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*Scientific articles*

***El papel de la investigación en la Universidad Autónoma de Zacatecas para elevar los indicadores de calidad durante el periodo 2021-2024***

***The role of research at the Autonomous University of Zacatecas to raise quality indicators during the period 2021-2024***

***O papel da pesquisa na Universidade Autônoma de Zacatecas para elevar os indicadores de qualidade durante o período 2021-2024***

**Fabiola Lydie Rochin Berumen**

Universidad Autónoma de Zacatecas, Unidad Académica de Medicina Veterinaria y Zootecnia,  
México

[fabiolauaz@outlook.com](mailto:fabiolauaz@outlook.com)

<https://orcid.org/0000-0002-8676-7768>

## **Resumen**

Durante la administración 2021-2024, la Universidad Autónoma de Zacatecas ha experimentado un notable crecimiento en su cuerpo de investigadores, alcanzando cifras históricas en el Sistema Nacional de Investigadoras e Investigadores (SNII). Actualmente, cuenta con 577 investigadores en distintos niveles, también se cuenta con CA de los cuales 126 están categorizados 73 como “consolidado”, 45 como “en consolidación” y 8 “en formación”. Estos logros posicionan a la institución como un referente en la generación de conocimiento y la excelencia académica. Asimismo, este aumento en la capacidad investigativa, gestionado a través de la coordinación de investigación y posgrado de la UAZ, demuestra un compromiso firme con la investigación interdisciplinaria y la colaboración para abordar desafíos específicos regionales y fomentar un crecimiento sostenible. Por tal motivo, el propósito de este análisis es profundizar en el papel de la investigación como catalizador de transformación en la Universidad Autónoma de Zacatecas durante el periodo 2021-2024, para lo cual se ha evaluado cómo el incremento en el número de investigadores en el SNII ha influenciado el desarrollo regional, la innovación y la excelencia académica de la institución. Mediante alianzas estratégicas con diversos actores, se fomenta la transferencia de conocimiento y la innovación, lo que consolida a la Universidad Autónoma de



Zacatecas como un agente de transformación y desarrollo tanto a nivel regional como nacional e internacional. En conclusión, se puede afirmar que la UAZ se apuntala como un motor de transformación a través de la investigación, lo cual contribuye de manera significativa al progreso y la innovación en la región, y reafirma su compromiso con la generación de conocimiento y la excelencia académica.

**Palabras clave:** investigación, innovación académica, impacto social, desarrollo regional.

## Abstract

During the 2021-2024 administration, the Autonomous University of Zacatecas has experienced notable growth in its body of researchers, reaching historic figures in the National System of Researchers (SNII). Currently, it has 577 researchers at different levels, there are also CAs of which 126 are categorized, 73 as “consolidated”, 45 as “in consolidation” and 8 “in training”. These achievements position the institution as a benchmark in the generation of knowledge and academic excellence. Furthermore, this increase in research capacity, managed through the UAZ research and postgraduate coordination, demonstrates a firm commitment to interdisciplinary research and collaboration to address specific regional challenges and foster sustainable growth. For this reason, the purpose of this analysis is to delve into the role of research as a catalyst for transformation at the Autonomous University of Zacatecas during the period 2021-2024, for which it has been evaluated how the increase in the number of researchers in the SNII has influenced the regional development, innovation and academic excellence of the institution. Through strategic alliances with various actors, the transfer of knowledge and innovation is promoted, which consolidates the Autonomous University of Zacatecas as an agent of transformation and development at both a regional, national and international level. In conclusion, it can be stated that the UAZ is supported as an engine of transformation through research, which contributes significantly to progress and innovation in the region, and reaffirms its commitment to the generation of knowledge and academic excellence.

**Keywords:** Research, Academic Innovation, Social Impact, regional development.

## Resumo

Durante a gestão 2021-2024, a Universidade Autônoma de Zacatecas experimentou um notável crescimento em seu corpo de pesquisadores, atingindo números históricos no Sistema Nacional de Pesquisadores (SNII). Atualmente conta com 577 investigadores em diferentes níveis, existem também CAs dos quais 126 estão categorizados, 73 como “consolidados”, 45 como “em consolidação” e 8 “em formação”. Essas conquistas posicionam a instituição como referência na geração de conhecimento e excelência acadêmica. Além disso, este aumento na capacidade de investigação, gerido através da coordenação de investigação e pós-graduação da UAZ, demonstra um firme compromisso com a investigação e colaboração interdisciplinares para enfrentar desafios regionais específicos e promover o crescimento sustentável. Por este motivo, o objetivo desta análise é aprofundar o papel da pesquisa como catalisador de transformação na Universidade Autônoma de Zacatecas durante o período 2021-2024, para o qual foi avaliado como o aumento do número de pesquisadores em o SNII influenciou o desenvolvimento regional, a inovação e a excelência acadêmica da instituição. Através de alianças estratégicas com diversos atores, promove-se a transferência de conhecimento e inovação, o que consolida a Universidade Autônoma de Zacatecas como um agente de transformação e desenvolvimento a nível regional, nacional e internacional. Concluindo, pode-se afirmar que a UAZ se sustenta como um motor de transformação por meio da pesquisa, que contribui significativamente para o progresso e a inovação na região, e reafirma seu compromisso com a geração de conhecimento e excelência acadêmica.

**Palavras-chave:** pesquisa, inovação acadêmica, impacto social, desenvolvimento regional.

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## Introduction

The Autonomous University of Zacatecas has experienced a notable revolution in its research capacity during the period 2021-2024, as it has reached unprecedented numbers in the National System of Researchers (SNII). This exponential growth in the number of researchers not only reflects the institution's commitment to the generation of knowledge and academic excellence, but also underlines its fundamental role as an agent of transformation in the region. In this context, research is positioned as the central pillar for regional development, innovation and academic progress at UAZ. Through strategic alliances and the active promotion of knowledge transfer, the university establishes itself as an engine of change and progress, thereby reaffirming its unwavering commitment to the generation of knowledge and academic excellence. This article, therefore, explores in detail the impact of research expansion at the Autonomous University of Zacatecas and



its surroundings, highlighting the achievements and challenges that have marked this period of unprecedented growth.

During the period 2021-2024, the increase in the body of researchers at the Autonomous University of Zacatecas is framed in an academic and scientific context widely studied by various authors in the field of research and higher education. To do this, first of all, it is relevant to mention Ramírez's theory of innovation, which postulates that research and development are essential drivers of economic and social progress (Ramírez, 2020). From this perspective, the increase in the number of researchers at UAZ can be understood as a drive towards innovation and the generation of new ideas that contribute to regional development.

On the other hand, authors such as Etzkowitz and Leydesdorff have formulated the triple helix theory, which emphasizes the importance of cooperation between the educational institution, the business sector and the government to stimulate innovation and sustainable development (Gálvez, 2022). In this way, the Autonomous University of Zacatecas actively promotes the transfer of knowledge and intersectoral collaboration through strategic alliances in order to enhance its impact in the region. In this same sense, Rivera (2022) analyzes the crucial role of the university as an agent of social change and economic development, and highlights its commitment to the generation of knowledge and its impact on society.

In addition to the aforementioned theories, it is relevant to consider the perspective of authors such as Chávarro, who developed the theory of sociology of science and highlighted the importance of the scientific community in the production of knowledge and its impact on society (Chávarro, 2022). In the case of UAZ, this means that the growth of its body of researchers not only implies an increase in research capacity, but also greater interaction and collaboration between members of the academic community.

On the other hand, authors such as Mercon (2022) include in their studies the concept of “mode 2” of knowledge production, which emphasizes interdisciplinarity, collaboration and the social relevance of research. Thus, the increase in the number of researchers at UAZ can be interpreted as a drive towards the adoption of interdisciplinary approaches and the generation of knowledge aimed at solving specific problems in the region.

Likewise, authors such as Turpo-Gebera *et al.*, (2020) have addressed the concept of the “research university”, which refers to the importance of integrating research into all dimensions of university life, including teaching and extension. In this sense, strengthening research capacity at UAZ not only enriches its academic work, but also amplifies its impact on society through the generation of relevant and applicable knowledge.

On the other hand, it is worth mentioning Boyer, who in his book *Scholarship Reconsidered: Priorities of the Professoriate* proposed a redefinition of the concept “academic scholarship”, emphasizing the importance of research, teaching, application and integration of knowledge. This comprehensive approach to academic work is crucial to understanding the role of researchers in the university since its inception (Boyer, 1990).

Another notable author is Kuhn, who is recognized for his work *The Structure of Scientific Revolutions*, where he introduces the concept of “paradigm change” in science. Its focus on the evolution of scientific knowledge and transformations in research offers an important perspective for understanding growth in the body of researchers (Kuhn, 2019).

Pierre Bourdieu, for his part, is known for his theory of scientific fields, which analyzes the dynamics of power, prestige and legitimacy in the field of academic research. Its sociological approach can help understand the relationships and hierarchies within the scientific community (Martinovich, 2019).

Bruno Latour, a sociologist of science, has also explored the social construction of scientific knowledge and the importance of non-human actors in the production of science. His actor-network approach is relevant to analyze collaboration networks and knowledge production in the university context (Rodríguez -Medina *et al.*, 2022).

For their part, Moreno -Pinado and Tejeda (2017) focus on critical pedagogy and liberating education. His ideas about education as a tool for social transformation and his emphasis on the active participation of students in their teaching-learning process are relevant to understanding the training of committed and critical researchers.

On this topic, another author who deserves to be mentioned is John Dewey, philosopher and pedagogue who developed the theory of experiential learning. Its focus on the relevance of experience and reflection in the educational process can be applied to the development of research skills and the training of researchers at the university (Dewey, 2022).

Likewise, Sánchez and Nacimba (2023) replicate the theory of multiple intelligences, which recognizes the diversity of abilities and talents in individuals. This vision can be relevant to design training programs for researchers that identify and strengthen the different capacities of students in the academic and scientific field.

Finally, Suazo and Núñez (2021) implement pedagogical dialogue as a methodological strategy that contributes to the development of the theory of reflection in action and reflection on action. This perspective highlights the importance of critical reflection and reflective practice in

learning and professional development, and can be applied in the training of researchers to encourage reflection on their research and learning processes.

All of these contributions mentioned are valuable to better understand the growth in the body of researchers at the Autonomous University of Zacatecas, since they serve to enrich training and academic development strategies at the university level.

## Method

To collect the necessary information for this qualitative analysis, the Research and Postgraduate Coordination was used, as well as the Federal Projects Coordination of the Autonomous University of Zacatecas. In addition, semi-structured interviews were conducted with researchers who are part of the National System of Researchers (SNII) of the institution, which focused on exploring their perceptions regarding the impact of their work on regional development, innovation and academic excellence of the UAZ.

Additionally, focus groups were conducted with representatives from different academic disciplines to more broadly discuss interdisciplinary collaboration in research and its contribution to the progress of the institution. These groups were held virtually to facilitate researcher participation and ensure diversity of opinions and perspectives. Below are some opinions :

Researcher 1: “The diversity of opinions and experiences that the researchers from the region contributed in our focus group was essential to enrich our perspective on the topic under study. “It allowed us to consider aspects that we otherwise would not have taken into account.”

Researcher 2: “I totally agree. Collaboration between researchers with different approaches and backgrounds was also key. “It challenged us to question our own assumptions and explore new lines of research that were adapted to the specific needs of the Zacatecan community .”

Researcher 3: “In addition, the interaction between the participants generated an environment of mutual learning and collaboration that enhanced the quality of our work. “It was inspiring to see how the diversity of perspectives enriched our discussions and led us to consider multidimensional approaches to address the phenomenon studied.”

The previous dialogues reflect the importance of diversity, collaboration and mutual learning in the research process, as well as the positive impact that these dynamics have on the quality and relevance of the results obtained.

An SNII researcher, focused on her line of research in communication-education in culture, has had a significant impact in the Zacatecas region. In one of his most recent studies titled “ Thesis direction process and advisory model. Postgraduate in education at the University of Zacatecas, Mexico ”, has contributed significantly to the establishment of a thesis direction process and an advisory model in postgraduate education. This advance has significantly improved teacher training and, therefore, the quality of education in Zacatecas (Capetillo-Medrano *et al.* , 2022).

Furthermore, Carrillo-Muro *et al.*, (2023) (SNII researchers), through their line of research in animal production, are also having a positive impact in the region. In his article titled “ Effect of Dietary Calcium Propionate yourself Inclusion Period on the Growth Performance, Carcass Characteristics , and Meat Quality of Feedlot RAM Lambs ”, have offered efficient alternatives in the production of foods of animal origin.

For their part, López-Carlos *et al.*, (2023); (SNII researchers), have developed applied work in veterinary medicine and zootechnics that has had a beneficial impact in the Zacatecas region, specifically in improving ruminant production. His most recent and relevant article, titled “ Effect of milking hygiene , herd size , water hardness and temperature-humidity index on milk quality of dairy farms ”, highlights the importance of cleanliness in the milking parlor, water quality and the temperature-humidity index on milk quality.

On the other hand, authors like Rochin Berumen *et al.*, (2023), also members of the SNII, have had a positive impact in Zacatecas through their research in education. His studies have addressed topics such as reducing school dropouts, strengthening skills, effective communication, and implementing tutoring and mentoring programs. His most recent and relevant article, “Specific competencies of the World Organization for Animal Health (WHO) fundamental for the graduate of veterinary medicine and zootechnics”, published in the magazine *Interdisciplinary* and recognized by Conacyt, highlights the importance of these competencies in training of professionals in the field.

The aforementioned authors have highlighted that their work has had a significant impact on strengthening research at the state, national and international level. In addition, they have contributed relevant knowledge and discoveries that have impacted various academic and scientific communities around the world. Their works have been recognized for their quality and relevance, hence they have positioned themselves as references in their respective fields of study at a global level.

On the other hand, to complement the information collected through interviews and focus groups, exhaustive reviews of institutional documents were carried out under the supervision of

the Research and Postgraduate Coordination of the Autonomous University of Zacatecas, as well as academic publications. This allowed us to contextualize the findings obtained in the interviews and focus groups, and identify trends and patterns in the research carried out at the institution during the period 2021-2024.

Finally, a content analysis of the interviews, focus groups and documents reviewed was carried out to identify relevant themes, emerging patterns and potential areas of improvement in the research strategy of the Autonomous University of Zacatecas. This provided a comprehensive view of the role of research as a driver of transformation in the institution and its impact on regional development, innovation and academic excellence.

## Results

The Autonomous University of Zacatecas has experienced notable growth in its body of researchers, reaching a total of 577 distributed at various levels, a figure that marks a milestone in the National System of Researchers (SNII). This increase in research capacity has had a significant positive impact on the institution's regional development, innovation, and academic excellence.

In this sense, the researchers interviewed have highlighted that the interdisciplinary collaboration facilitated by this growth has made it possible to more effectively address the specific challenges of the region and promoted sustainable growth that allows for the generation of high-impact knowledge. In addition, the strategic alliances established at the national and international level have promoted the transfer of knowledge and promoted innovation at the Autonomous University of Zacatecas, which consolidates it as a benchmark in the generation of knowledge and academic excellence.

According to the records of the Coordination of Federal Projects of the Autonomous University of Zacatecas, until March 13, 2024 there are 126 academic bodies (CA), 73 in “consolidated”, 45 “in consolidation” and 8 “in formation”; with the aim of raising the quality indicators of the university.

Finally, the announcement by Dr. Hamurabi Gamboa Rosales, general director of the Zacatecan Council of Science, Technology and Innovation (Cozcyt), about the increase in research capacity in Zacatecas — with a total of 577 Zacatecans in the National System of Researchers and Researchers (SNII)—, reflects a significant positive impact on regional development. This achievement shows that for every 100 thousand inhabitants there are an average of 18.1 science researchers in Zacatecas, while the national average is 21.8 researchers.



Despite this, Zacatecas exceeds the national average by more than 25% in the presence of researchers, which demonstrates the entity's commitment to scientific research and development. Ultimately, this positioning consolidates Zacatecas as a benchmark in the academic and technological field at the national level.

## Discussion

University research plays a fundamental role in the advancement of knowledge, innovation and socioeconomic development. According to Unzurrunzaga and Rozemblum (2018), universities that foster a culture of interdisciplinary research and collaboration are more likely to generate cutting-edge knowledge and address complex problems effectively. Therefore, collaboration between researchers from different disciplines and the transfer of knowledge to society are key elements to strengthen the impact of university research on regional development.

In the specific case of the Autonomous University of Zacatecas, the growth in the number of researchers in the National System of Researchers (SNII) and the consolidation of academic bodies reflect a commitment to academic excellence and the generation of quality knowledge. This expansion in research capacity, driven by the Research and Graduate Coordination, underscores the importance of interdisciplinary research and collaboration to address region-specific challenges and promote sustainable growth.

On the other hand, Pertuz *et al.*, (2020) emphasize that collaboration between researchers from different disciplines and the transfer of knowledge to society are essential to strengthen the impact of university research on regional development. Furthermore, Ríos *et al.*, (2024) highlight the impact of social and educational research in promoting innovation within the university environment.

## Conclusion

In conclusion, the notable increase in the number of researchers at the Autonomous University of Zacatecas, adding a total of 577 experts in various areas of the National System of Researchers (SNII), has consolidated the institution as a leader in the generation of knowledge, innovation and academic excellence in the region. The interdisciplinary collaboration facilitated by this growth has made it possible to effectively address the specific challenges of the region, such as physical-mathematical and earth sciences, life sciences, behavior and education, humanities, agricultural, forestry and ecosystem sciences, social sciences, biology and chemistry,

medicine and health sciences, engineering and technological development, as well as interdisciplinary studies.

In this sense, the strategic alliances established at the national and international level in these various areas of knowledge have encouraged the transfer of knowledge and the promotion of innovation, which reinforces the commitment of the Autonomous University of Zacatecas with academic excellence and its role transformer in the state. This increase in research positions UAZ as an engine of progress and development through research, and contributes significantly to scientific advancement and the strengthening of the academic environment for the benefit of society.

### **Future lines of research**

Considering the growth and diversification of the body of researchers at the Autonomous University of Zacatecas, as well as its positive impact on regional development, innovation and academic excellence, various future lines of research are envisioned that could further enhance the role of the institution as an engine of transformation and progress. Some of these lines could include the following:

**Interdisciplinary research to address complex challenges:** Promote collaboration between different areas of knowledge to address regional problems in a comprehensive manner, so that innovative and sustainable solutions can be suggested.

**Applied research with social impact:** Guide research towards the generation of knowledge with a direct impact on society to address local problems and contribute to the well-being of the community.

**International collaborations:** Strengthen strategic alliances with globally renowned institutions and experts to promote the transfer of knowledge, the internationalization of research and participation in projects of international relevance.

**Research in public policies and sustainable development:** Contribute to the design and implementation of public policies based on scientific evidence that promote sustainable development, social equity and environmental protection in the region.

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