation at the Bachelor's degree level [Charles, 2020].

Characteristics of Public Accounting

Public accounting covers the essential requirements of a profession, namely: academic requirements, social requirements, legal requirements, and personal requirements. Its field of action has also been clearly defined, namely the universal need of every entity to have financial information and control, as well as financial management, topics that are amply satisfied by the accounting expert: the public accountant.

The social needs it satisfies. Any entity, whether physical or moral, needs to know and manage its resources as effectively as possible, for which it needs to have adequate financial information and control. An entity is understood to be any economic-social unit, that is, the set of material, human, financial, and technological resources available to achieve certain goals or objectives. The branch of human knowledge that meets the need for financial information and control is called accounting and is part of public accounting. [Huéramo, 2020].

The Continuing Professional Development Standard [NDPC] and its Regulations [2021] state that this Standard is one of the fundamental provisions that must be complied with by all members of the Mexican Institute of Public Accountants [IMCP] and its Federated Members. The Standard [NDCP] was created as a voluntary accreditation provision in 1979 and has evolved over more than forty years to become the fundamental structure for the professional development of public accountants.

The document states that the NDPC navigates international trends by following the demands to promote a commitment to lifelong learning among IMCP members, facilitate their access to continuous development opportunities, and adopt mechanisms for the implementation, monitoring, and maintenance of professional learning in public accounting. All of this is aimed at preserving the NDPC as the backbone of professional development for public accountants in Mexico, to generate value beyond the numbers. For the purposes of this Standard, continuous professional development is understood to be the programmed, formal, recognised and ongoing knowledge activity that the Public Accountant, as an active member of the IMCP, must carry out in order to update and maintain their professional knowledge at the level required by their social responsibility.

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This last paragraph clearly and forcefully states what is meant by continuing professional development, i.e., the knowledge activity of the public accountant, as well as their relevance as an active member of the IMPC, with the aim of updating and maintaining their professional knowledge at the level required by social responsibility. [NDPC, 2021].

But what is the social responsibility referred to here? First, as Huéramo [2020] points out, in order for a profession to exist, there must necessarily be a human need. Every profession must have a spirit of social service, resulting in a legal and moral responsibility to the community. A high level of professional training makes it possible to approach those who request their services, satisfying needs of a legal, fiscal, scientific, physical, etc. nature [NDPC, 2022].

To comply with the Continuing Professional Development Standard [NDPC], each member must obtain professional development points each calendar year, according to the professional sector in which they work. Professional development points are included in the Scoring Table issued by the Continuing Professional Development Commission of the Mexican Institute of Public Accountants, A.C., as follows:

- Public accountants engaged in independent professional practice must earn 55 points or more.

- Full-time academic public accountants, part-time researchers or more, or those who carry out their professional work in the business, government or any other sector not specifically provided for, must comply with 40 points or more [NDPC, 2022].

The National Association of Accounting and Administration Faculties and Schools [ANFECA], which has been formed for exclusively academic purposes, has the following among its main objectives: To bring together higher education institutions that offer accounting and administration studies in order to jointly develop study plans and programmes, subject to regional circumstances, aimed at raising the level of academic preparation of students. To promote the training and updating of academic staff, as well as the application of the most up-to-date and appropriate methodologies for the teaching-learning process.

To promote academic, teaching, school and technical assistance exchanges among its members, and to support the proposals they carry out on academic, administrative and legislative reforms that help achieve their basic objectives.

The main objective of this association has been to raise the academic level of institutions by promoting their updating and development. The aforementioned curriculum sets the objectives for the basic areas of the bachelor's degrees, which in the case of Accounting are as follows: Accounting, Costs, Finance, Auditing, Taxation, and Control. Tax Administration System [SAT, 2022].

Professional Certification of Public Accountants and the USMCA

A public accountant is a professional with knowledge in areas such as cost accounting, financial statement analysis, financial mathematics, tax, banking and insurance law, labour law, commercial law, auditing, etc.

An accountant may opt for certification from a professional body in the field, such as the Mexican Institute of Public Accountants [IMCP].

This certification consists of a certificate indicating that the professional has the required and current knowledge and skills to practise, after passing an exam and meeting various requirements.

The Tax Administration System [SAT] has a register and a list of public accountants and firms where general information can be consulted on accountants authorised by the SAT to issue opinions on companies and other taxpayers [Soriano, 2022].

Article 52 of the Federal Tax Code [CFF] states:

The following shall be presumed to be true, unless proven otherwise: the facts stated in the opinions issued by public accountants on the financial statements of taxpayers or the sale of shares carried out by them; in any other opinion with tax implications issued by the public accountant or related to compliance with tax provisions; or in the clarifications that such accountants issue regarding their opinions, provided that the following requirements are met:

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- The public accountant issuing the opinion must be registered with the tax authorities for this purpose, in accordance with the terms of the Regulations of this Code [RCFF]. This registration may only be obtained by: Mexican nationals who hold a Chartered Accountant qualification registered with the Ministry of Education [SEP] and who have been members of a professional association recognised by the same Ministry for at least three years prior to submitting the corresponding registration application.

The persons referred to in the previous paragraph must also have certification issued by professional associations or associations of Chartered Accountants, registered and authorised by the Ministry of Public Education [SEP], and only certifications issued to Chartered Accountants by certifying bodies that have obtained the Recognition of Suitability granted by the Ministry of Public Education [SEP] shall be valid. In addition, they must have a minimum of three years' experience in the preparation of tax reports.

The term ‘suitability’ means the quality of being suitable. 1. adj. Suitable and appropriate for something. EcuRed defines suitability as: ‘The aptitude, willingness or ability that something or someone has for a specific purpose’. Suitability is also referred to when ‘someone is considered suitable, appropriate or convenient to perform certain roles or functions within an organisation’.

In Mexico, professional certification began on 1 January 1994, with the entry into force of the North American Free Trade Agreement [NAFTA], a treaty that also gave rise to the Mexican Committees for International Professional Practice [COMPI], which were established for each profession. However, professional certification itself began later.

For example, in the case of public accounting, the Mexican Committee for International Accounting Practice [COMPIC] was formed in 1998 [COMPIC] and the approval of the Regulations for the Professional Certification of Public Accountants at the Mexican Institute of Public Accountants [IMCP], which established the figure of the Certified Public Accountant [CPC], to bring it into line with the existing system in Canada and the United States of America [Soriano, 2022].

Objectives of Professional Certification

The understanding and comprehension of what the discipline of certification should be and mean for professionals in Mexico, and anywhere else in the world, lies in the intention that knowledge, skills, abilities, aptitudes, and experience be transmitted and delivered unconditionally to the society that demands them, which also means that professionals must constantly update their knowledge. In the case of the accounting profession, it also has the purpose of complying with the tax requirement established in Article 52, Section I, Subsection a], second paragraph of the Federal Tax Code [CFF], in order to obtain recognition as a Registered Public Accountant [CPR] before the General Administration of Federal Tax Auditing [AGAFF], so as to be able to issue financial statement opinions with tax effects.

Methodology

This research work is descriptive in nature because it is based on the description and analysis of situations, in addition to explaining the importance of professional ethics for public accountants and how they should develop them in society. For Abreu [2012], descriptive research refers to the type of research question, design, and data analysis applied to a given topic. According to Bonilla and Rodríguez [2000], the scientific method is understood as a set of postulates, rules, and norms for the study and solution of research problems. The method of the present study is framed within a quantitative approach. Scientific research, from a quantitative point of view, is a systematic and orderly process that is carried out by following certain steps [Ramos, 2015].

The study population corresponds to the teachers of the Bachelor's Degree, mixed and school modalities of the Irapuato Institute [UII], from which the sample is taken, representing 10% of the university's teachers, focusing the process on teachers who are qualified accountants and who provide their professional services both independently and as teachers, both as subject teachers and as part-time teachers.

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A data collection instrument called a 'survey' was applied, which will allow us to identify the main effects of using a designation other than Public Accountant and highlight the knowledge that exists regarding the impact when practising the profession or participating in professional accounting organisations and their Continuing Education Standards [NEC], as well as the impact of obtaining certification from the Mexican Institute of Public Accountants [IMCP]. In this regard, information will be collected on the different titles that are officially registered in the Higher Education Institutions [HEIs] of Irapuato, which refer to the profession of Public Accountant and which, for various reasons, mainly marketing-related, have different titles. Sixteen questions were defined in the survey with structured questions related to the research purpose. One hundred percent of the teachers surveyed responded based on their own experience and professional development.

Method

Non-experimental research design

Survey method

The use of surveys in scientific research aims to make data collection quick, simple and uncomplicated for respondents. They were conducted using written Google form surveys. They were captured electronically. Clear, simple and easy-to-understand questions were used so that the respondents' answers would be accurate and focused on the topic of opinion under study [Muñoz, 2015]. A Likert-type questionnaire was designed for data collection. According to Pineda and Alvarado [2008, p.151], this type of questionnaire is described as 'the method that uses an instrument or form, designed to obtain answers about the problem under study, which the respondent or interviewee fills out themselves'.

A Likert scale was used to collect the survey data, which allows the responses to be identified in an orderly manner. [1 strongly disagree, 2 disagree, 3 neither agree nor disagree, 4 agree, 5 strongly agree].

Results

The first phase shows that, of the 16 institutions analysed, only 6 offer a degree in Public Accounting or equivalent.

Based on the data analysed on this topic, it was determined that it is necessary to hold a broad discussion and serious, substantive reflection on the issue at hand and to make managerial and academic decisions that contribute to expanding the study from a regulatory perspective, without contravening educational policies and the market development of educational services.

Sixteen surveys were administered to professors with a Public Accountant profile at the Irapuato Institute, using an instrument with 16 questions related to research topics. When adding up the positive responses of agree and strongly agree, it appears that 86.7% agree on the importance of the title of Public Accountant in the graduates' degree. 46.6% stated that the name of the degree is for marketing reasons, 60.3% indicated that fashion or traditionalism has affected the name of the accounting profession, 66.7% consider it relevant to have the title of Public Accountant in order to belong to the Mexican Institute of Public Accountants [IMCP], 73.3% consider that it is a requirement to be a Public Accountant in order to audit financial statements, 46.6% refer to the importance of being a Public Accountant in order to be certified by disciplines, 66.7% agree that the Code of Professional Ethics [CEP] refers mainly to the figure of the Public Accountant, 66.7% refer to the importance of practising within the framework of the USMCA together with the United States and Canada for international professional practice, 66.37% agree on the importance of the accounting career in accreditation processes for the evaluation of educational quality, 86.7% approve that the Professional Standard for Continuing Education [NPEC] considers the accounting profession as an area of professionalisation and development, 33.3% indicate that the accounting profession in Mexico has more credits in its areas of knowledge than in programmes in the United States, 73.3% indicate that the name of the accounting profession should be called 'Public Accounting', 46.7% consider that it is irrelevant to refer to the degree with names that are different or equivalent to 'Public Accounting'; 46.7% agree that naming the degree differently from Public Accounting could cause problems for professional practice; 33.3% consider that it would be difficult for the General Directorate of Professions [DGP] to register related careers, and finally, 80% agree that the graduate profile offered by higher education institutions truly reflects the duties performed by public accountants in their professional development.

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Discussion

The results of this research contribute to the discussion on the naming of professional degrees offered by the universities analysed in this research in order to address the issue in corporate, academic, commercial, regulatory and career-specific decisions, and to ensure that the accounting profession is practised professionally and widely without impediments due to the names used in higher education institutions.

Most universities select a single name for the degree, and these names are only used by several institutions. The names are combined, but the impact that this variety of names could have on professional practice is not explored in depth.

Therefore, it is relevant for universities and the accounting profession to investigate how it affects accounting students to graduate with a degree with a name other than 'Chartered Accountant.'

Conclusions

This study concluded that students' perceptions of accounting and finance have certain similarities, but also pronounced differences. Likewise, public accounting programmes that emphasise 'finance' may run the risk of diminishing the importance of areas exclusive to the profession, such as financial accounting, tax accounting, auditing, taxes and costs, and losing sight of new areas of the public accountant's field of work, such as information technology.

Therefore, higher education institutions [HEIs] should reflect on the advisability of offering specialised undergraduate programmes such as Public Accounting, rather than broader academic programmes that allow students to gain a comprehensive overview of the accounting discipline and its field of work, leaving specialisation to postgraduate studies.

Likewise, we should question the contribution of universities to the correct perception of the public accounting profession, with the aim of attracting students with the necessary talent to be accountants in the full sense of the term or, on the contrary, whether universities are contributing to this confusion between disciplines.

Box 1

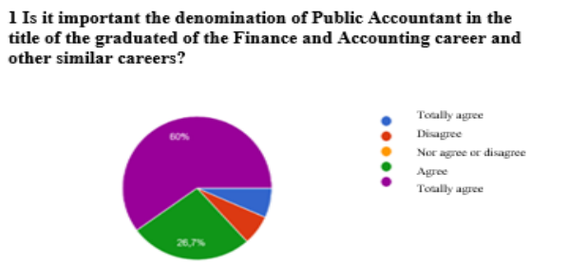

Figure 1
Name of chartered accountant
Source: own elaboration

Box 2

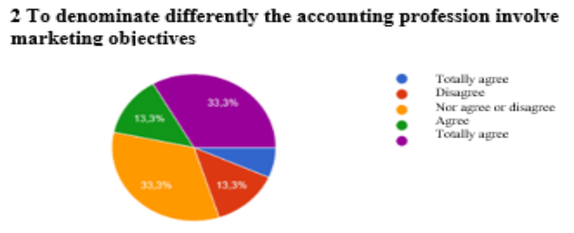

Figure 2
Career denomination objectives

Box 3

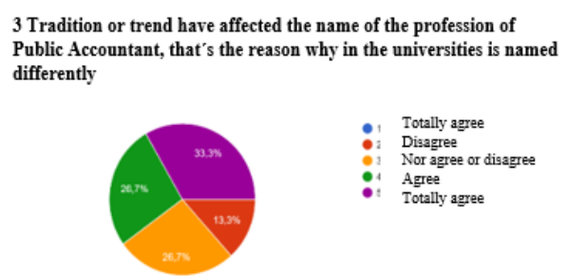

Figure 3
Fashion or traditionalism

Box 4

Figure 4
Relevance of a Certified Public Accountant's degree for membership of the IMCP.

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https://doi.org/10.35429/EJRC.2025.11.19.1.1.11

Box 5

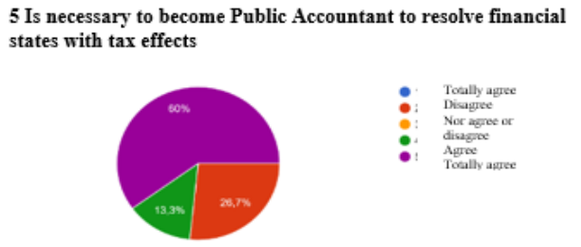

Figure 5
Tax effercts.

Box 6

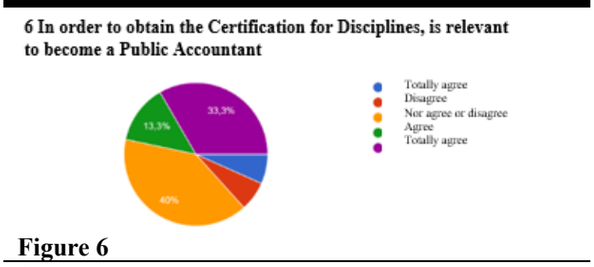

Figure 6
Certification by discipline

Box 7

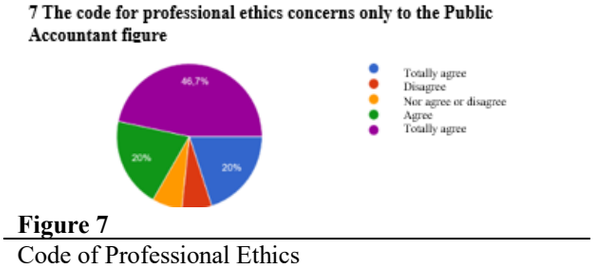

Figure 7
Code of Professional Ethics
Source: own elaboration

Box 8

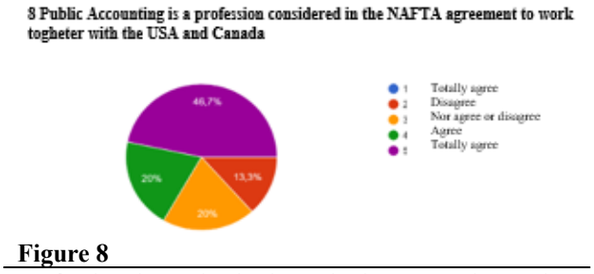

Figure 8
Professional practice in the United States and Canada.
Source: own elaboration

Box 9

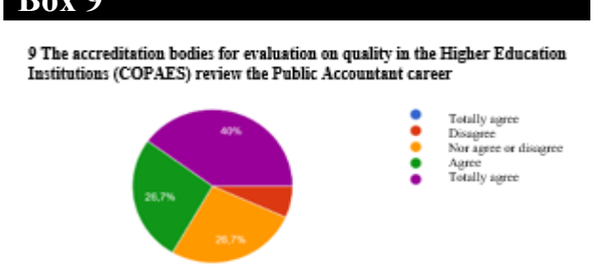

Figure 9
Accreditation Body
Source: own elaboration

Box 10

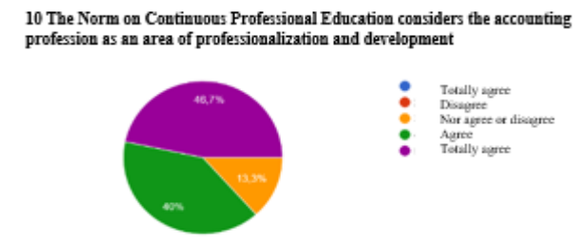

Figure 10
Continuing Professional Education Standard

Box 11

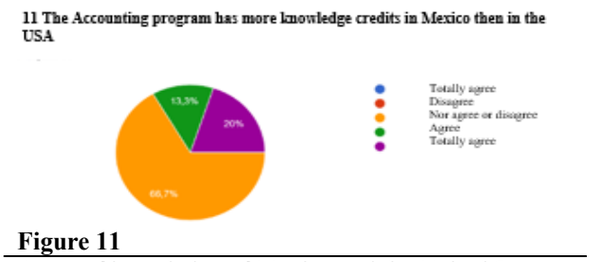

Figure 11
Areas of knowledge of Mexico and the United States

Box 12

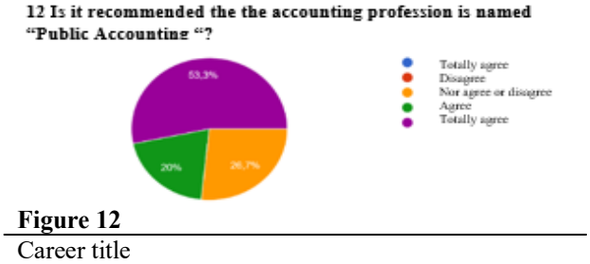

Figure 12
Career title
Source: own elaboration

Box 13

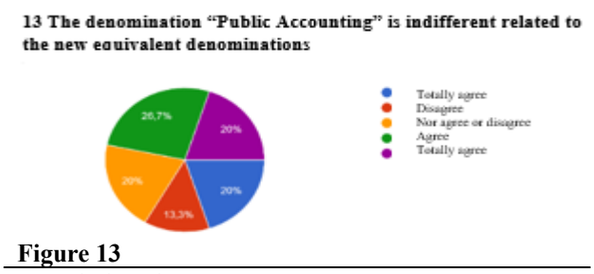

Figure 13
New designations
Source: own elaboration

Box 14

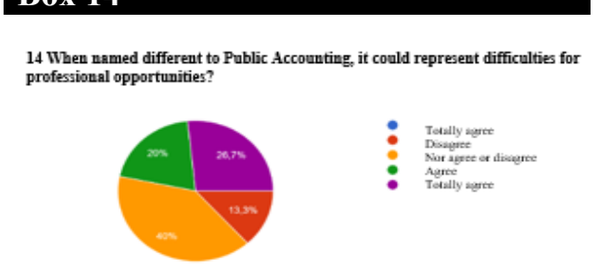

Figure 14
Difficulties in professional practice
Source: own elaboration

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Box 15

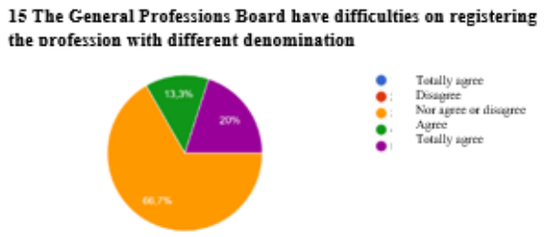

Figure 15
Directorate-General for Professions
Source: own elaboration

Box 16

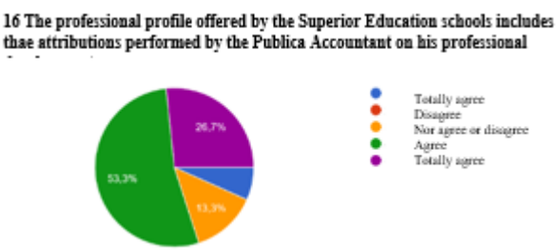

Figure 16
Graduation Profile
Source: own elaboration

Declarations

Conflict of interest

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

Contribution of the authors:

Martínez-Castro, José David: He carried out the conceptualisation and development of the research, defining the methodology, formulating the objective, analysing the results and developing the discussion. He also participated in the review and editing of the document.

Availability of data and materials

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

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This research project was funded by the Irapuato Institute, whose main objective is to implement its educational model, which requires the involvement of its teachers in high-level academic activities, such as research, for the development of cross-curricular skills.

This led to the creation of the MAGIS Teachers Call for Proposals, whose main interest is to motivate and provide our teachers with the necessary means and support to carry out this activity.

Acknowledgements

This research was made possible thanks to the support of the Irapuato Institute, which allows teachers to carry out research work.

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Article

Market study for the marketing of organic eggs in Ciudad Obregón Sonora

Estudio de mercado para la comercialización de huevo orgánico en Ciudad Obregón Sonora

Valenzuela-Córdova, Sergio [a], Valdez-Pineda, Dina Ivonne * [b], Leyva-Osuna, Beatriz Alicia [c] and Vázquez-Jiménez, Imelda Lorena [d]

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Classification:

Area: Social Sciences
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Subdiscipline: Business and commerce

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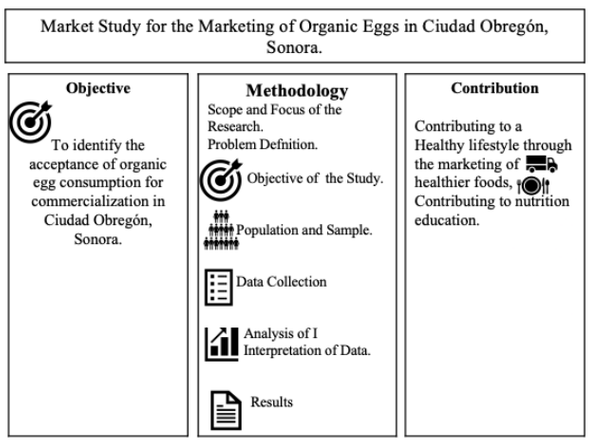
Abstract

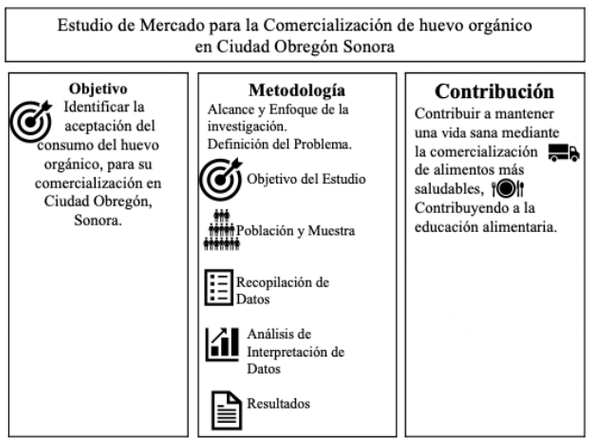
This study aims to identify the market acceptance of organic eggs in Ciudad Obregon, Sonora. A market research study was conducted using a descriptive and quantitative approach with a non-experimental design and a sample of 384 consumers.



Organic Egg, Marketing, Market

Resumen

Se realizó una investigación de mercado y se empleó por medio de una investigación descriptiva y cuantitativo, con un diseño no experimental con una muestra 384 de consumidores del producto.



Huevo Orgánico, Comercialización, Mercado

Area: Dissemination and universal access to science

Citation: Valenzuela-Córdova, Sergio, Valdez-Pineda, Dina Ivonne, Leyva-Osuna, Beatriz Alicia and Vázquez-Jiménez, Imelda Lorena. [2025]. Market study for the marketing of organic eggs in Ciudad Obregón Sonora. ECORFAN-Journal Republic of Cameroon. 11[19]1-7: e21119107.

Introduction

Foods of animal origin have become one of the main sources of nutrition for humans, with chicken eggs being one of the most widely consumed foods worldwide due to their high nutrient content. In this regard, organic production is an alternative to conventional egg production. Organic egg production is a recent activity that is gradually spreading and positioning itself as a viable business alternative. Healthy eating is an issue that has become increasingly important in recent years and has therefore positioned itself as a sector full of opportunities for entrepreneurs [Amaya, 2021].

Many years ago, it was thought that high egg consumption caused an increase in blood cholesterol, and therefore consumption was reduced. Today, it has been proven that moderate consumption does not increase the risk of cardiovascular disease, and society has changed its consumption habits [IEH, 2009].

Mexico is the largest per capita consumer of eggs in the world. Factors such as chronic diseases associated with overweight and obesity, and trends towards healthy and natural eating, have had an impact on the decline in generic egg consumption, thus reducing the profitability of small and medium-sized egg producers [Mendoza, 2016].

This is how organic egg production emerged in Mexico as a differentiated product, as a strategy to increase the profitability of the business, based on people's need to consume more natural products to balance their diet and improve their health.

Today, market research has evolved considerably and is heavily supported by the use of technology, which has an impact on and benefits the timing, accuracy, precision, costs, methods, etc. of the studies.

Justification

This work focuses on a market study and marketing of organic eggs, which is considered a recent activity that has gradually spread and positioned itself as a viable business alternative. For this reason, we wish to implement this product as a business alternative and thereby achieve higher sales based on people's need to maintain a healthier lifestyle through healthier foods.

Nowadays, when starting a business, it is vitally important to take the market into account in order to better meet society's expectations. It is necessary to carry out market research that provides accurate and reliable information for analysis and decision-making.

Miranda [2003] comments that it is important to know the entire market for the product and/or service to be addressed, because otherwise one would be taking a risk and running the risk of failure. Market research helps to understand the profile of the people to whom the product and/or service is directed, gathering important information such as age, location, diet, among many other highly relevant data, which help to make better decisions about where to focus.

Similarly, Kotler [2001] mentions that conducting market research will help you understand the business environment, so that you can make as few mistakes as possible and thus make better decisions.

By conducting market research correctly, you avoid the risk of losing your investment and help the business increase its sales, as you will be offering a product or service to the right market. Consumers would also have a greater choice of healthier products, and the government would benefit from the marketing of this product, as spending on the health sector would be lower due to people eating healthier food, thus improving their quality of life.

If this type of research is not carried out, the business investment could be lost, as there would be no additional income due to low sales, possibly leading producers to abandon the business. In addition, there would be no direct or indirect sources of employment from the marketing of this product.

Problem

The concern for the development of this research arises because current food trends have changed due to poor eating habits, which has led to a noticeable imbalance and/or disorder in our diet. People are constantly changing and do not have the same needs as they did ten years ago; we are constantly evolving. Therefore, today there is a need to purchase natural products that improve our health.

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The marketing of organic eggs is a business idea that has not yet been implemented because it is unknown whether there is a potential market in Cd. Obregón, Sonora, that would want to purchase the product.

Therefore, there is a need to conduct a market study to determine whether there is a potential demand and what consumers' expectations would be in order to implement this business initiative.

The fact that the egg production company does not have an adequate market study will not allow it to reduce risks when starting up, and will cause the company or business to focus its product or service on a niche market that is not suitable. Therefore, this can cause large losses for the business and/or even its disappearance.

In Cd. Obregón, there is no good marketing of organic products, i.e. there are no suitable places to meet this need.

Due to the need to obtain higher income by marketing a product that is different from what is commonly found on the market and based on people's need to consume healthier products to avoid health problems, the idea of marketing organic eggs has emerged. Therefore, the following research question is posed: What is the market acceptance for the marketing of organic eggs in Ciudad Obregón, Sonora?

Objective

To identify the acceptance of organic egg consumption for marketing in Ciudad Obregón, Sonora.

Theoretical Framework

Market research is a key tool that allows organisations to obtain valuable information for making sound decisions. In this sense, Kotler, Bloom, and Hayes [2004] define it as the process of 'systematically gathering, planning, analysing, and communicating data relevant to the specific market situation facing an organisation,' highlighting its strategic role in identifying opportunities, reducing uncertainties, and designing more effective proposals.

The main objective of market research is to obtain relevant and reliable information about a specific market in order to reduce uncertainty in a company's strategic decision-making. This type of research provides insight into consumer needs, preferences, behaviours and characteristics, as well as the competitive landscape, environmental trends and market opportunities or threats. [Kotler, P., & Keller, K. L. 2016].

Similarly, Kotler [2001] states that market research provides valuable information for the final decision on whether or not to invest in a project, starting with gathering information and then analysing it to arrive at two or more solutions.

According to Fisher & [2011], market research aims to provide information about consumer needs and preferences, taking into account socio-economic and market factors of the company. It also aims to provide useful information to solve various business problems. [Malhotra, 2014, p. 5] defines 'Market research as the systematic and objective identification, collection, analysis and dissemination of information for the purpose of improving decision-making related to the identification and solution of marketing problems and opportunities.' They consider five steps for conducting market research:

a. Define the problem and market objectives
b. Design an action plan, methodology, types of data, etc.
c. Collect information from both primary and secondary sources
d. Prepare and develop the analysis of the data obtained
e. Interpret the results obtained

Marketing consists of a series of activities that are carried out to facilitate a specific sale, according to people's needs in order to satisfy them. Marketing is the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods, and services to create exchanges that satisfy individual and organisational objectives [Kotler & Armstrong, 2012, p. 6].

Organic egg production is production carried out using organic methods, with all laying hens fed organic feed and living outdoors without stress.

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Antibiotics should not be administered unless the hens are ill, nor should they be forced to moult. All forms of mistreatment are prohibited, as they must have a high quality of life.

Organic eggs represent an alternative for the health sector to prevent high-incidence diseases by promoting the adequate intake of this type of egg, as well as healthy proportions according to specific characteristics, whether for certain conditions, age or deficiencies in the population.

Organic egg production requires specific conditions in terms of space management, feeding and bird welfare. According to Patterson [2015], it is essential to provide at least 1.5 m² per bird, covered with absorbent materials such as clean straw, wood shavings or sawdust. In terms of infrastructure, one feeder and one drinker can supply 20 birds, and it is recommended to have one nest for every five hens, which must be kept clean and dry to ensure egg quality.

In addition, Patterson points out that artificial lighting stimulates egg laying throughout the year, so it must be properly installed if continuous production is desired. Good ventilation, which must be adjusted to climatic conditions, and a diet based exclusively on organic products are also essential to meet organic production standards.

Organic eggs have certain characteristics that distinguish them from conventional eggs, not only in the multiple benefits they provide when consumed, but also in their positive impact on the environment. Their production process is healthier, without chemicals, and they have a higher concentration of vitamins that help prevent cholesterol and diabetes [Patterson, 2015].

Box 1

Figure 1

Organic Eggs vs. Industrial Eggs

Source: Own elaboration [2023]

Methodology to be developed

The research is descriptive and quantitative in scope, with a non-experimental design. The information was collected through a personal survey and the instrument developed was an ad hoc questionnaire, at a single point in time, during the months of April to June 2023, to identify the acceptance of organic egg consumption for marketing in Ciudad Obregón, Sonora.

The subjects of the study were various users who consume organic eggs and who responded to the surveys and questionnaires, namely people aged 15 and over who buy and/or consume the product.

This study was conducted through field research, with the primary source of information being surveys of users [customers] to gather information. A research instrument was adapted for this project, consisting of a questionnaire to identify user acceptance based on their needs with regard to the characteristics of the organic eggs they require, in order to offer a product that meets those needs.

The questionnaire consists of multiple-choice questions, which were administered to the population of Cd. Obregón, Sonora.

Results

Of the total number of people surveyed, 55.6% were female, while 44.4% were male. 38.8% were between 46 and 55 years of age, while 33.5% were between 36 and 45 years of age. Thus, we know that the age range that purchases the product the most is between 36 and 55 years of age.

Learning about egg consumption in people's diets. We observe that 97.5% of those surveyed consume eggs in their regular diet, while a small percentage do not consume the product. The average weekly egg consumption per person is 7 to 10 eggs for 39.6%, followed by 34.8% who consume 4 to 6 eggs, while 17.8% consume more than 10 eggs per week.

As for organic egg consumption, 56.3% of people do not consume organic eggs, while those who do consume them represent 43.7%. Of those who do not consume organic eggs, 91.5% would like to consume them, while a small percentage, represented by 8.5%, show that they would not like to consume them.

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Sixty-one per cent of people would be willing to pay £110 for a carton of organic eggs, while 31.5 per cent would pay £120. Eighty-six per cent of these people prefer packaging with a brand name identifying the product, while 8.5 per cent prefer unpackaged eggs.

Consumers enjoy eggs because they are safe to eat, easy to prepare, versatile, and inexpensive compared to other sources of animal protein [Martínez-Michel et al., 2011].

Consumer behaviour when purchasing food products is influenced by various factors related to the perception of value, safety, accessibility and quality. In the specific case of eggs, one of the most widely consumed animal products in many countries, purchasing decisions are determined by visible and functional attributes.

According to Fearne and Lavelle [1996], consumers attach great importance to egg size, considering it one of the main factors when purchasing the product. In addition, price and quality are elements that significantly influence the buyer's final decision. This finding highlights the need to segment the market according to consumer preferences and priorities, which can help to better position the product in different distribution channels.

However, Santoma [2017] points out that the main purchasing factors in Europe are safety, welfare, ecological aspects, date, taste, and local production, with different priorities depending on the country as it has greater purchasing power. Although most of the people surveyed indicated that they are only willing to pay between $90 and $100 for a carton of eggs, this coincides with the market value for a carton of free-range eggs. Patters et al. [2001] point out that eggs from different production systems [free-range, organic, among others] have a higher price range than those produced in conventional cages.

Once the product has been accepted, the marketing process can be carried out more directly with the user without intermediaries, generating a higher profit margin. The people of Ciudad Obregón largely accepted consuming healthier products, such as organic eggs, as they are willing to pay a higher price for something different from the ordinary or traditional.

Based on this acceptance with specific results, it was possible to provide more clarity on the market to be satisfied, thus achieving better results for poultry companies wishing to serve this sector.

Conclusions

In accordance with the objective of this research project, the selected method was successfully implemented, and therefore the research method used was optimal and reliable.

Therefore, the following conclusions can be drawn: there is positive acceptance of the product by the market, which allows for the creation of strategies with customers within the market and innovative ideas that improve the acceptance of the organic eggs they are purchasing.

Most users are egg consumers, and this made it possible to identify that almost all respondents would be willing to consume organic eggs, with women being the largest consumers. The average age of the largest consumers ranges from 36 to 55 years old, with a weekly, biweekly, or daily purchase frequency.

According to the analysis of current product prices, in order to establish the price in line with market trends, respondents would be willing to pay between £90 and £120 for a pack of organic eggs.

In conclusion, the market study identified certain areas for improvement, such as sales and promotion strategies and direct impact on consumers. Organic eggs are a very viable product in terms of revenue, since if they are marketed taking into account the above considerations, they can compete with the brands currently on the market.

On the other hand, a group of potential customers was identified, with the aim of bringing to each household a product that, in addition to contributing to a healthy and nutritious diet, will be affordable for everyone.

The recommendations for the organic egg production company are as follows: Emphasise that the organic eggs offered are more nutritious for consumers, and differentiate the service provided to customers, i.e. with better delivery times, product quality and a price in line with the competition.

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It is also important to inform the end consumer of eggs about the nutritional benefits of consuming organic eggs and the advantages of consuming industrially processed eggs, as well as the benefits of the latter for the environment and poultry.

Use social networks to create interest groups to raise awareness of the product, its benefits, recipes, quality, personal experiences of healthy eating, among other things.

Use biodegradable, eco-friendly packaging that benefits the environment.

Develop a referral plan for distribution and marketing channels such as gourmet restaurant chains, health food store chains, organic markets, and natural product marketplaces. Hold family interaction events to raise awareness about the process of bringing organic eggs to the city.

Declarations

Conflict of Interest

The authors declare that they have no conflict of interest. They are not known to have competing financial interests or personal relationships that would appear to influence the article reported in this article.

Author contribution

Valenzuela-Córdoba, Sergio: contributed the project idea and research development, Research method, data analysis

Valdez-Pineda, Dina Ivonne: advised on the project idea and research development, research method, data analysis.

Osuna-Leyva, Beatriz Alicia: contributed to and data analysis, review and editing.

Vazquez-Jimenez, Imelda Lorena: contributed to research development, data analysis, review and editing.

Availability of data and materials

The datasets used or analyzed during the current study are available from the corresponding author upon reasonable request.

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Article

Knowledge management and innovation, key to the performance of manufacturing SMEs in Mexico

Gestión del conocimiento e innovación, claves para el rendimiento de la PyMe manufacturera en México

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Abstract

In this new global landscape, companies must be prepared to face new challenges, particularly the industrial sector, which plays a vital role in generating formal and stable employment in an emerging economy like Mexico's. This study aims to identify the relationship between knowledge management, innovation, and performance. The research was conducted with 90 manufacturing SMEs in Sonora, Mexico, gathering information through a structured survey administered to senior management. The statistical technique employed for the analysis was variance-based Structural Equation Modeling [SEM] using the Partial Least Squares [PLS] method. The results indicate that innovation has a strong relationship with performance; knowledge management maintains a positive yet weak relationship with performance; and knowledge management also has a positive, though less significant, relationship with innovation within this sample.

Objective	Methodology	Contribution
Identify the relationship between knowledge management, innovation, and performance	Variance-based Structural Equation Modeling [SEM] using the Partial Least Squares [PLS] method	Knowledge management maintains a positive but weak relationship with performance, and knowledge management also has a positive yet less significant relationship with innovation in this sample.

Knowledge management, Innovation, Performance

Resumen

En este nuevo orden mundial, las empresas deberán estar preparadas para nuevos desafíos, sobre todo el sector industrial que juega un papel importante en la generación de empleos formales y solidos en una economía emergente como la de México. El presente estudio tiene como objetivo, encontrar la relación entre la gestión del conocimiento, innovación y rendimiento. El estudio fue realizado en 90 PyMes manufactureras de Sonora México, se recolecto información a través de una encuesta estructurada aplicada a directivos. La técnica estadística utilizada para el estudio fue mediante el estudio de la varianza, con método Ecuaciones Estructurales [SEM] y apoyo con [PLS]. Los resultados muestran que la innovación tiene relación fuerte con el rendimiento, la gestión del conocimiento mantiene una relación positiva pero poco fuerte con el rendimiento y la gestión del conocimiento también tiene una relación positiva con la innovación más poco significativa en esta muestra.

Objetivo	Metodología	Contribución
Encontrar la relación entre la gestión del conocimiento, innovación y rendimiento	Mediante el estudio de la varianza, con método Ecuaciones Estructurales [SEM] y apoyo con [PLS].	La gestión del conocimiento mantiene una relación positiva pero poco fuerte con el rendimiento y la gestión del conocimiento también tiene una relación positiva con la innovación más poco significativa en esta muestra.

Gestión del conocimiento, Innovación, Rendimiento

Area: Advocacy and attention to national problems

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Introduction

It has been thought that knowledge management involves constantly training employees. However, it is much more than that; knowledge management is a higher-level process that makes it a superior capability. The theory that supports knowledge management theory is the theory of resources and capabilities [Penrose, 1959; and Barney, 1991], which focuses on the resources a company possesses, its dynamic capabilities, and its knowledge [Arreguín et al., 2021].

This study seeks to find the relationship between knowledge management, innovation, and performance, considering these variables as part of the company's resources and capabilities. For this study, a theoretical model was defined, the variables were modelled, and finally, quantitative analyses were performed using the structural equation technique with Smart PLS 4 software to measure the intensity of the relationships between the variables and confirm the results. The hypothetical questions assume that innovation and knowledge management have a positive and significant influence on manufacturing SMEs, and also assume that knowledge management has a positive and significant influence on innovation in manufacturing SMEs.

The first part of the research presents the literature supporting the variables, followed by the modelling of the variables and the theoretical model, then the methodology describing the use of the research instrument, the sample and the analysis technique. Finally, the results and conclusions reached from the results are described. The results were obtained in two parts: first, the validity and reliability of the measurement model were assessed, and finally, the structural model was evaluated. The results obtained have interesting implications for the manufacturing industry, which is currently facing difficult times.

Literature review:

Knowledge management

The history of humanity has been marked by social revolutions that have led to substantial changes in development and progress. The first great revolution was the discovery of agriculture, which enabled humans to settle in one place and generate economic development based on agriculture and livestock.

This was followed by the industrial revolution, with capital investment in machinery that created the need to market surplus production. Finally, the information and knowledge society revolution arrived, where the main asset is the ability to transform information into knowledge.

The information society, from a critical point of view [de Querol, 2007], establishes the idea that it is a label for times when the digital age takes on great relevance and leaves behind the spaces for traditional media. It is now common to "post" information on the Internet. This achieves greater visibility and impact for the information, which presupposes the power to aid knowledge. However, this is a point that must be clarified in the development of this article.

Undoubtedly, information is the main source of knowledge; without it, it would be impossible to aspire to generate knowledge, but epistemologically there are different sources of knowledge and obviously not everything comes from the digital world. This would be the first of many drawbacks to overcome in order to think that information alone could be knowledge. Knowledge is the domain of human beings, and there are no automated or machine-based procedures [Canals, 2003].

The information society is the current name for a digital world that is gaining ground every day and is becoming essential for economic development due to the reduction in costs and the speed with which information can be disseminated. However, in terms of knowledge, it is only an efficient means of communication that can bring human beings closer to information, but the knowledge society is a highly complex idea that requires greater attention. For this reason, we will focus on the knowledge society in the analysis of this article, but clearly differentiating the limits of the information society.

The knowledge society is therefore the technology-mediated era in which the value of information as a generator of added value has been understood, but value is only generated with information when it can be managed to achieve knowledge that is useful for progress, development and improvement in quality of life.

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In other words, it could be summarised that knowledge is an added value of society that is obtained by processing information through complex schemes carried out by the human brain [Vigil et al., 2025].

In turn, this forces us to scrutinise the idea of knowledge management, starting from the ontological debate about whether knowledge can be managed.

Based on the above, there is a concern among educational institutions [EIs] to find the keys to achieving knowledge management [KM]. In this sense, KM is deficient in EIs due to a lack of motivation among staff as a result of the rapid changes that are currently taking place, which do not give knowledge any significance or usefulness; and, on the other hand, there is a deficiency in the proper use of technology, either due to its absence or its abusive use. [Díaz Rojas et al., 2025].

Another paradox emerges from the partial analysis: while knowledge management requires information and learning, there is a disregard for this due to sudden changes and developments mediated by the use of technology, which causes them to suddenly become obsolete. This is fundamental if we consider that industry, and manufacturing in particular, requires an adequate KM framework for organisations and the use of technology as a tool to reduce costs and generate competitiveness in globalised markets.

Therefore, it is appropriate to review KM in organisations as a central theme of this research.

As already mentioned, knowledge is the domain of human beings, but it is also necessary to mention that organisations thrive thanks to the decisions made by their human talent. Having clarified the above, in order to avoid ambiguity, we will now review the results of research on KM in organisations in the current era. The state of the art in this field focuses on artificial intelligence [AI] or the processing of large amounts of data obtained by digital resources or sensors, which leads to the need for KM in organisations with adequate human talent management that allows decisions to be based on accurate data that offers veracity and minimises the risks that decisions made within organisations lead to undesirable scenarios [del Carmen López-Urbina, 2025].

In other words, the KM of organisations requires ethical and moral values that guarantee the sustainability of organisations, processes that human beings can carry out in organisations, and that do not necessarily have to fall into discussions about man vs. machine, since machines [AI] are only tools that help organisations make more efficient decisions [man]. If these partial discussions are understood, it would be possible to guarantee the continuity of the economic model and of human beings. In all of the above, GC is implicitly and explicitly evident as a way of life for the present day.

Innovation

The need for organisations to enter highly competitive scenarios leads to the urgency of reducing costs and streamlining processes.

These processes, by their nature, require doing more with the same, and this is where we find innovation as the task of modern organisations seeking to safeguard their economic and social interests. Innovation is really a process of adaptation of organisations mediated by a three-pronged model [economic, social and environmental] to respond to the current needs of the competitive market.

On the other hand, organisations seek innovation processes to make resources more efficient, as a way of doing extraordinary things, finding creative solutions and visualising new opportunities in order to remain relevant. In other words, innovation is a necessity [García Pineda & Macías Urrego, 2025].

The key factors for the human talent of organisations to achieve KM through innovation revolve around two fundamental factors: first, teamwork and information-sharing networks to gain a broader perspective on the situations or problems of organisations; through collaborative work, creativity is evaluated and, with this, all possible scenarios within the complex world of organisations are explored; second, through the work of organisations open to change, innovation can occur more easily; without internal limits and barriers, creativity can be triggered in favour of the organisation's processes [Restrepo et al., 2025].

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Another study coincides with the central theme of this research on the importance of human talent in KM and innovation within organisations, because it establishes a direct correlation between investment in human talent training and innovation. In other words, it also notes that innovation goes hand in hand with KM through the acquisition of up-to-date information and the means and resources necessary to transform it into knowledge.

Ultimately, the efforts made by organisations today to have up-to-date human talent with a vision of development and progress will generate a higher return on investment [David & Téllez, 2024].

In EIs, AI plays an important role in achieving learning scenarios that are adapted to students' needs, breaking with homogeneous education models and providing unique learning experiences, while at the same time providing teachers with a wide range of teaching activities but also have the data and the means to analyse which ones are most efficient for learning [Aparicio-Gómez & Aparicio-Gómez, 2024].

In conclusion, innovation is closely linked to the use of technology, efficiency, and human talent development. Ultimately, as Marx said, raw materials do not acquire value on their own, but rather it is the hand of man that gives them added value. In this sense, it is clear that innovation and KM are the result of human ideas and actions.

SMEs and manufacturing: innovation and KM are key

Industry and commerce, especially SMEs and manufacturing, are experiencing difficult and complex times due to globalisation, which has brought competitive environments. As a result, they are seeking greater performance as a way to survive in highly predatory environments. In this sense, innovation and KM play a key role in the survival of organisations.

In the case of Mexico, it can be seen that the free trade agreement with North America brought about the era of technological industrialisation in Mexico. However, it can now be seen that SMEs and the manufacturing industry that have adopted technology incorporation and transfer processes have been able to achieve innovation and KM.

Therefore, and as a future perspective, public policies are required that prioritise investment in technology and training of human talent in this area [Alba et al., 2024].

In addition to the above, the manufacturing industry and SMEs require innovative KM models that promote higher performance processes such as lean manufacturing, quality focus and customer service. These can only be implemented if professional profiles are found that have the capacity to adapt and improve them to the conditions in Mexico. In other words, within these industries, it can also be seen that the human factor is the key to development and progress.

In addition to the human factor, investment in the technology sector is required to ensure that technology promotes performance and efficiency. One obstacle to investment is the lack of investment by entrepreneurs because technology is generally expensive. As a solution to this, and given its importance, public policies are needed to stimulate investment in technology and training of human talent in this area, such as preferential interest rates and tax deductibility or incentives.

A review of the literature clearly shows that the current state of the manufacturing industry and SMEs requires unprecedented investment if these industries are to achieve the desired GC and innovation.

In accordance with the context described above, the following hypothetical propositions are described:

H1: INNOV has a positive and significant influence on the REND of manufacturing SMEs.
H2: KM has a positive and significant influence on the REND of manufacturing SMEs.
H3: KM has a positive and significant influence on the INNOV of manufacturing SMEs.

The variables have been modelled based on the aforementioned hypotheses in order to visualise how the variables relate to each other according to the theory [see Figure 1].

Through the following model, we identify the hypotheses:

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Box 1

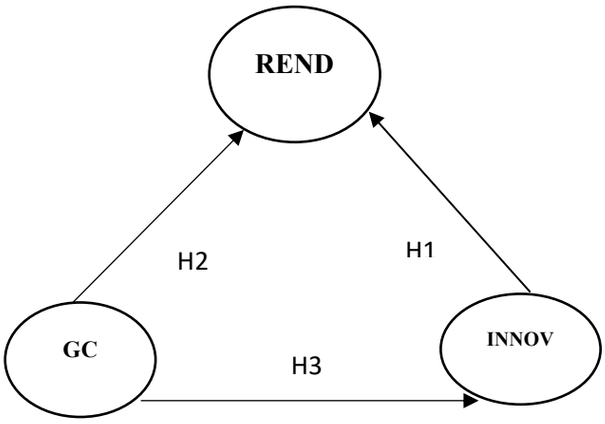

Figure 1

Modelling of variables and visualisation of hypotheses.

Source: own elaboration based on literature

Methodology

This study is quantitative, cross-sectional, and explanatory. The sample was determined using non-probabilistic and convenience sampling.

The technique used to collect all the information was a questionnaire, which was administered to managers of small and medium-sized manufacturing companies [SMEs] in Sonora, Mexico.

A sample of 260 questionnaires was administered, of which only 90 were answered by managers of SMEs in Sonora, Mexico. The questionnaires were administered in the cities with the highest number of manufacturing companies in the south and north of the state of Sonora. The cities considered for the study were: Obregón, Guaymas, Hermosillo, and in the north of the state, San Luis Río Colorado and Nogales during the year 2024. The questionnaire was administered in person.

The instrument was constructed using a Likert scale with seven possible responses: 1] Strongly disagree, 2] Disagree somewhat, 3] Disagree, 4] Neither agree nor disagree, 5] Agree, 6] Agree somewhat, and finally, 7] Strongly agree.

The variables were measured through their corresponding dimensions. In the case of the knowledge management variable, this was measured through four indicators: 1] training measured by [3 items], 2] policies and strategies measured by [7 items], 3] knowledge acquisition measured by [5 items], and 4] organisational culture measured by [4 items].

The concepts form the theoretical concept of KM, taking the studies of [Valdez Juárez et al., 2017] as a reference.

The Innovation variable was measured using three indicators: 1] effectiveness in product innovation [measured by 7 items], 2] effectiveness in process innovation [measured by 10 items] and 3] efficiency in the innovation process [measured by 4 items]. These concepts form the theoretical concept of INNOV and were taken as a reference from OECD/Eurostat [2018].

Finally, the performance variable was measured by 1] the company's evolution over the last two years [measured by 16 items] and 2] participation in decision-making [measured by 4 items]. These two concepts form the theoretical concept of PERF and were based on the studies by [Quinn and Rohrbaugh 1983].

Results

In constructing the results, a structural equation model was developed, where reflective constructs and indicators were observed. A multivariate statistical technique was used, which was carried out in three steps: 1] description of the model, 2] validity and reliability, and 3] structural model assessment.

This technique was used in accordance with the nature of the variables and the objective of this research. It is a technique that combines factorial analysis and regression with confirmatory and predictive analysis [Hair et al., 2013].

Description of the model

The theoretical model of this study consists of three latent variables [LV] and indicators as observable variables [OV]. In this case, the latent variable has reflective indicators that are visualisations of the construct they represent.

In this case, the three variables are: GC, INNOV and REND, which, according to the hypothetical assumptions, have a causal relationship with reflective indicators.

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Box 2

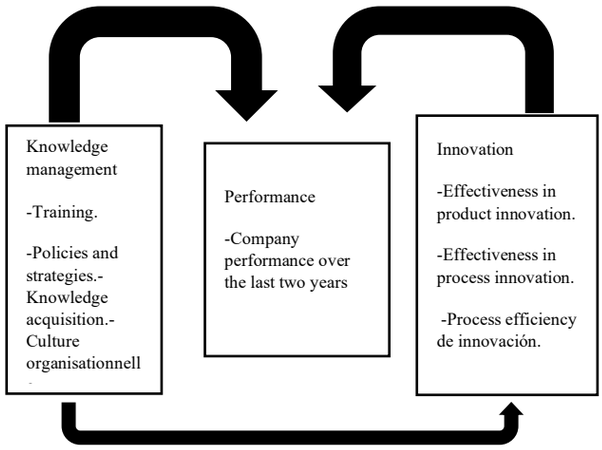

Figure 2

Theoretical model

Source: based on studies by Valdez Juárez et al., [2017]; Quinn and Rohrbaugh [1983]; OECD/Eurostat [2018].

Validity and reliability of the model

The variables were analysed using the weights and significance of the items. The variance inflation factor [VIF] was calculated, and the results obtained in the weights are significant, with the VIF remaining below 5, as indicated by Hair et al. [2018], ruling out the presence of multicollinearity among the indicators.

The reliability of each item was verified using the criterion of 0.70 used to measure reliability and used as a standard measure for measuring item reliability Hair et al. [2021].

The results obtained in this research range from 0.896 to 0.935. Cronbach's alpha value must be above 0.70, and in this study, the values are above this value [Saldaña and Huamán 2024].

To evaluate the internal consistency of the model, convergent validity was analysed through the average variance extracted [AVE]. The AVE indicates the mean variance explained by the indicators that make up the construct.
This measure is applied when we talk about Latent Variables [LV] that are made up of reflective indicators [Chin, 1998].

In this study, the EEV ranges from 0.528 to 0.666. Considering that in [EEV] we must take into account the criteria of Fornell and Larcker [1981], which indicates and suggests 0.5 as the lower limit of an [EEV] that can be acceptable.

This indicates that more than 50% of the variance of the construct is due to its indicators, showing a good fit of the model. The values in this research are above 0.5, indicating a good fit. It is important to mention that to determine the results of this model, we are carrying out three steps: 1] the description of the model, 2] the validity and reliability of the model, and 3] the evaluation of the structural model.

To determine the confirmatory results, the model must be analysed as a whole [see Table 1].

Box 3

Table 1

Operationalisation of variables

Variable	Items	Loads	VIF	Alpha	AVE
GC	P3.21, P3.34, P3.18.	0.7555 0.752 0.735	3.173 3.749 3.612	0.896	0.666
INNOV	P4.15, P4.12, P4.13.	0.775 0.639 0.609	3.708 3.240 4.021	0.923	0.660
REND	P5.12 P5.7 P5.8	0.691 0.759 0.700	2.921 2.853 2.392	0.935	0.528

Posteriormente en la Tabla 2 se observa la fiabilidad compuesta que mantiene valores 0.770 a 0.857. De acuerdo con Heinzl et al. [2011], una fiabilidad compuesta debe ser mayor a 0.70, los valores de esta investigación en la fiabilidad compuesta están por encima de 0.70, considerando que valores 0.9 pueden indicar redundancia entre los ítems. Por lo tanto, se estima que los valores mencionados son adecuados [Ver Tabla 2].

Box 4

Table 2

Reliability and construct validity

Constructo	Cronbach's alpha	Compound Reliability
GC	0.896	0.857
INNOV	0.923	0.853
REND	0.935	0.770

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Continuing with the results regarding discriminant validity, it can be seen that according to the criteria of Fornell and Larcker [1981], with values equal to or close to 0.70, this indicates the discriminant validity of the model according to the aforementioned criterion, as well as the cross-loadings, which meet the criterion and some are at or very close to the threshold set by the criterion, if we use a flexible analysis of the constructs [see Table 3].

Box 5

Table 3

Discriminant validity

Constructo	GC	INNOV	REND
GC	**0.600**		
INNOV	**0.617**	**0.631**	
REND	**0.750**	**0.603**	**0.751**

Assessment of the structural model

To evaluate the structural model, it was reviewed to determine whether the variables considered endogenous are explained by all the constructs they attempt to predict, considering that a should be without ruling out that the greater the greater its predictive capacity will be [see Table 4].

In this study, a can be observed with values above 0.1, which is considered moderate to high [Hair et al., 2021].

Box 6

Table 4

Coefficient of determination [R^2]

Constructo	R Square	R square-adjusted
GC	-	-
INNOV	0.132	0.122
REND	0.701	0.694

Finally, the estimated hypothesis test was tested using the trajectory coefficient and Bootstrapping calculation. It can be seen that the values of range between 0.266, 0.471 and 1.054.

According to Ramírez et al. [2014], a significant value of and above should be β≥0.2. Taking these results into account, we can interpret that hypothesis H1, which indicates that INNOV has a positive and significant influence on the REND of manufacturing SMEs, the values of [ρ] indicate a value of 0.471, presenting a significant and positive effect, demonstrating that the higher the innovation of manufacturing companies, the better their performance [β= 0.471; ρ

Hypothesis H2 assumes that KM has a positive influence on the REND of manufacturing SMEs. The result shows positive effects [β=0.266; ρ= 0.013], demonstrating a relationship between KM and REND. This can be interpreted as follows: the more a manufacturing company learns to constantly train its staff, create policies and strategies that favour KM, acquire knowledge and cultivate its employees, the more it will be able to deliberately bring about a better REND.

With regard to hypothesis H3, moderately significant values were obtained [β=1.054; ρ=0.000]. Although the ρ values are very significant, we must analyse everything globally, and the value of [β] could be interpreted as borderline. Therefore, it is considered that KM could be partially influencing INNOV in a positive and significant way [See Table 5].

Box 7

Table 5

Estimated hypotheses

Constructo	βetas	ρ	F^2	Soporte SI/NO
GC-INNOV	0.471	0.000	0.152	SI
GC-REND	0.266	0.013	0.215	SI
INNOV-REND	1.054	0.000	1.420	SI Parcial

Conclusions

Within the framework of knowledge management, innovation and performance theory, the following conclusions are drawn in a difficult context for the manufacturing industry in Mexico. Considering that this sector has experienced significant declines in competitiveness in areas such as textiles, furniture and other important inputs in recent years.

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And observing the strong competitiveness of the Chinese market, which is distinguished by its high competitiveness and efficiency in manufacturing. This becomes fierce competition for Mexico and its global industry.

This study has identified significant effects between the variables of innovation, knowledge management and performance. It points out that the greater the investment in innovation [R&D] made by SME manufacturing companies, the more they create new products and new processes and work to improve their own innovation process, the more profitable they can be. These findings are in line with empirical studies that have examined these variables as key factors in the economic development of companies.

On the other hand, knowledge management also has a positive but insignificant influence on the performance of manufacturing SMEs in Mexico. This indicates that if an industry works on knowledge management as one of its most important dynamic capabilities, is able to train its employees constantly, creates policies and strategies to support the consolidation of this capability at a higher level, acquires, appropriates and cultivates its organisation, it will be able to improve its performance. The results of this study show that, although there is a relationship between knowledge management [dynamic capability] and performance, it can be considered weak, and these results are not in line with previous theory and empirical studies.

This may be because manufacturing SMEs work with few resources and knowledge management may be a high-level capability for mature companies with greater resources. One might think that medium-sized companies would be better prepared for this type of process that seeks business performance, but it remains to be seen in what situation they are operating.

Finally, the relationship between the variables of knowledge management and innovation is somewhat weak. This may be because manufacturing SMEs lack the resources to innovate and work on a day-to-day basis with their own resources.

It is difficult to invest in innovation with their own money, considering that manufacturing companies or entrepreneurs do not have access to credit, which can make innovation more expensive. Innovating with their own resources is risky, so they prefer to remain in their current status. With regard to knowledge management, it can be said that it is a dynamic, high-level capability that ultimately leads to innovation thanks to its processes of knowledge management, creation and acquisition.

Knowledge management requires special care, including many intangible resources, which can be difficult for companies that sometimes work without the human resources with the necessary skills to carry out these processes. Many empirical studies have demonstrated the relationship between these two variables, but this study for this specific type of company contrasts with the results obtained in other research [Millán and Castañón 2019].

Declarations

Conflict of interest

The authors declare that they have no conflict of interest. The article is completely unpublished and has not been handled by any other journal.

Contribution of the authors

Espinoza-Castelo, Luz Maria: Her contribution to this article was to perform the statistical analyses, methodology, conclusion and writing style.

Solis-Barraza, Santos: his contribution to this article was translation, graphic summaries and literature support.

Linarez-Placencia, Gildardo: His contribution to this article was to develop the literature, write the article and style the article.

Pérez-Pompa, Alejandro: His contribution to this article was support in the literature and writing of the results.

Availability of data and materials

The database for this article is available from the researcher at the following email address: luz.espinoza@utslrc.edu.mx

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Abbreviations

KM: knowledge management
INNOV: innovation
REND: performance
LV: latent variable
OV: observable variable
R&D: research and development.

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Background

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Article

Leveraging digital tools to improve service quality for MSMEs in the restaurant sector of Comala, Colima. Mexico

Aprovechamiento de las herramientas digitales para mejorar la calidad en el servicio de las MIPYMES del sector restaurantero de Comala, Colima. México

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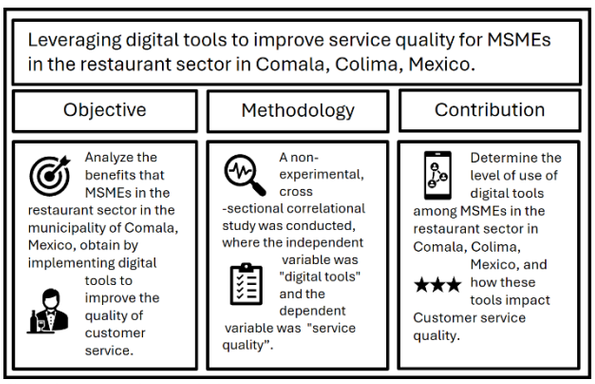
Abstract

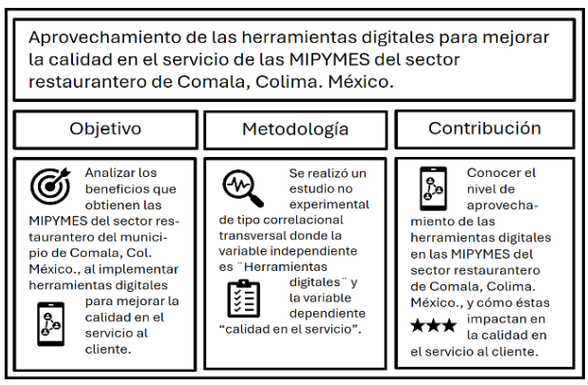
The purpose of this research is to analyze the benefits that the restaurant sector in the municipality of Comala, Colima, Mexico, obtains by implementing digital tools that improve the quality of customer service. A non-experimental, cross-sectional correlational study was conducted, where the independent variable is "Technological tools" and the dependent variable is "Service quality." A universe of 22 restaurant MSMEs was considered. A cluster sampling was used: a] Snack bars and restaurants, b] Restaurants, and c] Restaurant-bar. The measurement instrument was the SERVQUAL questionnaire to evaluate the quality of service and products for customers [Parasuraman, Zeithaml, & Berry, 1985]. This allowed for the examination of five dimensions: 1. Environment, facilities, and infrastructure; 2. Health, safety, and hygiene; 3. Systems [software, payment methods, programs]; 4. Service; and 5. Customer service quality.



Service quality, Digital tools, Restaurant sector

Resumen

El propósito de la investigación es analizar los beneficios que obtiene el sector restaurantero del municipio de Comala, Colima. México, al implementar herramientas digitales que permitan mejorar la calidad en el servicio al cliente. Se realizó un estudio no experimental, de tipo correlacional transversal, donde la variable independiente es "Herramientas tecnológicas" y la variable dependiente es "Calidad en el servicio". Se consideró un universo de 22 MIPYMES restauranteras. Se hizo un muestreo por conglomerados: a] Botanas y restaurantes, b] Restaurantes y c] Restaurante bar. El instrumento de medición fue el cuestionario SERVQUAL para evaluar la calidad de servicio y de productos para los clientes [Parasuraman, Zeithaml y Berry, 1985], el cual permitió examinar cinco dimensiones: 1. Ambiente, instalaciones e infraestructura, 2. Salubridad, seguridad e higiene, 3. Sistemas [software, métodos de pagos, programas], 4. Servicio y 5. Calidad en el servicio al cliente.



Calidad del servicio, Herramientas digitales, Sector restaurantero

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

Citation: López-Jiménez, Sergio Felipe, Cueto-Chavarín, María Enedina, Álvarez-Ochoa, Martín and Lino-Gamiño, Juan Alfredo. [2025]. Leveraging digital tools to improve service quality for MSMEs in the restaurant sector of Comala, Colima. Mexico. ECORFAN-Journal Republic of Cameroon. 11[19]1-9: e41119109.

Introduction

This research analyzed the impact of digital tools on the quality of service provided in restaurants in Comala, Colima, Mexico. It was conducted out of interest in understanding the advantages and significant improvements achieved by automating businesses such as restaurants.

Specifically, it sought to understand the types of tools available in Comala restaurants and the level of service diners receive. Two research variables were also considered: digital technology tools and customer service quality. By implementing and leveraging digital tools in the restaurant sector in Comala, businesses that prepare and serve food and beverages gain benefits that are reflected primarily in increased competitiveness and productivity, and primarily in a reduced likelihood of short-term failure. Customers also benefit from receiving quality service.

The objective of this research is to analyse the benefits that restaurants in Comala, Colima, Mexico, obtain by implementing digital tools to improve customer service quality. The main research question was: What is the impact of the use of digital tools on the quality of customer service?

Regarding the scope of this research, data were obtained from the Ministry of Tourism of the municipality of Comala, Colima, Mexico, and the National Statistical Directory of Economic Units [DENUE] of the National Institute of Statistics and Geography [INEGI]. Fieldwork was conducted with 22 restaurants in the town of Comala, using a measurement instrument validated by the Jalisco Institute of Statistical and Geographic Information [IIEG].

Twenty-two surveys were administered to the managers or owners of each restaurant to measure the use and utilization of digital tools. Subsequently, the SERVQUAL instrument was used to evaluate the quality of service and products offered to customers.

For this survey, a sample of 290 participants was used, which is the average number of customers received at each restaurant each weekend.

The data was subsequently analyzed using SPSS software, and important findings for this research were found, such as the fact that customers do identify the software, payment methods, and programs they use within restaurants. Furthermore, it was also found that only 3.4% of all restaurants have these tools, indicating a significant gap that needs to be improved.

1. Digital tools for restaurant SMEs

Digital tools for restaurant SMEs are understood as the set of software, applications, platforms and resources [online or offline], accessible from computers and mobile devices, used to manage information, communicate, coordinate processes and support tasks linked to service quality [Borja & Carcausto, 2020; Luke & Yan, 2023; Roby Nivelo, 2021].

Digital tools are part of the development of digital competencies, as they depend on the type of tool used [free or commercial]. They allow access to all types of information, from social networks to repositories, making it easy to find and share information for the successful completion of activities [Dueñas, 2022].

Digital tools are applications and programs used in various functions, which are available to people to facilitate work, allowing for the exchange of information within and outside the organization.

Information and Communication Technologies [ICTs] are elements of great importance for humans and businesses, as they allow us to understand the real state of things and manage the activities that machines and humans perform. The technological change brought about by the technological revolution, coupled with the immense advancement of computers, marks the difference between a developed civilization and one in the process of development. Therefore, it is possible to affirm that an organization that does not integrate technology into its activities is one that is lagging in today's world [Zapata et al., 2010].

1.2. The Technology Acceptance Model [TAM]

According to the Technology Acceptance Model [TAM] created by Davis [1989], the acceptance of information systems by users in organizations can be predicted.

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The main purpose of the TAM is to explain the factors that determine the use of ICTs by a significant number of users, meaning that usefulness and ease of use are determining factors in an individual's intention to use a system.

To determine whether a technology will be used optimally, the external variables [Figure 1] that directly influence usefulness, as well as the perceived ease of use by users, must be identified, and their relationship with the outcome of using these technologies must be determined.

Box 1

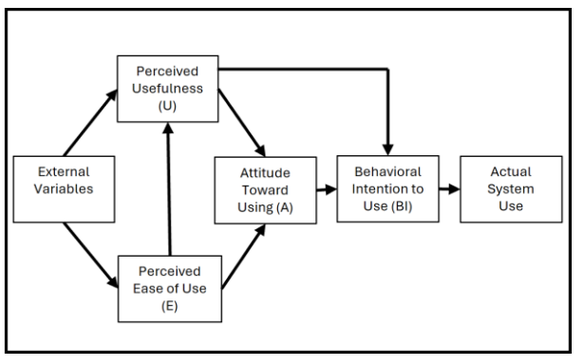

Figure 1
The Technology Acceptance Model [TAM]
Source: Davis, F. D. [1989]

This model is based on two main characteristics, the Perceived Usefulness [PU] which refers to the degree to which a person believes that using a particular system will improve their performance at work, and the Perceived Ease Of Use [PEOU] which indicates to what degree a person believes that using a particular system will make less effort to perform their tasks [Yong Varela et al., 2010].

1.3. Adaptation of digital technological tools in MSMEs

It emerged as a response to the need to manage the technological factor with a strategic sense. It is defined as the process of managing all those activities that enable the company to make more efficient use of the technology generated within it and that acquired from third parties, as well as to incorporate new products and the ways in which they are produced and delivered to the market.

It addresses decision-making problems at all levels related to the creation and use of technological assets and capabilities; their impacts on individuals, organizations, societies, and nature; and the reconciliation of the economic, social, and environmental consequences of technological innovations [Bayraktar, 1990].

1.4. Information and Communication Technologies [ICTs]

Information and communication technologies [ICTs] is a broad concept whose emphasis has varied over time, its focus on the internet and "basic" applications in communication and connectivity between companies and people are web pages, emails, e-commerce, e-government, etc., which have recently been incorporated into mobile devices and social networks [Dini et al., 2021].

ICTs encompass a set of tools, resources, equipment, programs, and networks that enable the creation, processing, storage, and transmission of information [voice, data, text, video, images] to connect people and boost communication and productivity in areas such as education, work, and entertainment.

They are associated elements that capture, store, and process data to inform decision-making. They are a fundamental tool for organizations, helping them achieve better business development. They allow companies to generate added value for their products, improve processes, and adapt to changes in the environment, giving them a certain competitive advantage and the opportunity to position themselves in the market.

ICTs have been part of the emerging technologies, which use computing media to store, process, and disseminate all types of information generated by companies. The adoption of ICTs benefits companies to the extent that it enables cost reduction and increased speed and efficiency of organizational processes and operations [Carrión et al., 2021].

2. MSMEs [Micro, Small, and Medium-Sized Enterprises] in the Restaurant Sector

Micro, Small, and Medium-Sized Enterprises [MSMEs] occupy a crucial position in the economies of countries.

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These businesses, mostly family-run and with limited financial resources compared to large companies, play a role in their ability to adapt to changing circumstances in the business environment, as they have shaped their development over time.

During the COVID-19 pandemic, several companies in the restaurant sector were affected primarily because they did not react in a timely manner to implement strategies that would have allowed them to survive during this difficult period.

On the other hand, those that relied on the use of technology managed to remain in the market and remain competitive in an increasingly digitalized world.

2.1. Concept of MSMEs

MSMEs are a group of micros, small, and medium-sized enterprises based on their number of employees, time in the market, and production levels.

They are also considered to be companies with lower capital requirements compared to large companies.

These companies are comprised of families that initially emerge as a family project. They play a very important role in the economy, and their weakness is that they tend not to expand; their growth is generally local [Carrión et al., 2021].

MSMEs are the various projects or ventures created with their own or family financial resources, where they focus on creating innovative products or services to penetrate a competitive market. These companies also create thousands of jobs, taking advantage of the growth of the economically active population [Padilla Martínez et al., 2019].

2.2. Background on MSMEs

MSMEs in Mexico represent the largest number of jobs and the largest share of economic units in both developed and developing countries.

It is important to support MSMEs because, according to several international organizations, they are key to increasing the potential growth of economies.

These companies are important for economies due to their contributions to the production of goods and services, their ease of adaptation to technological change, and their potential to generate jobs.

MSMEs lack the resources necessary for significant development, as the main limitation is access to adequate financing. Low investment in technological development and infrastructure is also considered problematic.

The fact that they are primarily family businesses is also considered problematic. In many cases, this is the reason why they resist change.

They are also unaware of new technological and information systems, which leads to a limited vision [Martínez, 2015].

2.3. MSMEs in the context of the COVID-19 pandemic and post-pandemic

COVID-19 caused the closure of 2.7 million businesses, equivalent to 19% of all businesses in Latin America, and the job losses of more than 8.5 million people [ONU México, 2020].

Within these figures, MSMEs represent the largest percentage of affected businesses. The International Labor Organization noted a series of bankruptcies among SMEs because of the economic crisis and estimated that more than 50% of these businesses would not survive 2020 [OECD, 2020; Rojas, 2021].

2.4. Technological Adaptation in MSMEs

A survey conducted by the Colombian Association of MSMEs indicates that 85% of business owners have begun using technological tools in sales, marketing, and administrative areas.

It also states that there is a need to expand knowledge in the use of platforms for remote work.

According to the measures adopted by the national government to contain Covid-19, sales fell by 94.2%. Therefore, companies implemented measures to address the current situation regarding investment in technology, where only 10.4% of business owners are investing in this technological strategy.

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Research conducted by MSME entrepreneurs revealed a collateral effect of COVID-19, due to a lack of skills and knowledge regarding the use and application of technological resources that would mitigate the consequences of the weakening economy [Mosquera et al., 2021].

Methodology

A non-experimental, cross-sectional correlational study was conducted with "Digital Tools" as the independent variable and "Service Quality" as the dependent variable.

The study population [Figure 2] of this research focused on MSME restaurants in the town of Comala, Colima, Mexico.

Box 2

Figure 2

Map of the limited area for research

Source: Google Maps [2024].

Based on data obtained from the Ministry of Tourism of the municipality of Comala and DENUE [National Institute of Statistics and Censuses], the sample consisted of 22 MSME restaurants.

In this research, cluster sampling was conducted [Table 1], identified as: snack bars and restaurants, restaurants, and restaurant bars.

From these clusters, the sample was taken, and questionnaires were randomly administered to the local restaurants.

Box 3

Table 1

Cluster sampling in the limited area of the city of Comala, Colima. México

No.	Conglomerates	Restaurant name
1	Snacks and restaurants	Los Portales
2	Snacks and restaurants	Salón Don Comalón
3	Snacks and restaurants	Campestre Fundador
4	Restaurant	Fonda Jardín La Lupita
5	Restaurant	El Fogón
6	Restaurant	La Comalteca
7	Restaurant	Cenaduría Fuentes
8	Restaurant	Adobe
9	Restaurant	Twins
10	Restaurant	El Horno Mágico
11	Restaurant	El Kiosko de Páramo
12	Restaurant	El Culpable
13	Restaurant	Terraza 45
14	Restaurant	Las Jaranas
15	Restaurant	Cuaxiote
16	Restaurant	Casa Colibrí
17	Restaurant	Casa Pascual Del Río
18	Restaurant	La Comalita
19	Restaurant	La Terracita
20	Restaurant	Distrito Comala
21	Restaurant	Oktli
22	Restaurant Bar	Comalala

Source: Own elaboration, 2024

The measurement instrument used was the SERVQUAL questionnaire for evaluating customer service and product quality.

Developed by Parasuraman, Zeithaml, and Berry [1985] and validated.

The questionnaire identifies the five basic dimensions that characterize a service, represented in a 22-question questionnaire. The data obtained allow us to identify and quantify the five most important gaps that determine the degree of customer satisfaction and the quality of a service [Weil, 2003].

The model and tool consider the following four dimensions: empathy and trust [6 items]; reliability [3 items]; responsiveness [6 items]; guarantee and security [5 items]. The proposed questionnaire was reduced to 20 items with a single perceptions section, where each statement has a 5-point scale [5 strongly agree and 1 strongly disagree].

This questionnaire has been extensively validated through the system of expert judges in the field and from different disciplines, gathering opinions from experts who examined the contents of the instrument, validated by a total of 7 judges, 4 research professors from the Monterrey Institute of Technology and Higher Education, and three experts from the restaurant industry.

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This research was conducted from 2023 to mid-2024. This period allowed for comparative data collection and analysis across months, reflecting variations in emerging trends in the restaurant sector.

The study focused exclusively on the city of Comala, Colima, Mexico, exclusively on the restaurant sector.

This included a wide variety of restaurants located in this geographic area, which provided a relevant context for evaluating services and the influence of digital technologies on restaurants.

Structured surveys were used to collect information directly from two main groups: restaurant managers and customers who frequent these establishments.

This methodology provided insight into the consumer experience, facilitating analysis through the collection of data obtained.
The lack of internet coverage to apply the measurement instruments to customers in the municipality of Comala, Colima, Mexico, represented a limitation of the research.

Results

This study sought to demonstrate whether the causal research hypothesis, "The lack of use of digital tools leads to poor performance in customer service quality," was proven or not.

To this end, questionnaires focused on assessing service quality were designed and administered using the SERVQUAL questionnaire, a recognized methodology for measuring service quality developed by Parasuraman, Zeithaml, and Berry [1985].

In addition, another questionnaire was implemented to measure the use of digital platforms and new technologies in the performance and evolution of businesses in the restaurant industry.

Subsequently, the data obtained from the questionnaires were tabulated, entering them into Excel for analysis using IBM SPSS version 29.0.2.0.

Descriptive analyses were performed to identify the characteristics of the participants and evaluate the levels of the variables.

Crosstabs were also generated to observe the behaviour of the variables in relation to the demographic characteristics of the sample.

To test the hypotheses, Pearson correlation analyses were performed, identifying specific correlations between variables. In addition, regression analyses were conducted to examine the effect of the independent variables on the dependent variables.

The results of these analyses were presented in tables, facilitating interpretation and answering the proposed hypotheses.

Causal or explanatory research hypothesis:

The lack of use of digital tools leads to poor performance in customer service quality.

According to Table 2, a weak, positive correlation of 0.138* was found between the variables home delivery and customer service quality. This demonstrates that, although the correlation is weak, customer service quality tends to improve as the use of digital tools [digital applications, social media] increases.

Box 4

Table 2

Correlation analysis results

	Gender	Age	Areas and services	Home delivery	Food preparation	Social media and advertising
Age	.175**	.156**	.165**	.214**	-.296**	.031
Environment and Working Conditions	.099	-.028	.144*	.036	.041	-.014
Health, safety, and hygiene	.187**	.116*	.179**	.179**	.011	.064
Systems	-.232**	-.078	-.118	-.065	-.030	-.064
Service	.116*	.110	.003	.213**	-.016	-.067
Quality in customer service	.092	.131*	.206**	.138*	-.055	-.018
Presentation and Image	.048	.043	.097	.322**	-.164**	.108
Customer Factors	.030	-.026	.303**	.530**	-.375**	.255**

Note: p value= ´05, ** = .01*
Source: Prepared by the authors using SPSS version 29.0.2.0.

Null hypothesis:

The lack of use of digital tools does not lead to poor performance in customer service quality. Table 3 shows that the variables related to areas and services and customer service quality had a weak positive correlation of 0.206**.

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This demonstrates that, although the correlation is moderately positive between the variables, as the areas and services improve, customer service quality tends to improve, but the relationship between them is not as strong.

Box 5

Table 3

Correlation analysis results

	Gender	Age	Areas and services	Home delivery	Food preparation	Social media and advertising
Age	.175**	.156**	.165**	.214**	-.296**	.031
Environment and Working Conditions	.099	-.028	.144*	.036	.041	-.014
Health, safety, and hygiene	.187**	.116*	.179**	.179**	.011	.064
Systems	-.232**	-.078	-.118	-.065	-.030	-.064
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Quality in customer service	.092	.131*	.206**	.138*	-.055	-.018
Presentation and Image	.048	.043	.097	.322**	-.164**	.108
Customer Factors	.030	-.026	.303**	.530**	-.375**	.255**

Note: p value= ´05, ** = .01*
Source: Prepared by the authors using SPSS version 29.0.2.0.

Alternative hypothesis:

The use of digital tools positively influences customer service quality.

Table 4 shows that the home delivery variables and important factors have a medium positive correlation, with a significant correlation of 0.530**.

Box 6

Table 4

Correlation analysis results

	Gender	Age	Areas and services	Home delivery	Food preparation	Social media and advertising
Age	.175**	.156**	.165**	.214**	-.296**	.031
Environment and Working Conditions	.099	-.028	.144*	.036	.041	-.014
Health, safety, and hygiene	.187**	.116*	.179**	.179**	.011	.064
Systems	-.232**	-.078	-.118	-.065	-.030	-.064
Service	.116*	.110	.003	.213**	-.016	-.067
Quality in customer service	.092	.131*	.206**	.138*	-.055	-.018
Presentation and Image	.048	.043	.097	.322**	-.164**	.108
Customer Factors	030	.026	303**	530**	.375**	255**

Note: p value= ´05, ** = .01*
Source: Prepared by the authors using SPSS version 29.0.2.0.

This indicates that as digital technology tools increase, the factors important to customer service quality increase.

Finally, the results indicate a lack of digital tools in the restaurant sector in Comala, which leads to poor customer service and employee disorganization. It is important to mention that each previous result helped to confirm or reject the hypotheses.

Conclusions

The causal and alternative research hypotheses are approved, while the null hypothesis is rejected. According to the results obtained, no association was found indicating that the lack of use of digital technology tools does not cause poor performance in customer service quality.

Contrary to the causal and alternative hypotheses, they indicate that as the use of digital technology tools increases, customer service quality tends to improve. Therefore, it can be stated that there is a correlation between digital technology tools and customer service quality in the restaurant sector of Comala, Colima, Mexico.

The findings showed that the correlation between the dependent variable "Digital Tools" and the dependent variable "Service Quality" was positively related to the quality of customer service reported by the respondents. Through data analysis and a review of various authors, it has been shown that the implementation of digital tools is positively related to the quality of customer service.

This demonstrates that companies that invest in technology and properly integrate it into their customer service processes could improve the quality of customer satisfaction.
The findings highlight the importance of adopting a technology strategy in the context of customer service. It is not just about adapting or implementing digital technology tools, but also about understanding how these tools can be used effectively to improve customer experience and generate value for the company.

However, it is important to keep in mind that technology alone does not guarantee quality customer service. Adequate staff training, culture, and attention to individual customer needs remain fundamental elements for offering better service.

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This research emphasizes the importance of strategically integrating technology and focusing on customer experience. Companies can position themselves to compete effectively in an increasingly customer-centric market. Therefore, it is proposed to answer the question: What is the effect of digital tools on customer service quality?

The use of digital tools is increasingly being implemented in companies to improve customer service quality processes, so entrepreneurs are faced with the need to implement digital technology tools. This leads to the adaptability of technology to strengthen businesses, where innovative entrepreneurs will always seek to offer the best experiences for their customers.

Declarations

Conflict of interest

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

Author contribution

López-Jiménez, Sergio Felipe: Contributed with the idea of the project, analysis of various concepts, research method, analysis of the data and drafting of conclusions.

Cueto-Chavarín, María Enedina: Contributed to the coordination of the process of applying surveys to restaurants.

Álvarez-Ochoa, Martín: Contributed to strengthening the theoretical framework and the analysis of the information.

Lino-Gamiño, Juan Alfredo: Contributed with the statistical analysis of the data.

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Abbreviations

DENUE	Directorio Estadístico Nacional de Unidades Económicas
ICTs	Information and Communication Technologies
IIEG	Instituto de Información Estadística y Geográfica de Jalisco
INEGI	Instituto Nacional de Estadística y Geografía
MSMEs	Micro, small and medium-sized enterprises
SMESs	Small and medium-sized enterprises
TAM	Technology Acceptance Model

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Discussions

Parasuraman, A., Zeithaml, V. A. & Berry, L. [1985]. A Conceptual Model of Service Quality and Its Implications for Future Research. *Journal of Marketing*, *49*[4], 41–50.

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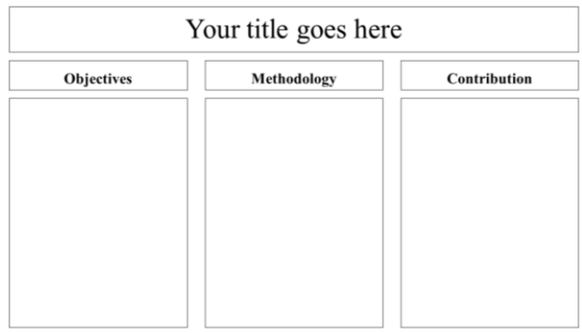

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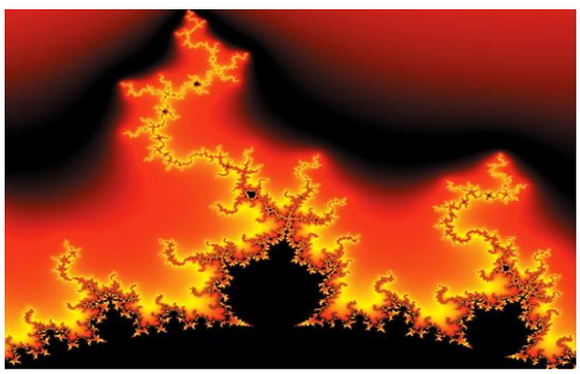

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$$Y_{ij} = \alpha + \sum_{h=1}^{r} \beta_h X_{hij} + u_j + e_{ij} \qquad [1]$$

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Methodology

Develop give the meaning of the variables in linear writing and important is the comparison of the used criteria.

Results

The results shall be by section of the article.

Conclusions

Clearly explain the results and possibilities of improvement.

Annexes

Tables and adequate sources.

The international standard is 7 pages minimum and 14 pages maximum.

Declarations

Conflict of interest

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

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Author contribution

Specify the contribution of each researcher in each of the points developed in this research.

Prot-
Benoit-Pauleter, Gerard: Contributed to the project idea, research method and technique.

Availability of data and materials

Indicate the availability of the data obtained in this research.

Funding

Indicate if the research received some financing.

Acknowledgements

Indicate if they were financed by any institution, University or company.

Abbreviations

List abbreviations in alphabetical order.

Prot-

ANN	Artificial Neural Network

References

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