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# ECORFAN Journal - Spain

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The works must be unpublished and refer to topics of education, crowdsourcing, operation of academics' corps, regional development, fiscal, architecture, networks and other topics related to Social Sciences.

## Presentation of the Content

As the first article we present, *Correlation between memory ability and age in older adults* by Rosales-Sánchez, Andrea, Ontiveros-Vargas, Angel Adrián, Santiesteban-Contreras, María Tereza and Vázquez-Ríos, Elda Raquel, with adscription in the FaPyTCH, UJED, as a second article we present, *The role of the accountant in the digital transformation of accounting through the application of Artificial Intelligence*, by Loayza-Pereira, Walter Arturo & Herrera-Freire, Alexander Geovanny, with adcription in the Universidad Técnica de Machala, as a third article we present, *Virtual reality for inclusion in community health*, by Flores-Azcanio, Nancy P., González-Hernández, Jorge Daniel and Echevarría-Chan, Ivonne, with adcription in the Universidad Politécnica del Valle de México, Universidad Autónoma Metropolitana and Tecnológico Nacional de México, as fourth article we present, *Rural electromobility: innovation for transportation in indigenous and rural communities*, by Eliseo-Dantés, Hortensia, Pérez-Garmendia, Gloria, García-Reyes, David Antonio and García Jerónimo, Beatriz, with adscription in the TecNM / Instituto Tecnológico de Villahermosa and TecNM / Instituto Tecnológico de Mérida.

## Content

**ECORFAN Journal-Spain** 12[22]1-8: e11222108
Article

# Correlation between memory ability and age in older adults

# Correlación entre la habilidad para la memoria y la edad en adultos mayores

Rosales-Sánchez, Andrea * [a], Ontiveros-Vargas, Angel Adrián [b], Santiesteban-Contreras, María Tereza [c] and Vázquez-Ríos, Elda Raquel [d]

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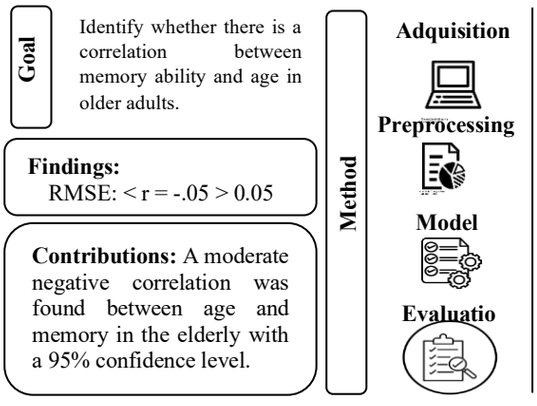
**Abstract**

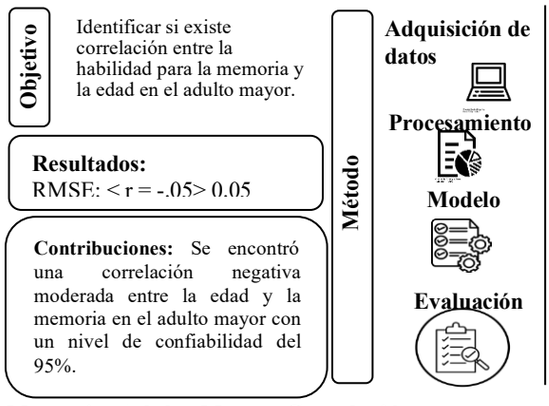
It is important to point out that old age is a substantive state, which is reached by a chronology of biological events, whose most visible and experiential manifestation is the functional wear and tear of daily life. In this article we identified the correlation between memory and age in the elderly, evaluated by means of the MINI-MENTAL test. Methodology: non-experimental, exploratory, observational research with correlational analysis. Contribution: in a sample of 19 participants, a moderate negative correlation was found between age and memory in older adults with an average of 78 years of age. Therefore, it is interpreted that the older the age, the lower the memory ability with an r = -0.05 and a p = 0.05 of reliability.




**Memory, Elderly, Correlation.**

**Resumen**

Es importante señalar que la vejéz es un estado sustantivo, a la cual se llega por cronología de sucesos biológicos, cuya manifestación mas visible y experiencial es el desgaste funcional de la vida cotidiana. En el presente artículo sidentificó la correlación que existe entre la memoria y la edad en el adulto mayor, evaluados mediante en Test MINI-MENTAL. Metodología: investigación de tipo no experimental, exploratorio, observacional y con análisis correlacional. Contribución: en una muestra integrada por 19 participantes, se encontró una correlación negativa moderada entre la edad y la memoria en adultos mayores con una media de 78 años de edad. Por lo que se interpreta que a mayor edad, menor habilidad para la memoria con una r = -0.05 y una p = 0.05 de confiabilidad




**Memoria, Adulto Mayor, Correlación**

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

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## Introducción

The affective or emotional component of the daily life of the older adult, often deprived of the warmth and support of the family group or a minimum of positive social interactions, confers different meanings to the gradual reduction of various biological, cognitive or sensory functions and, with it, a greater vulnerability to various agents or pathogenic factors. [Tello, 2020]

There are elements to take into account that determine the maintenance of cognition in the elderly patient such as; pathologies of the patient, social support, mood and the presence of geriatric syndromes such as frailty and osteopenia. [Zambrano, 2020]

With aging, there is the consequence of a degenerative process at the organic level, due to the accumulation of molecular errors, including in the brain. Dr. María Sagrario Manzano, a neurology specialist in Madrid at the Infanta Cristina Hospital, mentions that in the aging brain only certain areas involved in executive functions and memory are affected. Throughout this process, neurons decrease in size and others die [Riojas, 2021]

Memory and attention are higher brain functions that, under normal conditions, allow human beings to perform appropriately in personal and social life. To a large extent we are what we remember, and in doing so we can guide and inform our present and future behavior [Zanín, 2004].

Since these functions are of utmost importance for our life, the question arises whether mood influences the alteration of these functions, hence the objective of this research which is to know the processes of attention and memory and their relationship with mood in the elderly through the application of the following tests: Hamilton test, Beck test and mini-mental screening test.

## Justification

It is known that memory and attention are main aspects of executive functions; with the passage of time the quality of life and health of people is affected by a decline in their functionality, which leads to consequences at social, mental and physical levels. [Riojas, 2021]

Age-related memory problems are a cognitive alteration considered normal, they are mild forgetfulness. It has been suggested as a normal stage in the elderly. This event is known as Age-Related Memory Impairment [ARMD], but this cognitive alteration is not considered a disease. [Sosa, 2016]

Carbajal [2007] explains that in our country most of the older adults who consult for memory loss do not have cognitive disorders, what they present are these subjective memory losses, where they believe they present a decrease of some cognitive function but in reality this loss is not made known after the corresponding tests have been performed. This subjective loss is strongly related to anxieties, fears of developing dementia, relationship conflicts and attention problems of older adults. [Sosa, 2016].

According to the above mentioned and seeing the importance of attention and memory in daily life, it was considered important to conduct this research in order to verify the impact that the mood of older adults may have in relation to the loss or deterioration of attention and memory.

Based on the above, the interest of this research is to investigate attention and memory in older adults and their relationship with mood.

## Problem

Depression is a common illness worldwide, with an estimated 3.8% of the population affected, including 5.0% among adults and 5.7% among adults over 60 years of age. Approximately 280 million people worldwide have depression. Depression can become a serious health condition. It can cause the affected person to suffer greatly and function poorly at work, at school and in the family. In the worst cases, depression can lead to suicide. More than 700 000 people die due to suicide every year [INEGI, 2021].

According to the World Health Organization [WHO] dementia and depression affect approximately 5% and 7% of the world's elderly population, respectively. Anxiety disorders affect 3.8% of the older population. [INEGI, 2021].

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Older people with depressive symptoms have poorer functioning compared to those with chronic medical conditions such as lung disease, hypertension or diabetes. [GOB, 2017].

**Hypothesis**

**Ho:** "Age is not a factor influencing memory ability in the older adult."

**Hi:** "Age is a factor that influences memory ability in the older adult."

**Objectives**

**General objective:** to identify whether there is a correlation between memory ability and age in older adults.

**Specific objectives**

- To know the total score of the memory subsection of the Mini Mental Test.
- Determine the mean age of the study population.

**Theoretical framework**

**Background:**

**Older adult**

In Mexico, older adult is considered a person who is over 60 years old and refers to the stage that adds up all the experiences of life and goes through most of the family, professional and social goals. But it also marks the beginning of a stage where people present conditions of physical, social and economic vulnerability. [GOB, 2017]

Aging involves a series of physical, psychological and social changes related to changes in all organs, including the brain. With the passage of time, a series of cognitive modifications begins involving memory, language, perception and attention. These cognitive changes constitute one of the central factors of the late stages of life. [Ardila, 2007]

Individuals between 55 and 74 years of age are considered senile young, senile old those over 75, and senile older those over 85 years of age. [Ardila, 2007]

**Aging**

Human aging is a dynamic process and not a static one; it is a natural process of change. Therefore, it does not occur suddenly or accidentally, but is gradual and progressive. It is characterized by the existence of biological, psychological and social conditions determined as a function of time [Tortosa, 2002]

Aging is a multifactorial phenomenon, which affects all levels of biological organization, from molecules to physiological systems. However, this biological phenomenon does not always coincide with the chronological one [Allevato, 2008]

Aging is a process inherent to human nature. All men of all times and cultures, transit and will continue to transit through aging. But it is worth noting that this process is highly differential and asynchronous in its manifestations [Binotti, 2009].

There is a great variation among individuals, since each person ages differently due to physical and physiological characteristics, personality structure and life history, as well as the socioeconomic context in which he/she develops. [Comachione, 1999]

Human aging is becoming a relevant topic for current research in all fields; however, there is still little information and dissemination on the topic of aging, which professionals should study in depth to improve the quality of life of the elderly and promote healthy and active aging.

**Pathological deterioration in the older adult**

Mainly it is necessary to clarify that there is a healthy aging that is the physiological aging process that develops chronologically in a normal way according to the standards of biological, physiological and psychological changes that are gradual and irreversible in the process of human development and a pathological aging that deviates below the ranges classified as normal. [Falqué, 2014]

The key is to recognize and make known to every human being that the aging organism is not necessarily sick; healthy aging is possible. Many problems can be avoided or reversed [Allevato, 2008].

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The important thing is to reach old age, the last stage of the aging process with quality of life, surrounded by conditions not only material, but also affective, emotional, that provide an economic, social and spiritual balance. [Falqué, 2014]

The World Health Organization [WHO] has defined active aging as the process "by which opportunities for physical, social and mental well-being are optimized throughout life, with the aim of extending healthy life expectancy, productivity and quality of life in old age". [INEGI, 2021].

Allevato & Gaviria tells us that, although at the moment it is not possible to stop the aging process, you can work to obtain a good quality of life. He mentions that the ideal would be to reach old age with a good cognitive level, adaptation to the changes associated with age, including some disease or degree of physical disability, a good level of socialization and life satisfaction. [Allevato, 2008].

**Memory:**

Memory is a neurocognitive function that allows recording, encoding, consolidating, retaining, storing, retrieving and recalling previously stored information. While learning is the capacity to acquire new information, memory is the capacity to retain the information learned [Portellano, 2005].

Basically, we can establish two main memory modalities according to the time elapsed for its storage: short-term memory and long-term memory. [Portellano, 2005].

**Short-term memory [STM]**

It is the process of initial retention of information for a short period of time ranging from a few fractions of a second to several minutes, although some authors place the time limit of short-term memory at 30 seconds. Before any perceptual processing of information can take place, it is necessary that a sensory encoding of the stimuli to be memorized takes place, so that within short-term memory there are several modalities: sensory memory, immediate memory and working memory. [Portellano, 2005].

**Long-term memory [LTM]**

is the ability to retain information for longer periods of time or permanently. LTM also refers to the ability to recall information after an interval of time in which the subject has focused his attention on another task. [Portellano, 2005].

**Mini Mental Screening Test**

The Mini-Mental State Examination [MMSE] is a written test commonly used as part of the process when considering a diagnosis of dementia, with a maximum score of 30, with lower scores indicating more severe cognitive problems.

It is one of the most widely used tools worldwide for its brevity and easy application it has 10 areas of assessment: spatiotemporal orientation, three-word register, attention fixation, memory, verbal nomination, repetition and comprehension, reading, writing and visuospatial construction, The cut-off point established for the MMSE defines "normal" cognitive function and is generally set at 24, although theoretically it could be anywhere between 1 and 30 [Llamuca, 2020].

It is mandatory when starting the test to begin by collecting the patient's data, as well as their degree of schooling and work they did before retirement [year in which they started school and year of completion, approximately]. This will also help to create a degree of trust with the patient and facilitate their collaboration.

If we analyze the MMSE, we see that it consists of 5 sections: [1º] Orientation, [2º] Fixation, [3º] Calculation and attention, [4º] Memory and [5º] Language and praxis. When carrying it out, we should not interrupt it, especially the sequence of fixation, calculation and attention and memory. Between the 1st and 2nd, and between the 4th and 5th we can make a brief pause if the patient gets tired or is very nervous, trying to reassure him and tell him that it is not an exam.

**Range Level of cognitive impairment**

< = 24 Probable cognitive impairment
> 24 No cognitive impairment

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With all this we will have reached the end of the test and we will have to make the correction for age and cultural level. After reviewing the MMSE we reach the following agreement.

Schooling refers to the age of completion of studies, not to the number of years of schooling. Broadly speaking, the first group includes those who have not completed primary school, the second group includes those who have completed primary school and those who have completed high school, and the third group includes those who have completed high school or a degree.

Patients with depression and anxiety usually score low on this type of test due to impaired attention and concentration, without being indicative of MCI or dementia [the response of "I don't know, I don't know" to simple orientation or calculation questions is characteristic, and they end up performing if we insist that they pay attention and make an effort.

## Research methodology

The present study is exploratory, non-experimental, observational and cross-sectional, with a descriptive statistical analysis.

The complex variable of memory was analyzed for its relationship with neurocognitive functions by means of Mini Mental. In addition, the following variables were considered: age, gender and school grade.

For the statistical analysis of the population studied, measures of central tendency and dispersion were used.

## Procedure

The participants were patients attending a geriatric geriatric center called "taking care of those who gave us life" in the city of Durango. Data collection was carried out during the month of February 2021, culminating at the end of February of the same year.

Informed consent was obtained after signing the informed consent in accordance with the official Mexican standards 004-ssa3-2012 on the clinical record and 040-ssa2-2004 on information, and the instruments for data collection and interpretation of the results were applied.

The identification of the signalistic variables and academic performance [gender, age and school average] was obtained through the application of a clinical survey. Statistical analysis of the information obtained was performed using Excel software.

The inclusion criterion was limited to all those patients in the group who agreed to be part of the sample and signed the informed consent corresponding to the Mexican official standards [NOM-004-SSA3-2012 for the clinical record and NOM-040-SSA2-2004 on information] prior to their participation in the evaluation. Elimination criteria were discarded for participants who left any of the evaluation tests unfinished, previous neurodegenerative diseases and non-attendance at evaluations, as well as patients who wished to withdraw from the study. According to these criteria, out of a total of 20 patients, 10 were eliminated, leaving a total of 10 valid cases for the investigation.

## Results

The sample studied was made up of 19 participants, who attend the "Geronto-geriatric Center: taking care of those who gave us life", of which 8 correspond to individuals of the female gender and 2 of the male gender [See graph 1].

**Box 1**

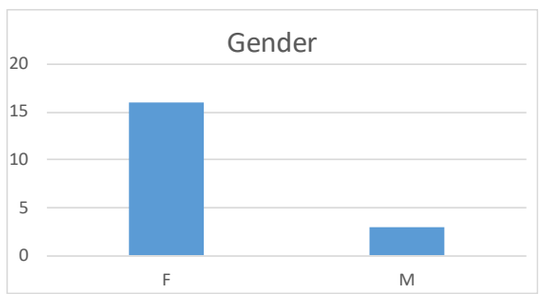


**Figure 1**
Gender of the simple

The mean age of the participants was 78.3 years, with the minimum being 55 years and the maximum being 88 years, with a mode of 71 years and a mean of 82.5, the standard deviation was 10.57. The reliability of the results obtained in the evaluation of the Beck Depression Test was with a Chronbach's alpha of .90 [excellent reliability].

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As for the results obtained from the evaluation of the memory of the subtest of the MINIMENTAL Test, the following results were obtained. [See graph 2].

**Box 2**

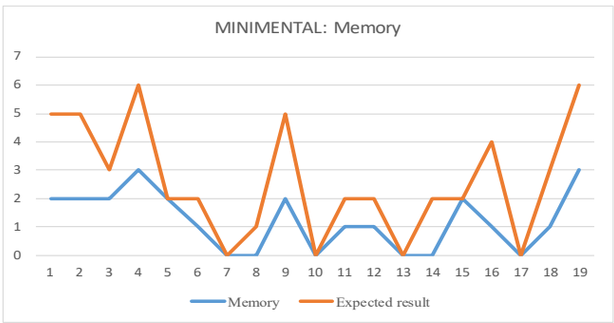


**Figure 2**

MINIMENTAL: Sub test memory

Regarding Pearson's correlational analysis between age and memory in people older than 78 years, it was found that there is a moderate negative correlation of r= -.05 with a reliability of 95%. This means that the older the person is, the lower the memory ability in older adults [See graph 3].

**Box 3**

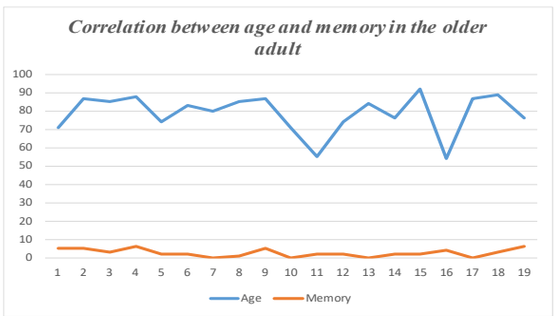


**Figure 3**

Correlation, age and memory.

Therefore, in the present investigation, the alternative hypothesis is accepted with a value of moderate negative significance with an r = -.05 and with a reliability of p = 0.05 which refers that, in a moderate negative way, the older the age, the lower the memory ability in older adults.

It is essential to emphasize that the results obtained in this population cannot be extrapolated, since it is a small sample from a single site. Comparisons with other institutes would be necessary to evaluate the state of cognitive functions more broadly and accurately.

## Conclusion

Identifying the aspects involved in older adults is fundamental, since neuropsychological alterations can be prevented with timely evaluations and with the purpose of improving the quality of life of those who once cared for us.

With aging, there is the consequence of a degenerative process at the organic level, due to the accumulation of molecular errors, including in the brain. Dr. María Sagrario Manzano, a neurology specialist in Madrid at the Infanta Cristina Hospital, mentions that in the aging brain only certain areas involved in executive functions and memory are affected. Throughout this process, neurons decrease in size and others die [Riojas, 2021]

In the case of the limitations of this research, it is recommended to expand the sample by including a larger number of participants from different rehabilitation centers.

Additionally, it is suggested to increase the participation of professionals in human communication therapy during the rehabilitation steps of this addiction. In this way, along with the behavioral work, a therapeutic plan focusing on neurocognitive processes in adults could be evaluated and structured.

## Declarations

### Conflict of interest

*Rosales Sánchez, Andrea.*
*Ontiveros Vargas, Angel Adrián.*
*Santiesteban Contreras, María Tereza.*
*Vázquez Ríos, Elda Raquel.*

We declare that we have no conflicts of interest, either competitive or financial. In addition, we have no interest in personal relationships that could have influenced the article.

In addition, we declare that we have no conflict of interest with the publisher, the members of the editorial and arbitration board or committee.

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## Authors' Contribution

The contribution of each researcher in each of the points developed in this research, was defined based on:

*Rosales-Sánchez, Andrea*: Contributed to the project idea, research method and technique. He supported the design of the field instrument. He carried out the data analysis and systematisation of results, as well as writing the article.

*Ontiveros-Vargas, Angel Adrián*: Carried out the systematisation of the background for the state of the art. She supported the design of the field instrument. She also contributed to the writing of the article.

*Santiesteban-Contreras, María Tereza*: contributed to the research design, the type of research, the approach, the method and the writing of the article.

*Vázquez Ríos, Elda Raquel:* He supported the design of the field instrument.

## Availability of data and materials

The data obtained were previously authorized by the geriatric center called “taking care of those who gave us life” in the city of Durango, as well as from the participants in this research by means of informed consent.

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## Abbreviations

| | |
|---|---|
| APA | American Psychiatric Association |
| DSM-V | Diagnostic and statical manual of mental disorders |
| IMMS | Mexican Institute of Social Security |
| INAPAM | According to the National Institute of Older Adults |
| INEGI | National Institute of Statistics and Geography |
| MMSE | The Mini-Mental State Examination |
| NOM | Mexican Official Standards |
| WHO | World Health Organization |
| NOM | Mexican Official Standards |
| OMS | World Health Organization |

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## References

### Background

Ardila, A., & Rosselli, M. [2007]. NeuropsicologÃa clÃnica. Mexico, D.F.: El Manual Moderno S. A. de C. V. PP. 227

Allevato-Gaviria. [2008]. *Envejecimiento.* Educación Continua.

### Basics

Binotti, P., Spina, D., Barrera, M. L., & Donolo, D. [2009]. Funciones ejecutivas y aprendizaje en el envejecimiento normal. Estimulación cognitiva desde una mirada pedagógica. *Revista Chilena de Neuropsicología.*

Comachione Larrinaga M.A. [1999]. *Psicología evolutiva de la vejez | ISBN 978-987-43-0911-2 - Libro.* Tallerres gráficos de Germán Marcelo Ferrero.

Falqué, L. [2014]. La evidencia científica y el arte de envejecer. Madrid. vol.27, n.1, pp.110-118. ISSN 0798-0752.

Llamuca Quinaloa, J. G., Macías Guamangate, Y. K., Miranda Caisaluisa, J. L., & Tapia Cerda, V. D. [2020]. Test Minimental para el diagnóstico temprano del deterioro cognitivo. Repositorio Digital UIDE: Test Minimental para el diagnóstico temprano del deterioro cognitivo. *Revista de la Universidad Internacional del Ecuador*, 315 - 328.

### Supports

Riojas-Duarte, M. F., & Quintana-López, V. A. [2021]. Influencia de memoria y atención en la calidad de vida de la población geriátrica - Dialnet. *Know and Share Psychology*. ISSN-e 2695-723X, Vol. 2, Nº. 3, 2021, págs. 7-17

Portellano, J. A. [2005]. Portellano Jose Antonio - Introduccion a la Neuropsicologia - Google Drive. España. Mcgraw-hill Interamericana de España S.L. ISBN 9788448198213. PP. 227

Portellano, J. A. [2005]. Portellano Jose Antonio - Introduccion a la Neuropsicologia. Mcgraw-hill Interamericana de España S.L. ISBN 9788448198213. PP. 233.

Rosales-Sánchez, Andrea, Ontiveros-Vargas, Angel Adrián, Santiesteban-Contreras, María Tereza and Vázquez-Ríos, Elda Raquel. [2025]. Correlation between memory ability and age in older adults. ECORFAN Journal-Spain. 12[22]1-8: e11222108. https://doi.org/10.35429/EJS.2025.12.22.1.1.8

Portellano, J. A. [2005]. Portellano Jose Antonio - Introduccion a la Neuropsicologia. España. Mcgraw-hill Interamericana de España S.L. ISBN 9788448198213. PP. 235

Sosa Sosa, M. J. [2016]. Deterioro cognitivo en la vejez. Universidad de la Repúbica Uruguay. Pp. 01-30.

**Differences**

GOB. [2017, Agosto 25]. *Gobierno de Mexico*. Retrieved from Gobierno de Mexico

INEGI. [2021]. *Encuesta Nacional de Bienestar Autorreportado 2021*. Retrieved from Encuesta Nacional de Bienestar Autorreportado 2021

Tello-Rodríguez, Tania, Alarcón, Renato D e Vizcarra-Escobar, Darwin. [2020]. Saúde mental em idosos: principais distúrbios neurocognitivos, afetivos e do sono. Jornal peruano de medicina experimental e saúde pública, 33 [2], 342-350.

Tortosa, J. [2002]. Psicología del envejecimiento - Ediciones Pirámide. Madrid: Editorial pirámide.

**Dsicussions**

Zambrano-Calozuma, P. A., & Estrada-Cherre, J. P. [2020]. Salud mental en el adulto mayor. *Polo del Conocimiento*, Polo del Conocimiento: Revista científico - profesional. 2020, Vol. 5, Nº. 2 - Dialnet ISSN-e 2550-682X, Vol. 5, Nº. 2, 2020, págs. 3-21

Zanín, L., Gil, E., & De Bortoli, M. [2004]. Atención y memoria: su relación con la función tiroidea. Dialnet-Atencion Y Memoria-2004362.pdf *Fundamentos en humanidades*, 31 - 42.

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RENIECYT: 1702902


Rosales-Sánchez, Andrea, Ontiveros-Vargas, Angel Adrián, Santiesteban-Contreras, María Tereza and Vázquez-Ríos, Elda Raquel. [2025]. Correlation between memory ability and age in older adults. ECORFAN Journal-Spain. 12[22]1-8: e11222108.
https://doi.org/10.35429/EJS.2025.12.22.1.1.8

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Article

# The role of the accountant in the digital transformation of accounting through the application of Artificial Intelligence

# El rol del contador en la transformación digital de la contabilidad a través de la aplicación de la Inteligencia Artificial

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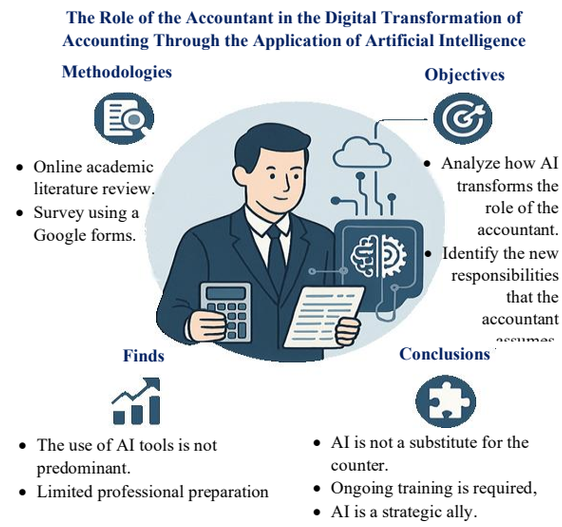
**Abstract**

The study analyzes how artificial intelligence is revolutionizing accounting and the role of the accountant in the digital context. Based on an online literature review, based on up-to-date academic sources, different points of view about the effect of Artificial Intelligence on accounting functions were examined. The objective is to identify the importance of accountants obtaining new digital skills and adjusting to technological platforms. The findings indicate that, although most recognize the advantages of Artificial Intelligence in the efficiency and accuracy of accounting work, there is also limited preparation. It is concluded that constant training is crucial to keep professionals up to date and have a strategic impact on decision-making. Instead of replacing the accountant, Artificial Intelligence emerges as an ally that enhances their skills, and creates new possibilities for the profession.




**Artificial Intelligence, Accounting, Digital Transformation**

**Resumen**

El estudio analiza la manera en que la inteligencia artificial está revolucionando la contabilidad y la función del contador en el contexto digital. Basándose en una revisión bibliográfica en línea, fundamentada en fuentes académicas actualizadas, se examinaron diferentes puntos de vista acerca del efecto de la Inteligencia Artificial en las funciones de contabilidad. El objetivo es identificar la importancia de que los contadores obtengan nuevas competencias digitales y se ajusten a plataformas tecnológicas. Los hallazgos indican que, a pesar de que la mayoría reconoce las ventajas de la Inteligencia Artificial en la eficacia y exactitud del trabajo contable, también se nota una preparación limitada. Se concluye que la formación constante es crucial para mantener profesionales actualizados y tener un impacto estratégico en la toma de decisiones. En lugar de sustituir al contador, la Inteligencia Artificial emerge como un aliado que potencia sus habilidades, y crea nuevas posibilidades para la profesión.


**Inteligencia artificial, Contabilidad, Transformación digital**

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

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## 1. Introduction

Digital transformation is profoundly impacting the accounting sector, with artificial intelligence [AI] playing a leading role in optimizing processes, reducing errors and strengthening data-driven financial decisions. This technology allows automating routine tasks, applying predictive models on financial information and significantly improving fraud and anomaly detection. [Appelbaum, Vasarhelyi, M.A., & Yan, Z, 2022].

Unlike other automated tools, AI has the ability to learn and evolve, making accounting processes increasingly efficient and accurate. In this sense, it does not replace the accountant, but rather expands his role, allowing him to focus on strategic activities such as tax planning, financial analysis and consulting. Far from representing a threat, AI becomes a powerful ally that strengthens the work of the professional accountant. [IFAC, 2021].

These technological innovations require a profound change in the accountant's profile. It is no longer enough to master basic digital tools; a combination of technical knowledge, advanced digital skills and strong professional ethics is required. [Gartner, 2022]. In this new context, the accountant must not only act as a user of the technology, but also as an active player in its implementation, ensuring a transition aligned with the strategic objectives of the organizations.

However, one of the main challenges to achieving a true digital transformation is the lack of preparation. This gap is not limited to the technical aspect, but also encompasses scarce continuing education, limited investment in technology and the persistence of outdated academic programs. As they warn, this situation is aggravated by the fear of being replaced by technology, which prevents taking full advantage of the potential offered by artificial intelligence.

This lack of digital skills is observed even in areas such as accounting, auditing, law and taxation, where, despite advances, there is still a significant gap between technological development and professional training. [IFAC, 2021].

However, those who choose to adapt find that Artificial Intelligence does not represent a threat, but an opportunity to reinvent their role and generate greater value. As Susskind and Susskind [2015] argue, accounting professionals will not disappear, but they will need to evolve to maintain their relevance in an era marked by collaboration between human knowledge and artificial intelligence.

At the organizational level, this resistance to change is particularly visible in small and medium-sized companies, which continue to use traditional methods due to fear, inertia or the perception that emerging technologies are costly, complex or of uncertain benefit. This situation is intensified by the shortage of personnel trained in the implementation of AI, which significantly limits the adoption of innovations in the accounting field.

In the Ecuadorian context, this reality represents a contradiction with the provisions of Article 385 of the Ecuadorian Constitution. [Constitución de la República del Ecuador, 2008], which establishes the State's commitment to promote equitable access to science, technology and innovation as instruments for development and improvement of the quality of life.

Against this backdrop, this study emphasizes a key aspect: the role of the accountant is crucial for the successful integration of artificial intelligence in accounting. It is not only a matter of managing technological systems, but of assuming an active role as an agent of change that articulates accounting knowledge with technology, without neglecting the ethical dimension of their professional practice. When accountants assume this role with leadership, adequate training and strategic vision, many of the obstacles begin to disappear, and investment in technology ceases to be perceived as an expense, becoming a firm commitment to sustainable development.

### 1.1 Objective of the study

The objective of this research is to analyze how digitalization is modifying the functions and skills linked to the professional performance of accountants.

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In a context characterized by technological progress, not only have new tools been incorporated, but also the profile required by different sectors to perform accounting tasks has been reconfigured.

To understand this transformation process, it is crucial to begin with a description of the most relevant technological advances that are impacting accounting practice, with special emphasis on artificial intelligence as a revolutionary element. Therefore, the objective is to analyze how the traditional duties of the accountant are being redefined within the framework of digitalization, in addition to recognizing the new technical, digital and analytical competencies required by the contemporary work environment.

In addition, we seek to examine the degree of preparation and ability of accountants to adapt to the challenges posed by digital transformation. In this study, it is important to investigate the strategic role played by the accountant in corporate decision-making processes, in contexts driven by intelligent technologies.

In this context, artificial intelligence is presented as a main agent of transformation, gradually adopting reiterative operational functions and contributing to increase the accuracy and quality of accounting decision-making processes. [Kokina, J., & Davenport, T. H., 2017].

In addition, the contribution of neuroscience is relevant, as it facilitates the understanding of the cognitive processes involved in learning, adaptation and decision making. This insight is valuable in describing why accountants should enhance skills such as critical reasoning, cognitive adaptability and emotional intelligence.

These skills become essential in a work environment increasingly marked by the fast pace of technological innovation, where the human gains a new role. Nowadays, the practice of public accounting goes beyond the pure handling of normative and quantitative elements. The increasing automation of technical tasks requires accounting experts to acquire interpersonal, communication and strategic thinking skills, which are becoming key factors in professional performance.

Modern accounting is not restricted to compliance with tax or regulatory responsibilities, but also focuses on active participation in important decision-making processes for organizations, consolidating bonds of trust and offering a global perspective that automated systems are not yet able to emulate.

Therefore, preparing for the future means not only renewing technical knowledge, but also fostering personal skills that facilitate building meaningful relationships, generating added value and practicing the profession holistically and ethically.

In this context, although technical skills continue to be the mainstay of accounting practice, the real professional trait lies in human skills: ethics, empathy, clarity in communication and critical judgment. It is this combination of technical knowledge and soft skills that makes the accountant an essential professional in today's landscape.

## 2. Methodology

This analysis opted for a combined method, merging qualitative and quantitative instruments to gain a deeper understanding of the role that the accountant is playing in the process of digitalization of accounting, particularly with the inclusion of AI.

On the one hand, a bibliographic analysis was conducted, based on modern digital sources such as scientific publications, digital books and specialized research. This phase made it possible to understand the current status of the academic debate on Artificial Intelligence in areas closely linked to accounting, such as auditing, finance, law and taxation.

The second stage, of a quantitative nature, an online survey was developed and implemented, distributed with a Google form. The questionnaire was completed by accounting experts, which facilitated the collection of authentic views and experiences of the work environment. The questionnaire included 10 questions, focusing on two key elements of the study:

Variable 1:

Level of knowledge and use of artificial intelligence by accountants.

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Variable 2:

Perception of the impact of AI on their professional role.

The results achieved were examined through descriptive statistics [such as frequencies and percentages], which facilitated the identification of patterns and trends about how accountants are approaching technological transformations and how empowered they perceive themselves in the face of the progress of artificial intelligence in their field of work.

In the accounting field, artificial intelligence is automating monotonous tasks, enabling accountants to focus on more strategic and analytical functions, demanding new competencies such as data analysis and interpretation [Appelbaum et al., 2017].

In the field of auditing, artificial intelligence is revolutionizing financial valuation by enabling more accurate identification of anomalies and fraud, enabling constant and proactive monitoring. [Yoon, Hoogduin y Zhang, 2015].

In the economic sector, artificial intelligence enhances analysis, risk assessment and investment management by handling data in real time and creating predictive models that improve decisions and boost efficiency and profitability.

In business and taxation, Artificial Intelligence automates tasks such as contract review and regulatory analysis, optimizing the interpretation of the law, although it raises questions about entrusting legal judgments to algorithms. [Surden, 2014].

In the tax field, the implementation of intelligent technologies is optimizing both taxpayer compliance procedures and the supervision procedures of public entities.

Studies such as the one conducted by Beretta, Demartini and Trucco [2020] show that algorithms are able to identify inconsistencies in tax returns, simplify digital audits and foresee tax risk behaviors. However, this technological progress requires continuous updating of the accounting expert's skills.

Research such as that conducted by Beretta, Demartini and Trucco [2020] evidences how algorithms can identify irregularities in returns, conduct digital audits and anticipate risky tax behaviors.

Undoubtedly, this increases the efficiency of the tax system, although it also requires constant updating of the accountant's skills to face new regulatory and technological challenges.

In all situations, preference was given to current, reliable and academically backed documents, which facilitated the construction of a complete perspective of how artificial intelligence is revolutionizing the accounting profession from various perspectives. This research modality not only facilitated the grouping of different points of view, whether theoretical or practical, but also made it possible to analyze trends endorsed by the global scientific community.

The literature review [in exploratory research such as this] is essential for understanding the phenomenon under analysis, as it facilitates the formation of links between previous studies and the present context. [Hernández-Sampieri, Fernández-Collado & Baptista-Lucio, 2014].

## 3. Results

This analysis adopted a combined methodology, merging a literature review with data collection through an online survey of experts in the accounting field. The mix of methods made it possible to understand both the theoretical-academic context and the perceptions and practical experiences of the experts.

### 3.1 Results by variable

**Variable 1**: Level of knowledge and use of AI.

A question related to this variable was:

**Box 1**

**Table 1**

Do you currently use artificial intelligence tools in your accounting work?

| Age | Yes | No | I do not know / I am not sure[a]. |
|---|---|---|---|
| 20 to 30 | 3 | 21 | 10 |
| 31 to 40 | 2 | 35 | 18 |
| 41 to 50 | 0 | 47 | 4 |

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## Box 2

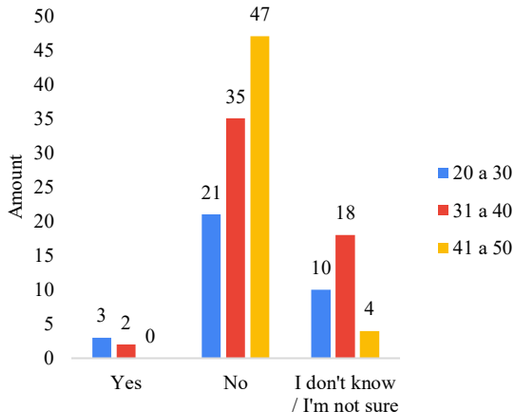


**Figure 1**

Do you currently use artificial intelligence tools in your accounting work?

**Principal findings:**

A considerable percentage of the participants in the survey expressed a general or average understanding of Artificial Intelligence, although not all of them implement it directly in their professional work.

The use of Artificial Intelligence tools is not yet predominant, indicating a gap between theoretical knowledge and its practical application.

The majority indicated that they had not obtained specific education in Artificial Intelligence during their university studies or job training, which underlines the urgency of a professional update.

**Variable 2**: Perception of the impact of AI on the accountant's professional role.

A question associated with this variable was:

## Box 3

**Table 2**

Do you consider that AI is transforming the accountant's professional practice?

| Age | Yes, significantly | Yes, but moderately | Not yet, but will soon | It is not transforming the profession | I do not have a formed opinion |
|---|---|---|---|---|---|
| 20 a 30 | 13 | 4 | 17 | 0 | 11 |
| 31 a 40 | 17 | 5 | 15 | 0 | 12 |
| 41 a 50 | 16 | 6 | 13 | 0 | 11 |

## Box 4

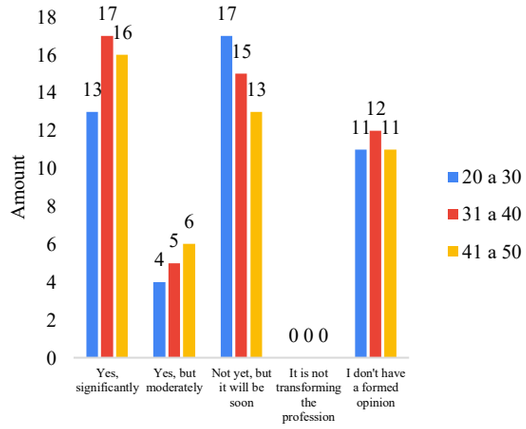


**Figure 2**

Do you consider that AI is transforming the accountant's professional practice?

**Principal findings:**

There is a very common perception that Artificial Intelligence will not fully replace the accountant, but will be an additional resource. It is also clear that the education provided by universities is considered insufficient, indicating a gap between academic education and the demands of the labor market.

Numerous participants in the survey expressed that the responsibility for failures made by Artificial Intelligence systems should be shared between developers, users and organizations.

In the short and medium term, a transformation of the accountant's role towards a more analytical, strategic profile focused on informed decision making is anticipated.

Although some experts consider themselves prepared, many admit that they require more training to face the technological challenges of the digital era.

### 3.2 Analysis overview

Based on data collected through the survey, a favorable attitude towards the adoption of technologies was observed, although this is intensified by an uncertainty resulting from poor preparation. This finding underscores the imperative need to review and renew both university-level educational programs and continuing education projects to include digital skills and knowledge in artificial intelligence [AI].

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The current implementation of AI-based technologies by accounting experts is still in its infancy, indicating that technology adoption in this sector is still at an early stage of evolution.

### 3.3 Interpretation of data

The data shows that AI is bringing about a relevant change in accounting practice, although its effective implementation depends largely on the professional's training and ability to adapt. Not only do accountants need to understand the operational elements of AI; they must also develop critical and ethical competencies that will enable them to properly oversee its implementation.

This analysis highlights a disparity between the rapid progress of technology and the current training of those practicing the profession, which poses a significant challenge for both educational institutions and accounting regulatory authorities. Digitalization is not an ephemeral phenomenon, but a structural transformation that is significantly changing the dynamics of organizations. It is a cross-cutting combination of digital solutions focused on improving processes, increasing efficiency in operations and generating added value.

In the field of accounting, this change has been driven by the emergence of technologies such as Big Data analysis, cloud computing and, especially, artificial intelligence.

When AI is mentioned, it refers to the ability of technological systems to replicate some cognitive functions characteristic of human beings, such as learning, data processing, problem solving and decision making.

In the field of accounting, this involves the application of resources such as machine learning, natural language processing and specialized systems. These solutions make it possible to automate reiterative processes, identify anomalies or potential scams, and examine large volumes of data more quickly and accurately than conventional procedures.

This scenario is drastically changing the traditional perspective of accounting. The task is no longer restricted solely to the implementation of accounting rules and principles, but requires a more strategic perspective, focused on the analysis and projection of future situations.

Today, the accounting expert has extended his or her role beyond the pure recording of operations, becoming a crucial agent in the interpretation of real-time data and in assisting in decision-making within the entity. Faced with this new scenario, the accountant's profile is built on three fundamental dimensions:

**3.3.1 Technical dimension.** - Detailed understanding of accounting principles, current regulations and accuracy in financial records remains essential.

**3.3.2 Technological dimension. -** Functional management of digital tools and intelligent systems, which are transforming working methods in accounting practice, is essential.

**3.3.3 Ethical dimension. -** A solid commitment to the responsible and clear use of Artificial Intelligence is necessary, preserving respect for the principles of privacy, professional integrity and ethics in decision making.

This analytical approach facilitates understanding how artificial intelligence is changing the professional profile of the accountant and what skills he/she must cultivate to lead this transformation process efficiently and responsibly.

### 3.4 Evolution of the accountant's professional profile

Historically, the accountant has been recognized as the person responsible for financial control in entities, with responsibilities focused on manual recording of transactions, creation of accounting records, reconciliation of bank accounts and reporting. While these tasks remain critical, the work environment has undergone a significant transformation with the implementation of emerging technologies.

The incorporation of solutions such as automated accounting software, enterprise resource planning [ERP] systems and innovations based on artificial intelligence [AI] has transformed the skills expected of the accountant. No longer restricted to recording data, he or she is expected to be able to analyze complex financial information, provide strategic guidance and forecast economic situations through the use of predictive tools.

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This transformation has redefined the accounting practice, giving it a more analytical, strategic and information-driven decision-making perspective. Some of the most significant changes include:

From recorder to analyst: AI gradually automates day-to-day tasks, allowing the accountant to focus on understanding results, identifying patterns and formulating projections.

From strategy compliance: The accounting expert, in addition to fulfilling legal responsibilities, is actively involved in financial planning and optimizing the use of resources.

From technical to digital: The management of technological platforms and intelligent tools has become a crucial skill for today's accountant.

From the personal to the community: Increasingly, accounting practice is carried out in multidisciplinary contexts, with specialists in data science, information technology and business analytics.

Rather than diminishing in importance, the accountant is taking on a more strategic and cross-cutting role in organizations. Their ability to adapt, constant education and the acquisition of new competencies are becoming crucial elements to remain active in a constantly changing environment.

### 3.5 Current implementations of Artificial Intelligence in Accounting

AI no longer represents an encouraging future, but a tool that is palpably revolutionizing contemporary accounting practice. Through its implementation, financial processes are becoming faster, more accurate and more efficient.

Among the most notable implementations are:

Automating daily processes: activities such as invoice classification, bank reconciliations and reporting are managed by intelligent systems, allowing the accountant to focus on tasks of greater complexity and significantly reduce the incidence of human error.

Machine learning-based financial projections: AI has the ability to examine large amounts of historical data to detect patterns and formulate financial projections, simplifying the organization of cash flows and more accurate decision making.

Assisted auditing and early anomaly identification: Some algorithms make it easier to identify atypical behavior or inconsistencies in accounting records, improving fraud identification and increasing audit accuracy.

Natural Language Processing [NLP]: This technology allows the study of unstructured documents, such as agreements or emails, obtaining relevant information for accounting procedures.

Digital assistants and chatbots: Several companies have implemented solutions that facilitate the response to common queries, the creation of real-time reports and immediate access to financial information through conversational interfaces.

Automated regulatory updates: Artificial Intelligence also has the ability to monitor changes in tax and accounting regulations, ensuring that returns and reports conform to current regulations.

These features not only increase efficiency, but also enable accountants to take on a more strategic role, focusing on analysis, data interpretation and decision support for the organization.

### 3.6 Challenges and possibilities in the age of Artificial Intelligence

The use of artificial intelligence in the accounting field is an important opportunity to update the profession, but it also presents several challenges that demand preparation, readiness for change and a vision for the future.

#### 3.6.1 Main Challenges

Lack of digital skills: Many experts still lack the technical competencies required to handle AI-based tools, which restricts their effective application.

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Resistance to transformation: The misconception that artificial intelligence could replace the accountant generates many fears, hindering the technology adoption process. However, it is important to emphasize that AI is not intended to replace the professional accountant, but to enhance his or her capabilities, allowing him or her to focus on strategic tasks and decision making with human judgment.

Ethical and legal issues: The implementation of algorithms raises questions about transparency, the safeguarding of personal information and the distribution of responsibilities in the event of automated failures. For this reason, clear and ethical regulations are needed to guide these practices.

### 3.6.2 Emerging opportunities

Greater efficiency and reduction of errors: The automation of tasks considerably reduces the risk of errors and increases the quality of the work, facilitating a more effective accounting administration.

Transformation of the professional profile: Accountants, instead of becoming outdated, have the possibility of moving towards more strategic roles, based on analysis and specialized consulting.

Transformation of the professional profile: Accountants, instead of becoming old-fashioned, have the possibility of moving towards more strategic roles, based on analysis and specialized consulting.

Protagonism in the digital transformation: Accountants trained in technology have the ability to lead innovation processes in organizations, establishing themselves as protagonists of the transformation..

## 4. Conclusions y recommendations

### Conclusiones

Technological progress, especially the advance of artificial intelligence, has radically transformed the accounting process. Actions that previously required manual intervention and were performed systematically can now be automated, enabling the accounting expert to devote his or her time to tasks of greater strategic and analytical relevance.

The accountant's role has progressed beyond conventional duties such as documenting transactions or complying with regulations. Today, it is anticipated that they will become actively involved in data analysis, valuable knowledge creation and strategic decision making with the help of technological tools.

Today, total control of accounting principles is not enough. Technological skills, the ability to sift through large amounts of information, and interpersonal skills such as ethics, effective communication and complicated problem solving are also needed.

Despite attempts by accountants to adjust to the new digital environment, there are still significant differences in terms of access to training and technological resources. This restricts the full integration of innovative tools in professional practice.

The accountant stands out as a crucial participant in the organization's decision making, due to his specialized knowledge and his ability to efficiently employ intelligent technologies. This mix gives them a significant role in the elaboration of business strategies.

The progress of digital transformation in accounting is not based solely on the adoption of cutting-edge technologies. Its real triumph is based on the attitude and willingness of the experts leading this transformation. It is the accountant's ability to adjust, acquire knowledge and lead that will define his or her importance in this new era. In this context, artificial intelligence does not replace, but enhances the value that humans can provide.

### Recommendations

It is vital for accounting experts to keep abreast of the use of emerging technologies. It is essential to acquire knowledge about the operation and practical use of these tools in order to maintain their importance in the work environment and provide considerable added value. Both educational institutions and entities must modernize their methods in relation to the accountant's profile. It is essential to educate and attract professionals with a more complete perspective, able to play more strategic roles in organizations.

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It is advisable to invest in training processes that merge the use of digital technologies with the strengthening of soft skills. This mix of technical skills and human skills is essential to face the challenges of the current labor market.

It is crucial to create opportunities for constant updating. Companies, professional unions and educational institutions must take a proactive role in the training of accounting staff, fostering a culture of constant learning.

It is necessary to encourage the accountant's involvement in strategic areas of the company. Their holistic perspective and career path can contribute significantly beyond the economic, enhancing the decision-making process in various sectors of the organization.

## Declarations

### Conflict of interest

The authors declare that there is no conflict of interest related to the preparation and publication of this scientific article. They have no financial interests or personal relationships that could have influenced the development, content, or results of the study presented.

### Authors' contribution

This article was prepared in collaboration between Loayza Pereira, Walter Arturo, who developed the methodological framework, data analysis and recommendations; and Dr. Herrera Freire, Alexander Geovanny, who formulated the theoretical-critical analysis, interpreted the results from a strategic perspective and wrote the academic conclusions. Both authors approved the final version of the article.

*Loayza-Pereira, Walter Arturo*: Responsible for Introduction, Objective of the study, Methodology, Variable 1: Level of knowledge and use of AI, Descriptive results and data analysis, Current implementations of Artificial Intelligence in accounting, Recommendations.

The author Loayza Pereira, Walter Arturo, contributed to the development of this article by preparing the introductory framework, formulating the general objective and structuring the methodology used.

He also led the collection and analysis of data on the current use of artificial intelligence in the accounting field, with special emphasis on its practical application, as well as the development of strategic recommendations for strengthening the professional profile of the accountant.

Herrera-Freire, Alexander Geovanny: Responsible for Review of the theoretical framework [AI, digital accounting, digital transformation, professional ethics], Variable 2: Perception of the impact of AI on the professional role of the accountant, Interpretative and prospective analysis of the accountant's profile, Challenges and possibilities in the era of AI, Conclusions, Critical and academic view on the strategic role of the accountant.

Dr. Herrera Freire, Alexander Geovanny, has contributed with the theoretical and analytical development of the article, providing a critical review on the impact of artificial intelligence on the accounting profession. He also elaborated the analysis of the change in the accountant's profile, identifying the main ethical, professional and technological challenges, and actively collaborated in the construction of the conclusions that support the need for strategic adaptation in the digital environment.

## Funding

The research did not receive any funding.

## Abbreviations

| | |
|---|---|
| IA | Intelligence Artificial |
| IFAC | International Federation of Accountants |
| ERP | Enterprise Resource Planning |
| NLP | Natural Language Processing |
| Big Data | Conjunto de datos masivos o análisis de datos en masa [No es una sigla tradicional, pero se considera una abreviatura común] |

## 5. References

### 5.1 Antecedents

References that provide historical or foundational context to the accountant's role in relation to AI or emerging technologies.

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RENIECYT: 1702902

Appelbaum, D. [2016]. Securing big data provenance for auditors. The big data provenance black box as reliable evidence. Journal of Emerging Technologies in Accounting, 13[1], 13–17.

Cooper, D. J., Ezzamel, M., & Qu, S. Q. [2019]. Popularizing a management accounting idea: The case of the balanced scorecard. Contemporary Accounting Research, 36[3], 1296–1331.

Moll, J., & Yigitbasioglu, O. [2019]. The role of internet-related technologies in shaping the work of accountants: New directions for accounting research. The British Accounting Review, 51[6], 100833.

### 5.2 Basics

References that explain in general terms what AI is and how it is applied in accounting or auditing.

Almeida-Blacio, J. H., Naranjo-Armijo, F. G., Maldonado-Pazmiño, H. O., & Rodríguez-Lara, A. D. [2024]. Inteligencia artificial como mecanismo eficiente de la contabilidad. Código Científico Revista de Investigación.

Alzate Serna, D., Londoño Blandón, C., Ortiz Montoya, J. F., & Quintero Patiño, D. [2023]. El contador público y la inteligencia artificial: Un paso hacia la innovación. Ágora Revista Virtual de Estudiantes, [16], 33–55.

Kokina, J., & Davenport, T. H. [2017]. The emergence of artificial intelligence: How automation is changing auditing. Journal of Emerging Technologies in Accounting, 14[1], 115–122.

Martínez, C., & Salvador, M. [2024]. La influencia de la inteligencia artificial en la contabilidad. Ciencia Latina Revista Científica Multidisciplinar, 8[6].

Richins, G., Stapleton, A., Stratopoulos, T. C., & Wong, C. [2017]. Big data analytics: Opportunity or threat for the accounting profession? Journal of Information Systems, 31[3], 63–79.

### 5.3 Soporte

References that delve into the benefits, tools, models, or case studies where AI supports accounting work.

De La Hoz Suárez, B. A., Luna Moran, I. F., Manjarres Tete, A. E., & De La Hoz Suárez, A. I. [2024]. Inteligencia artificial como estrategia para gestionar los procesos de auditoría financiera. Revista Estrategia Organizacional, 7[1], 45–60.

García-Vera, Y. S., Juca-Maldonado, F. X., & Torres-Gallegos, V. [2023]. Automatización de procesos contables mediante inteligencia artificial: Oportunidades y desafíos para pequeños empresarios ecuatorianos. Revista Transdisciplinaria de Estudios Sociales y Tecnológicos, 3[3], 68–74.

Juca Maldonado, F., & Carchi Arias, K. L. [2024]. Transformación contable: El impacto de la inteligencia artificial en la eficiencia de los procesos de análisis de costos. Revista Científica Sapientia Technological.

León Osorio, M. C., & Obando Ricardo, K. D. [2023]. Automatización de tareas contables [Trabajo de grado, Corporación Universitaria Remington]. Repositorio Institucional UNIREMINGTON.

Sun, T., & Vasarhelyi, M. A. [2018]. Deep learning and the future of auditing: How technology could transform audit. Journal of Emerging Technologies in Accounting, 15[1], 1–20.

Torres Rosero, A. A., & Clavijo-Cáceres, J. L. [2025]. Impacto de la inteligencia artificial en la contabilidad y la ética empresarial. Código Científico Revista de Investigación.

### 5.4 Differences

References that contrast the before and after application of AI in accounting or show changes in the professional role of the accountant.

Delgado, V. E., & Reinoso, A. L. [2024]. Desafíos en la integración de la inteligencia artificial en la contabilidad pública. Ágora Revista Virtual de Estudiantes, [18], 180–215.

Morel Marín, D. S., Insfrán Cibils, M., & Chung, C. K. K. [2025]. Transformaciones y retos de la profesión contable en la era de la inteligencia artificial. Revista de Investigación Científica y Tecnológica, 8[2], 1–20.

ISSN: 2444-3204
RENIECYT: 1702902


Loayza-Pereira, Walter Arturo & Herrera-Freire, Alexander Geovanny. [2025]. The role of the accountant in the digital transformation of accounting through the application of Artificial Intelligence. ECORFAN Journal-Spain. 12[22]1-11: e21222111.
https://doi.org/10.35429/EJS.2025.12.22.2.1.11

Pilay-Asunción, D. D., & Marcos-Rodríguez, K. L. [2025]. Los desafíos tecnológicos y el rol del contador en la automatización de procesos contables. Journal of Education and Social Sciences Research [JESSR].

Sanabria Tarazona, N., & Barajas Picón, J. P. [2024]. Exploración de la aplicación de la inteligencia artificial en los procesos contables comprendiendo su influencia en la eficiencia, precisión y toma de decisiones en la contabilidad empresarial. Repositorio UTS.

### 5.5 Discussions

References that address debates, ethical dilemmas, or controversial proposals regarding the use of AI in accounting.

Acosta Benítez, W. R., Gamarra Cardozo, M. D. J., & Villalba Chamorro, A. A. [2024]. El rol del contador frente a las nuevas tecnologías. Ciencia Latina Revista Científica Multidisciplinar.

Chicaiza Ortiz, W. [2023]. La inteligencia artificial en auditoría: Riesgos éticos y requisitos normativos. ECiencia, 1[3], 41–58.

Kanaparthi, V. [2024]. Exploring the impact of blockchain, AI, and ML on financial accounting efficiency and transformation. arXiv preprint.

Massoud, H. [2024]. Inteligencia artificial y auditorías basadas en datos no estructurados. Entre Líneas, 5[2], 60–75.

Munoko, I., Brown-Liburd, H., & Vasarhelyi, M. A. [2020]. The ethical implications of using artificial intelligence in auditing. Journal of Business Ethics, 167[2], 209–234.

Raji, I. D., Smart, A., White, R. N., Mitchell, M., Gebru, T., Hutchinson, B., Smith-Loud, J., Theron, D., & Barnes, P. [2020]. Closing the AI accountability gap: Defining an end-to-end framework for internal algorithmic auditing. arXiv preprint.

Salazar-Rebaza, J. A., & colaboradores. [2024]. La inteligencia artificial en contabilidad desde la percepción de los contadores. Revista de Ciencias Contables.

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RENIECYT: 1702902


Loayza-Pereira, Walter Arturo & Herrera-Freire, Alexander Geovanny. [2025]. The role of the accountant in the digital transformation of accounting through the application of Artificial Intelligence. ECORFAN Journal-Spain. 12[22]1-11: e21222111.
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Article

# Virtual reality for inclusion in community health

# Realidad virtual para la inclusión en salud comunitaria

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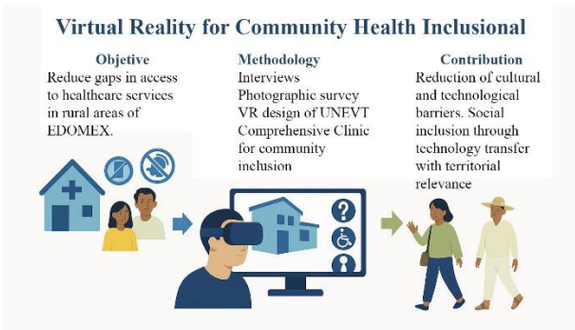
**Abstract**

Design of a virtual tour as a tool for inclusion in community healthcare, developed for the Comprehensive University Clinic of UNEVT, within the framework of the TIAPYC Node. The proposal integrates technological innovation and territorial relevance through the use of 360° photography, institutional narrative, and accessibility strategies. The study is based on the recognition of inequalities in access to healthcare services in rural areas of the State of Mexico and draws on concepts such as digital literacy and emerging technologies with an educational focus. It also considers previous experiences with the use of virtual reality in clinical settings, although the present case has not yet been evaluated with users. Furthermore, the importance of technology transfer models with social impact is discussed. The virtual tour is projected as a replicable tool that strengthens the relationship between the university and the community and promotes digital and territorial inclusion.




**Virtual Reality, Technology Transfer, Community Health**

**Resumen**

Diseño de un recorrido virtual como herramienta de inclusión en salud comunitaria, desarrollado para la Clínica Integral Universitaria de la UNEVT, en el marco del Nodo TIAPYC. La propuesta articula innovación tecnológica y pertinencia territorial mediante el uso de fotografía 360°, narrativa institucional y estrategias de accesibilidad. El estudio parte del reconocimiento de las desigualdades en el acceso a servicios de salud en zonas rurales del Estado de México y se apoya en conceptos como alfabetización digital y tecnologías emergentes con enfoque educativo. También se consideran experiencias previas del uso de la realidad virtual en entornos clínicos, aunque el presente caso aún no ha sido evaluado con usuarios. Además, se discute la importancia de los modelos de transferencia tecnológica con impacto social. El recorrido virtual se proyecta como una herramienta replicable que fortalece la relación entre universidad y comunidad y promueve la inclusión digital y territorial.


**Realidad Virtual, Transferencia Tecnológica, Salud Comunitaria**

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

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## Introduction

Equitable access to health services is a fundamental human right. However, in many regions of the State of Mexico—especially in rural and peri-urban areas—significant gaps persist in the use and utilisation of these services. Among the factors that limit effective access are misinformation, geographical distance, lack of trust in medical institutions, and low digital literacy [Arteaga-Yánez, Mocha-Román, Vélez-Castillo & Zambrano-Requelme, 2025]. These elements, combined with contexts of structural poverty and cultural diversity, exacerbate inequalities in community health.

Against this backdrop, emerging technologies, particularly virtual reality [VR], offer a strategic opportunity to improve the relationship between health institutions and the communities they serve. VR allows the creation of immersive environments accessible from any device with an internet connection, providing users with a visual and spatial experience that facilitates understanding and symbolic appropriation of institutional places before visiting them in person [Yañez-Santaolalla, Gómez-Dantés, Piña-Pozas, Lloyd, Betanzos-Reyes & Arenas-Monreal, 2025].

In this context, the State University of the Toluca Valley [UNEVT], in collaboration with the TIAPYC Node [Technology, Innovation, Productive Autonomy and Consumption], accredited by the National Institute of Social Economy [INAES], is promoting the design of an interactive virtual tour of its Comprehensive University Clinic.

This initiative is part of a broader strategy of digital transformation and social inclusion that links university education with territorial development. The virtual tour is conceived as an educational and social tool aimed at reducing cultural, cognitive and technological barriers, while strengthening links between the university and the communities that use its services. The project is based on a vision of technology transfer with regional relevance, where the knowledge generated in the classroom is converted into concrete solutions to improve people's quality of life.

This article aims to describe the design process of the virtual tour, detail the pedagogical and technological foundations that support it, and reflect on its potential as a training tool.

Although the resource is still in the development phase and has not been evaluated by end users, it is projected as a replicable and scalable model, whose next application is planned at the Intercultural University of the State of Mexico [UIEM], adapting it to contexts with cultural and linguistic diversity.

## Theoretical foundations

The design and implementation of digital technologies with a social focus requires conceptual support from multiple perspectives: technological, educational and community. In this sense, virtual reality [VR] has gained relevance in recent decades as a tool with high educational potential, due to its ability to simulate environments, facilitate discovery learning and generate meaningful experiences. Its use has spread to various fields, including health, architecture, tourism, education, and professional training. VR allows the creation of immersive environments accessible from any device... facilitating understanding and symbolic appropriation [Yañez-Santaolalla, Gómez-Dantés, Piña-Pozas, Lloyd, Betanzos-Reyes & Arenas-Monreal, 2025].

In the field of community health, VR has been used to recreate hospital tours, teach preventive practices, and train medical staff in complex procedures. For patients, the ability to virtually explore a clinical space before visiting it helps to reduce fear, familiarise them with the services and build trust in the care process [López-Isola, F. S., & Íncera-Fernández, D. 2025]. In communities with low exposure to technology, these experiences also help to introduce the use of digital tools in an intuitive way.

On the other hand, the concept of digital literacy plays a central role in this project. According to UNESCO [2022], digital literacy is not limited to the technical use of devices, but involves the ability to access, understand, use and transform digital information into useful knowledge. From this perspective, the virtual tour is not only an informative tool, but also a means of digital inclusion that enables the population to develop basic skills in navigation, interpretation of multimedia content and informed decision-making regarding their health.

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The approach of this project is also aligned with the principles of socially meaningful technology transfer, understood as the process by which knowledge and products developed at the university are transferred to the environment to solve specific needs. Through the TIAPYC Node, this transfer is articulated under a model of territorial innovation, where the participation of community actors and the local relevance of knowledge are fundamental elements.

Likewise, the project is part of university-community outreach strategies promoted by public policies for social inclusion, regional development and the knowledge economy. The participatory methodology adopted for the design of the tour reinforces this link, as it actively involves institutional staff and students in the joint construction of technological solutions with a direct impact on the territory.

**Design methodology**

The methodology used to design the virtual tour followed a mixed and participatory approach, combining elements of qualitative research, instructional design and technological development. This approach made it possible to build a meaningful tool for both the user community and the educational actors involved [Kouijzer, M. M. T. E., Kip, H., Bouman, Y. H. A., & Kelders, S. M. 2023].

**Contextual analysis and narrative design**

As a first phase, semi-structured interviews were conducted with the head of the UNEVT Comprehensive University Clinic and the university rector. These interviews provided key information about the functioning of the medical service, relevant spaces and the institutional vision of community outreach. Based on these inputs, a storyboard was developed to structure the tour, define the visual narrative and plan the navigation points.

***Note:*** *The interviews were conducted in June 2025 and documented as part of the narrative design process for the tour. Internal project records are available for methodological traceability purposes.*

**Content planning**

The essential spaces of the clinic [reception, consultation rooms, pharmacy, common areas] were identified and organised into a logical sequence. The key messages to be conveyed by the tour were also defined.

**Content capture**

360° photography technology was used to document the spaces, ensuring sharpness, clear visual orientation, and institutional neutrality. Technical aspects such as lighting, angle, and visual cleanliness were carefully considered.

**Technological integration**

The images were integrated into an accessible web platform, adapted for mobile and desktop browsers. An intuitive interface was designed, with interactive elements that allow for smooth navigation through the different spaces.

**Accessibility and cultural adaptation**

Although the tour was designed in Spanish, its translation into indigenous languages is being considered for future replicas. In addition, audio guides and subtitles are planned. The entire tour was designed with diverse audiences in mind, with special attention to digital inclusion.

**Box 1**


**Figure 1**

First version of the virtual tour of the integral university clinic

*Source: Own elaboration*

**Results**

Although the virtual tour has not yet been formally evaluated with end users, the design and pedagogical planning process has allowed us to anticipate a series of positive impacts, both for the community and for the university environment.

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**Reduction of access barriers**

It is hoped that previewing the clinic's spaces and services will reduce fear, uncertainty, or cultural prejudices that may limit the use of medical services. This tool could be especially useful for older adults, indigenous populations, or individuals with low functional or digital literacy.

**Appropriation of the university space**

The tour promotes a sense of belonging between the community and the university by representing the clinic as an accessible, reliable place that serves the collective well-being.

This symbolic appropriation can strengthen institutional identity and foster university-community collaboration.

**Development of student skills**

The project has been a learning experience for the students involved, who have been able to apply technical knowledge of web design, audiovisual production and interdisciplinary work. They have also reflected on the social use of technology and their role as agents of change in territorial innovation processes.

**Scalability and intercultural adaptation**

One of the main objectives is to adapt the tour model for implementation at the UIEM Intercultural Health Clinic. The lessons learned during the design phase will be used to incorporate linguistic criteria, cultural narratives and local knowledge that respond to the worldview of the indigenous peoples of the State of Mexico.

**Discussions**

The design of the virtual tour has been an opportunity to reflect on the relationship between technological innovation, social inclusion and university education. Although there are still no empirical results from the community's use of the tour, the design phase allowed us to identify good practices, needs and opportunities for improvement.

From an academic point of view, the process made it possible to identify how projects with a social purpose can be integrated as pedagogical strategies in curricula, promoting active learning, teamwork and commitment to the environment [Hoffman et al., 2023]. The teaching of web design and emerging technologies was enriched by a methodology based on real problems, linking professional practice with social transformation.

From an institutional perspective, the course can be considered a tool for guidance, service promotion and strengthening university identity [INAES, 2023]. Its digital dissemination allows it to reach populations that do not have direct access to the facilities and offers a bridge between the physical and virtual worlds.

Finally, future evaluation with users will be essential to validate the effectiveness of the course.

Finally, future evaluation with users will be essential to validate the effectiveness of the tour. This follow-up research is expected to focus on the browsing experience, understanding of the services offered, and perception of trust.

The findings will guide the continuous improvement of the tool and its replicability in intercultural contexts.

**Conclusions and future work**

The development of the virtual tour has made it possible to combine technological innovation with community engagement, generating both educational and institutional benefits. Beyond the final product, the process has been formative, reflective and proactive.

Among the main contributions are:

- The application of virtual reality as an educational and social strategy.
- The creation of a replicable, scalable and low-cost tool.
- The active participation of students in real projects with social impact.
- The integration of the university into territorial outreach processes through technological solutions.

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Future lines of work include:

- Validating the tour with users through pilot tests, using qualitative and quantitative methods.
- Incorporating universal accessibility elements, including indigenous languages, visual contrast, screen reading and audio guides.
- Documenting institutional learning and publishing the experience as an academic reference.
- Adapt and implement the model at the UIEM Intercultural Clinic, in collaboration with community actors and with a focus on cultural relevance.

## Declarations

### Conflict of interest

The authors declare that they have no conflicts of interest. They have no competing financial interests or known personal relationships that could have influenced the content of the article presented in this document.

### Contribution of the authors

*Flores-Azcanio, Nancy Patricia*: Led the technological and pedagogical planning of the project. Conducted the photographic survey and interviews with the main actors of the clinic. Coordinated the design, development and implementation of the virtual tour, and was in charge of the writing and main editing of the article.

*González-Hernández, Jorge Daniel*: Participated in gathering information through institutional interviews. Collaborated in defining content and the overall structure of the tour.

*Echevarria-Chan, Ivonne*: Actively participated in designing the storyboard for the virtual tour, contributing to the narrative and visual construction. Also supported the organisation of content and review of the manuscript.

### Availability of data and materials

Survey_Students.xlsx
Survey_ClinicUsers.xlsx
Interviews_Doctors.xlsx

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### Abbreviations

| | |
|---|---|
| CSS | Cascading Style Sheets |
| DOI | Digital Object Identifier |
| HTML | HyperText Markup Language |
| INAES | National Institute of Social Economy. |
| NODESS | Nodes for the Promotion of the Social and Solidarity Economy. |
| RV | Virtual Defendant. |
| TIAPYC | Technology and Innovation in Productive and Consumer |
| UIEM | Autonomy<br>Intercultural University of the State of Mexico |
| UNEVT | Toluca Valley State University |

## References

### Background

Arteaga-Yánez, Y. L., Mocha-Román, V., Vélez-Castillo, A. E., & Zambrano-Requelme, J. [2025]. Educación continua del profesional de salud para la prevención de enfermedades crónicas no transmisibles en comunidades vulnerables. Revista Mexicana de Investigación e Intervención Educativa, 4[S1], 241–248.

### Basic concepts

Yañez-Santaolalla, J., Gómez-Dantés, H., Piña-Pozas, M., Lloyd, L. S., Betanzos-Reyes, Á. F., & Arenas-Monreal, L. [2025]. Tecnologías de la información y comunicación en la educación para la salud en el control del Aedes aegypti. Salud Pública de México, 67[2], 172–179.

López-Isola, F. S., & Íncera-Fernández, D. [2025]. Uso de realidad virtual basada en actividades de la vida diaria en la rehabilitación cognitiva del ictus: una revisión sistemática. Revista de Neurología, 80[3], 37507.

UNESCO [2022]. La alfabetización digital en el contexto postpandemia: Inclusión educativa y equidad tecnológica. París: UNESCO.

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https://doi.org/10.35429/EJS.2025.12.22.3.1.6

**Supports**

Hoffman, J. L., Wu, T.-Y. & Argeros, G. [2023]. An Innovative Community Health Nursing Virtual Reality Experience: A Mixed Methods Study. Creative Nursing, 29[3], 303–310.

**Differences**

Kouijzer, M. M. T. E., Kip, H., Bouman, Y. H. A., & Kelders, S. M. [2023]. Implementation of virtual reality in healthcare: A scoping review on the implementation process of virtual reality in various healthcare settings. Implementation Science Communications, 4, 67.

**Discussions**

INAES [2023]. Lineamientos para el fortalecimiento de los NODESS en México. Instituto Nacional de la Economía Social.

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RENIECYT: 1702902


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Article

# Rural electromobility: innovation for transportation in indigenous and rural communities

# Electromovilidad rural: innovación para el transporte en comunidades indígenas y campesinas

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**Abstract**

Rural electromobility represents a strategic and innovative alternative for reducing mobility gaps in indigenous and rural communities in southeastern Mexico. This article analyzes the potential for implementing light electric vehicles [tricycles, motorcycles, motorized carts, and community transport] in rural contexts with a focus on sustainability, social justice, and cultural relevance. It presents an assessment of current conditions in rural municipalities in Tabasco, Chiapas, and Campeche, evaluating factors such as energy availability, road infrastructure, public policies, social acceptance, and local technical capabilities. The methodology is based on a mixed approach, using semi-structured interviews with community actors, documentary analysis, and case studies. The findings reveal that, although there are challenges in financing, maintenance, and training, rural electromobility can generate significant benefits: reduced emissions, economic savings, equitable access to services, and strengthening of the community fabric. It concludes that participatory design, local technical training, and coordination with academic institutions can accelerate the adoption of these technologies.

| Objective | Methodology | Contribution |
|---|---|---|
| Analyse the potential of electromobility as an innovative and sustainable solution to improve access to transportation in indigenous and campesino communities in south-eastern Mexico, identifying barriers, opportunities and implementation strategies suited to the rural context. | A mixed approach is employed. The qualitative part involves conducting semi-structured interviews with community actors, technicians and local authorities, the documentary part analyses case studies, public policies and national and international experiences on rural electric mobility. Municipalities in Tabasco, Chiapas and Campeche are selected as feld study sites for their territorial. | The article provides a contextualized vision of rural electromobility as a tool for territorial equity, social inclusion and environmental sustainability. It offers a framework of participatory implementation based on local capacities, promoting alternative transport models tailored to the needs and realities of south-eastern Mexican indigenous community. |

**Sustainable transport, Rural electromobility, Territorial inclusion**

**Resumen**

La electromovilidad rural representa una alternativa estratégica e innovadora para reducir las brechas de movilidad en comunidades indígenas y campesinas del sureste de México. Este artículo analiza el potencial de implementar vehículos eléctricos ligeros [triciclos, motos, motocarros y transportes comunitarios] en contextos rurales con enfoque de sostenibilidad, justicia social y pertinencia cultural. Se presenta un diagnóstico de las condiciones actuales en municipios rurales de Tabasco, Chiapas y Campeche, evaluando factores como disponibilidad energética, infraestructura vial, políticas públicas, aceptación social y capacidades técnicas locales. La metodología se basa en un enfoque mixto, utilizando entrevistas semiestructuradas a actores comunitarios, análisis documental y estudios de caso. Los hallazgos revelan que, si bien existen desafíos en financiamiento, mantenimiento y capacitación, la electromovilidad rural puede generar beneficios significativos: reducción de emisiones, ahorro económico, acceso equitativo a servicios y fortalecimiento del tejido comunitario. Se concluye que el diseño participativo, la formación técnica local y la articulación con instituciones académicas pueden acelerar la adopción de estas tecnologías.

| Objetivo | Metodología | Contribución |
|---|---|---|
| Analizar el potencial de la electromovilidad como solución innovadora y sostenible para mejorar el acceso al transporte en las comunidades indígenas y campesinas del sureste de México, identificando barreras, oportunidades y estrategias de implementación adecuadas al contexto rural. | Se emplea un enfoque mixto. La parte cualitativa consiste en realizar entrevistas semiestructuradas con actores comunitarios, técnicos y autoridades locales, mientras que la parte documental analiza estudios de caso, políticas públicas y experiencias nacionales e internacionales sobre movilidad eléctrica rural. Se seleccionan municipios de Tabasco, Chiapas y Campeche como sitios de estudio de campo por su territorio. | El artículo ofrece una visión contextualizada de la electromovilidad rural como herramienta para la equidad territorial, la inclusión social y la sostenibilidad medioambiental. Propone un marco de implementación participativa basado en las capacidades locales, promoviendo modelos de transporte alternativos adaptados a las necesidades y realidades de la comunidad indígena del sureste de México. |

**Transporte sostenible, Electromovilidad rural, Inclusión territorial**

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

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## Introduction

La electromovilidad ha ganado una importancia strategic in the global context as a technological alternative that reduces polluting gas emissions, promotes the use of clean energy, and transforms the transport system towards sustainable models. www.gob.mx › semarnat [Ministry of the Environment and Natural Resources [SEMARNAT], 2022]. In Mexico, electromobility has been promoted in urban areas; however, rural areas, especially indigenous and peasant communities, continue to face significant barriers in accessing adequate means of transport. In the southeastern states of Mexico, such as Tabasco, Chiapas, Campeche, and Oaxaca, there are high levels of marginalisation and social backwardness, which limit connectivity, access to basic services, and the productive mobility of their inhabitants [National Council for the Evaluation of Social Development Policy [CONEVAL], 2023].

This article argues that rural electromobility, particularly through light electric vehicles, can become a strategy for social innovation and territorial justice. Its implementation would improve access to services, reduce transport costs, generate local jobs and contribute to environmental sustainability. In this context, this article analyses the feasibility, barriers and opportunities of electromobility for rural communities in southeastern Mexico, with an emphasis on its socio-technical, cultural and economic adaptation [Secretariat of Energy [SENER], 2022].

## Definition and relevance of rural electromobility

Rural electromobility can be defined as the use of electric vehicles adapted to the geographical, economic and cultural conditions of rural communities. These vehicles can include electric bicycles, motorcycles, tricycles, motorised rickshaws or minibuses that run on rechargeable batteries. Unlike urban solutions, rural electromobility requires innovative, adaptive and participatory approaches.

Its relevance is evident in multiple dimensions [Economic Commission for Latin America and the Caribbean [ECLAC] 2022]. Socially, it improves access to health, education and markets, facilitating mobility for women, young people and older adults.

Economically, it reduces dependence on fossil fuels, generates household savings and can activate local production chains. Environmentally, it contributes to climate change mitigation, reduces air pollution and promotes the use of renewable energies [Litman, 2025; Eliseo Dantés, 2024]. Culturally, it allows for the design of locally relevant solutions, respecting community knowledge and promoting technological appropriation.

**Box 1**

**Figure 1**

AI-generated image on electromobility *OpenAI*

*Source: [2025]. AI-generated image on electromobility*

## Methodology

This research adopts a mixed approach combining qualitative methods and documentary analysis. The qualitative component involved semi-structured interviews with 15 key actors, including community leaders, municipal technicians, teachers from technological institutions, and representatives of grassroots organisations in rural communities in Tabasco, Chiapas, and Campeche. The interviews identified perceptions, needs, obstacles and expectations regarding the possible adoption of electromobility.

The documentary component included a systematic review of scientific literature, government reports and international experiences in the implementation of rural electric mobility projects. This review contextualised the phenomenon, identified good practices and built a comparative base with experiences in other Latin American countries. The triangulation of qualitative and documentary data strengthened the validity of the findings and guided the analysis towards viable proposals from a territorial development perspective.

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### Technical analysis

The qualitative analysis was structured using thematic coding, with Atlas.ti software to organise and classify the information obtained in the interviews.

Five central categories were identified: community perception, technical barriers, economic viability, social participation, and environmental sustainability. Each category allowed us to establish relationships between the different social, technical, and economic elements that influence the adoption of electromobility.

A documentary analysis matrix was also applied to compare public policies, regulatory models, and successful cases of electromobility in rural contexts in countries such as Colombia, Bolivia, and Peru.

This cross-analysis identified replicable patterns, as well as important differences in the institutional and cultural framework that must be considered for the Mexican context.

### Results

For rural electromobility to become a viable reality, it is necessary to articulate multisectoral and inclusive strategies:

1. Participatory design: communities must be involved from the diagnosis to the operation of the systems, culturally validating the technologies.
2. Technical training: rural youth must be trained in the maintenance, installation and operation of electric vehicles through programmes coordinated by institutions such as the National Technological Institute of Mexico.
3. Inclusive financing: microcredit schemes, mobility cooperatives and subsidies targeting rural areas should be promoted to facilitate the acquisition of vehicles.
4. Charging infrastructure: It is proposed to install community solar stations that function as charging points and local energy management centres. Differentiated public policy: There is an urgent need to create a regulatory framework that includes rural areas in energy transition and electromobility plans.

### Impact of electromobility

The impacts of rural electromobility on indigenous and rural communities are multiple and cross-cutting. In the environmental sphere, it translates into reduced $CO_2$ emissions, improved air quality and reduced environmental noise. In the social sphere, it facilitates the mobility of vulnerable populations, enables access to health and education services, and strengthens community cohesion.

From an economic point of view, the use of electric vehicles reduces household spending on transport, improves agricultural production logistics and generates new job opportunities in the maintenance, assembly and operation of electrical systems. It also promotes energy autonomy through the use of solar systems and encourages sustainable social innovation models. In cultural terms, it contributes to strengthening community identity by allowing technological solutions to be integrated into the local way of life and values [Mexico City Government Portal, 2022].

### Discussion

The findings show that rural electromobility can be an effective tool for reducing structural inequalities, but its success depends on critical factors: community ownership, access to financing, institutional support, and differentiated public policies. As mentioned by [Litman, 2025], experiences in Latin America show that cooperative models, targeted subsidies and technical education are key elements in ensuring the sustainability of these projects.

In the case of Mexico, the absence of specific regulations for rural areas, as well as the concentration of efforts in urban areas, represents a significant obstacle. However, coordination with academic institutions, local governments, and civil society organisations can generate synergies capable of overcoming these barriers.

The case of electric tricycles in municipalities in Chiapas and community solar systems in Campeche are examples of emerging initiatives that deserve to be strengthened and replicated.

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## Conclusions

Rural electromobility represents a viable, sustainable and necessary alternative for improving the living conditions of indigenous and rural communities in southeastern Mexico. Its implementation requires comprehensive strategies that include the active participation of communities, the development of local technical capacities, the design of inclusive public policies and the establishment of accessible financing schemes.

The approach must be intercultural, territorial and sustainable, promoting innovation models that are built on local knowledge and respect cultural diversity. Rural electromobility is not only a technical solution, but also an opportunity to advance towards energy justice that integrates historically excluded territories into the national development agenda.

## Declarations

### Conflict of interest

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

### Contribution of authors

*Eliseo-Dantés, Hortensia*: Conceptualisation of the study, development of the theoretical framework, methodological design, data collection and analysis, drafting of the original manuscript.

*Pérez-Garmendia, Gloria*: Support in instrument validation, statistical analysis, critical review of content, editing and proofreading of the manuscript.

*García-Reyes, David Antonio* and *García-Jerónimo, Beatriz*: Overall supervision of the research project, advice on the interpretation of results, project management, resource acquisition, final review of the manuscript for submission.

### Availability of data and materials

The data on which the conclusions of this study are based can be requested from the corresponding author.

Due to [confidentiality agreements / ethical considerations / institutional restrictions], some parts of the data cannot be shared publicly. Researchers interested in accessing the data sets can contact the corresponding author to discuss the possibility of sharing the data under appropriate conditions.

### Funding

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### Abbreviations

1. CONEVAL: National Council for the Evaluation of Social Development Policy [Consejo Nacional de Evaluación de la Política de Desarrollo Social].
2. SENER: Energy Secretariat.
3. SEMARNAT: Ministry of Environment and Natural Resources.
4. CEPAL: Economic Commission for Latin America and the Caribbean.
5. CDMX: Mexico City.

## References

### Background

CONEVAL. [2023]. Informe de pobreza y rezago social en México 2023.

SENER. [2022]. Prospectiva del sector eléctrico 2022–2036. Secretaría de Energía.

SEMARNAT. [2022]. Estrategia Nacional de Movilidad Eléctrica. [Archivo PDF].

### Basic

CEPAL. [2022]. Transición energética con equidad en América Latina.

Eliseo Dantés, H. [2024]. Productividad Integral. Ecofran.

### Support

Portal de Gobierno de la Ciudad de México. [12 de noviembre del 2022]. Impulsamos la electromovilidad en taxis de la CDMX.

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**Discussion**

Litman, T. [2025]. Evaluating Transportation Equity: Guidance for Incorporating Distributional Impacts in Transportation Planning. Victoria Transport Policy Institute.

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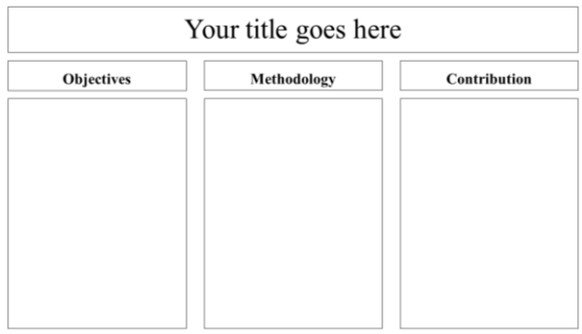


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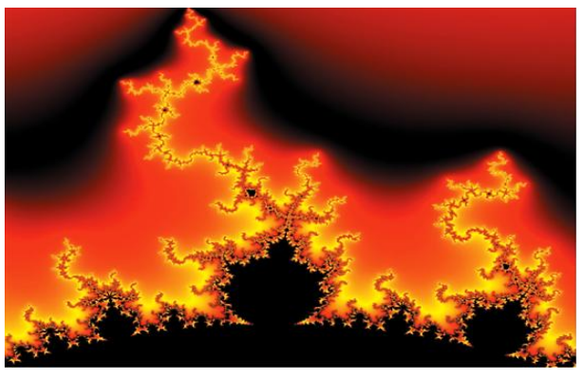

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