RESEARCH
TECNOLÓGICO DE MONTERREY
2024 ACTIVITIES REPORT

Tecnológico de Monterrey

INTRODUCTION

At Tecnológico de Monterrey, research goes beyond the boundaries of knowledge to become a tool that transforms realities and generates solutions to humanity's greatest challenges. Through the Educational Group, the institution fosters interdisciplinary research projects that address key issues such as health, sustainability, industrial transformation, and the future of education, consolidating its commitment to excellence and high-impact knowledge.

This research ecosystem integrates schools, institutes, centers, and strategic projects that collaborate to generate relevant, innovative, and applicable knowledge. From scientific exploration to the development of practical solutions, each initiative reflects the institution's purpose of contributing to social, economic, and environmental well-being at both local and global levels.

This document presents the main achievements, key figures, and outstanding projects that highlight how research at Tecnológico de Monterrey is a transformational force for transformation with significant impact in Mexico and worldwide. Through the collective efforts of faculty members, researchers, and students, the institution strengthens its leadership as a generator of knowledge that inspires, connects, and creates new possibilities for the future.

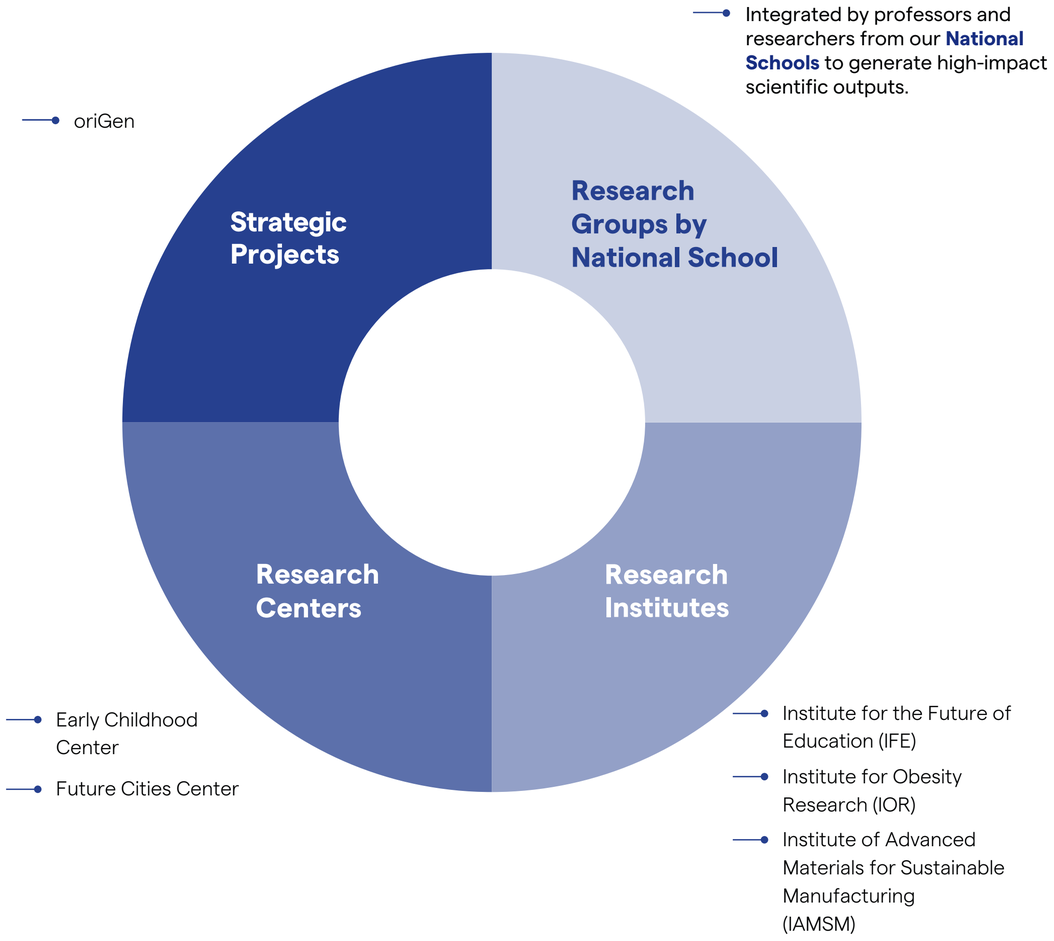
RESEARCH ECOSYSTEM

In 2024, we consolidated an ecosystem that integrates and makes visible the work of schools, institutes, centers and strategic projects, in alignment and coordination with the institutional vision. For this, it was necessary to implement the following actions:

- Define a comprehensive vision and establish a perspective that promotes multi- and interdisciplinary work to achieve high social impact results.
- Identify focus areas to align research with society's most pressing challenges, such as health, climate, sustainability, industrial transformation, education, and the development of prosperous communities.
- Strengthen strategic alliances and promote key collaborations, such as the Cyber-Physical Learning Alliance Summit (CPLAS 2024) of the Institute for the Future of Education (IFE) and TecSalud's alliance with the Ragon Institute, to enhance knowledge generation, develop innovative solutions, and address global challenges collaboratively.

"At Tecnológico de Monterrey Education Group, we firmly believe that education is the force that drives change. For this reason, we have worked tirelessly on initiatives that respond to current challenges and anticipate future needs.
We are proud to witness how creativity and applied research open new doors, generate solutions and respond to the demands posed by the challenges of our time. In our classrooms, laboratories, and collaborative spaces, ideas are born with the power to transform and position Mexico as a key player in solving global problems."

Ricardo Saldívar Escajadillo
Chairman of the Board of Directors, Tecnológico de Monterrey



RESEARCH IN NUMBERS

INVESTIGACIÓN

1,176
RESEARCHERS

387
PROFESSORS PARTICIPATED IN THE PROFESSOR RESEARCHER MODEL

16
TECHNOLOGY-BASED COMPANIES CREATED AT TEC WITH LINKS: SPINOFFS, CO-DEVELOPMENTS / EQUITY

49%
publications with international collaboration

705
PROFESSORS ARE MEMBERS OF THE NATIONAL SYSTEM OF RESEARCHERS (SNI)

123
RESEARCH AND DEVELOPMENT PROJECTS FINANCED WITH EXTERNAL FUNDS

2,306
SCOPUS* PUBLICATIONS IN THE YEAR
*INDEX OF INTERNATIONAL SCIENTIFIC JOURNALS

"During 2024, our educational models consolidated to continue strengthening the competencies that allow our students to imagine and build new worlds. The linking with industry and collaboration with international universities and institutions stood out as fundamental pillars to offer academic experiences with global impact. In addition, **we have consolidated more applied research efforts to address the most pressing challenges we face as a society**"

Juan Pablo Murra Lascurain
Rector, Tecnológico de Monterrey

RESEARCH

Tecnológico de Monterrey promotes the creation of knowledge through cutting-edge research that seeks solutions to the great problems of humanity. In 2024, an ecosystem was consolidated that integrates and highlights the work of schools, institutes, centers, and strategic projects, in alignment and coordination with the institutional vision. For this, it was necessary to carry out the following actions:

- Define a comprehensive vision and establish a perspective that promotes multi- and interdisciplinary work to achieve high social impact results.
- Identify focus areas to align research with society's most pressing challenges, such as health, climate, sustainability, industrial transformation, education, and the development of prosperous communities.
- Strengthen strategic alliances and promote key collaborations, such as the Cyber-Physical Learning Alliance Summit (CPLAS 2024) of the Institute for the Future of Education (IFE) and TecSalud's alliance with the Ragon Institute, to enhance knowledge generation, develop innovative solutions, and address global challenges collaboratively

RESEARCH IN SCHOOLS

SCHOOL OF ARCHITECTURE, ART, AND DESIGN (EAAD)

The EAAD of Tecnológico de Monterrey is positioned as a reference in innovative and transformative design initiatives, with a significant impact on society, with a focus on the generation of applied knowledge.

RESEARCH IN NUMBERS

11 RESEARCH PROFESSORS

2 RESEARCH GROUPS

- 75 affiliated faculty members

14 RESEARCH PROJECTS IMPLEMENTED

94 ANNUAL SCOPUS PUBLICATIONS

32 ANNUAL ORIGINAL PUBLICATIONS

243 FIVE-YEAR SCOPUS PUBLICATIONS

RESEARCH IN SCHOOLS

LINES OF RESEARCH

SUSTAINABLE TERRITORY DEVELOPMENT

Addresses contemporary challenges, such as inequities and climate change, through innovative methodologies.

SOCIO-ENVIRONMENTAL VULNERABILITIES

Analyzes factors affecting vulnerable territories and develops proposals to promote adequate and resilient housing.

FAIR CITIES

Investigates inclusive urban policies and practices to design safe, habitable, and accessible cities.

ADVANCED PROCESSES FOR SUSTAINABLE TRANSFORMATION

Redefines methods of interaction, education, and materiality to foster sustainability.

REGENERATIVE DESIGN

Proposes solutions for complex contexts by integrating community, space, and the environment.

STUDIES OF ARCHITECTURE AND DESIGN

Examines how people inhabit and transform spaces, fostering interdisciplinary dialogue.

MOST RELEVANT RESEARCH PROJECTS

Walking to School in Latin America: Mexico City, Medellin and Recife

- Leader: Aleksandra Krstikj
- Goal: to analyze and improve walkability and safety conditions for children in three Latin American cities: Mexico City, Medellin, and Recife.
- Impact: encouraged international collaborations and generated high-impact publications that provide evidence for the creation of public policies on school mobility.

Design for Vulnerables: Technology Challenge

- Leader: Emanuele Giorgi
- Goal: to develop sustainable solutions through technology, participatory design, and community strategies to address the needs of vulnerable communities.
- Impact:
  - Transformation of more than 1,200 m² of gardens.
  - Restoration of 2 parks and 9 educational spaces in Chihuahua.
  - Recognition as a "key project serving the community" in the Tec de Monterrey Report on Sustainable Development Initiatives.

Urban Logistics Networks Using Medium-Range Drones with a Circular Economy Perspective

- Leader: Leticia Gaytán
- Goal: optimize urban logistics networks through the use of medium-range drones, integrating circular economy principles.
- Impact:
  - Collaborations with state universities and logistics companies.
  - Advances in patents for drone technologies.
  - Development of operational models focused on reducing costs, minimizing environmental footprints, and promoting sustainable practices in urban logistics.

Design for Vulnerables

Recognized as a “key project serving the community” in Tecnológico de Monterrey’s Sustainable Development Initiatives Report, this research includes five intervention hubs:

- Environmental Laboratory: space designed to monitor and improve environmental conditions by analyzing air, soil, and water quality, with the goal of promoting environmental regeneration.

RESEARCH IN SCHOOLS

- Composting Systems: infrastructure for recycling organic waste to encourage sustainable practices within communities.
- Solar Panels: installation of renewable energy systems in public spaces to enhance energy efficiency and reduce reliance on fossil fuels.
- Drinking Water Filters: technologies implemented to ensure access to clean water in resource-limited communities.
- Participatory Designs: collaboration with local communities to co-create solutions tailored to their specific needs.

AWARDS AND RECOGNITIONS

National Design Award in the category of “Professional Research Article”, awarded to Juan Carlos Márquez, a member of the Design and Advanced Processes of Sustainable Transformation Research Group.

SCHOOL OF SOCIAL SCIENCES AND GOVERNMENT (ECSG)

With an interdisciplinary focus, the ECSG addresses global, national, and local challenges through research conducted in collaboration with international institutions, government agencies, and civil society organizations. These initiatives have the goal to generate applied knowledge that transforms social, political, and economic realities.

RESEARCH IN NUMBERS

23 **RESEARCH PROFESSORS FROM THE MODEL**

40 **RESEARCH-ORIENTED FACULTY**
(including the 23 from the model)

92 **PARTICIPANTS IN RESEARCH GROUPS**

159 **SCOPUS PUBLICATIONS**

RESEARCH GROUPS

Four ECSG research groups focus on analyzing and proposing solutions to society's most pressing challenges in the following areas:

DEMOCRACY AND GLOBAL AFFAIRS

Studies the evolving role of the state and NGOs in the face of globalization, populism, post-truth, emerging technologies, and the crisis of multilateralism.

FUTURE ECONOMIES

Investigates the social dimensions of contemporary economic issues by designing and evaluating public policies that promote economic prosperity, social inclusion, the future of work, and demographic transitions.

INNOVATION IN LEGAL SYSTEMS

Designs proposals to transform legal systems and facilitates society to respond to challenges in an environment of rapid technological change.

GOVERNMENT AND PUBLIC ENTREPRENEURSHIP

Addresses critical issues such as health, climate change, security, and artificial intelligence, developing applicable solutions for society.

RESEARCH

RESEARCH IN SCHOOLS

MOST RELEVANT PROJECTS

The ECSG leads high-impact projects addressing current challenges through collaborations with prestigious institutions:

- Supporting a Robust Louisiana Comprehensive Climate Action (CARE) Plan: a project developed with the Water Institute of Louisiana and the United States Environmental Protection Agency (EPA) to strengthen climate actions in the region.
- Asking about Violence: research on ethical aspects in the measurement of partner violence in collaboration with Innovations for Poverty Action (IPA).
- Norte Seguro: strengthening criminal analysis capabilities in Mexico and the United States, in collaboration with Arizona State University and the Bureau of International Narcotics and Law Enforcement Affairs.
- Looking Back to Look Forward: a study on global systemic risks through historical approaches and collaborative scenarios, in partnership with RAND Corporation and the V. Kaan Rasmussen Foundation.
- Obsolescence of Hydraulic Infrastructure in Mexico: analysis of challenges and perspectives developed with the Water Center and Fundación Río Arronte.
- Regulatory and Economic Sectoral Analysis (ARES) 2024: evaluation of regulatory and economic aspects of strategic sectors, in collaboration with CAF - Development Bank of Latin America and the Caribbean.

School of Government and Public Transformation (EGobiernoyTP)

Through its Research and Impact Centers, the School of Government and Public Transformation (EGobiernoyTP) leads innovative projects focused on addressing social, economic, and health-related challenges.

RESEARCH IN NUMBERS

7 **RESEARCH PROFESSORS**

7 **RESEARCH GROUPS**

4 **AFFILIATED FACULTY MEMEBERS**

23 **SCOPUS PUBLICATIONS**

RESEARCH INITIATIVES AND MOST RELEVANT PROJECTS

DECISIONS SCIENCE

Goal: to create advanced tools to analyze public issues and support public policies related to climate change and technology. This initiative focuses on designing simulation models and databases that optimize decision-making in complex environments.

Most relevant projects:

- Supporting a Robust Louisiana Comprehensive Climate Action Plan Phase 2
- Analytical Support for World Banks' Country Climate Development Reports
- Global Analysis of Decarbonization
- Mexico Decarbonization Analysis
- The Impact of Artificial Intelligent Tools on Decision Making Behavioral and Neural Dynamics

REGIONAL DEVELOPMENT LABORATORY

Goal: to promote sustainable and inclusive development through applied research, industrial strategies adapted to local contexts and collaboration with decision makers to enhance productive capacities.

Most relevant projects:

- Productive development policies for El Salvador
- Diagnosis of Panama's growth
- Collaboration with alliances to manage small and medium scale projects

EDUCATION WITH EQUITY INITIATIVE AND QUALITY

Goal: to promote equitable access to high-quality educational opportunities in Mexico, addressing socioeconomic and regional inequalities through policies that promote inclusion and comprehensive development.

Most relevant projects:

- Learning evenly: Educational Agenda 2024
- Learning for All
- Learning recovery
- Education and employability

RESEARCH IN SCHOOLS

DATA SCIENCE CENTER

Goal: to develop data-driven technological solutions for complex social problems. It promotes the responsible use of artificial intelligence and innovative tools to address challenges such as social justice and health.

Most relevant projects:

- SNE: National Employment Service
- Hutchison Ports
- Conjusticia
- Regulation of Artificial Intelligence
- Use of artificial intelligence to address maternal mortality in Nuevo León (in collaboration with EVIS)

LEGALTEC LAB

Goal: to explore the interaction between law and technology, focusing on regulation, legal innovation, and the impact of technology—particularly artificial intelligence—on legal frameworks.

Most relevant projects:

- Study on Regulation and Public Policies in Artificial Intelligence in Mexico (book edition)
- Discussion Panels on Artificial Intelligence
- Impact on the Regulation of Artificial Intelligence in Mexico

EVIS CENTER (EQUITY AND HEALTH)

Goal: to address the greatest health challenges through interdisciplinary research that promotes public policy to improve population health, with an emphasis on international collaboration.

Most relevant projects:

- Implementation of Public Policies for the Digital Transformation of Health Systems (in collaboration with TRIADA and CIPPS)
- Use of Artificial Intelligence in maternal health
- Violence Against Women and Children (in collaboration with the National Institute for Health Care Research and the Medical Research Council)
- Use of Artificial Intelligence to address maternal mortality in Nuevo León (in collaboration with the Data Science Center)

RESEARCH IN SCHOOLS

SCHOOL OF HUMANITIES AND EDUCATION (EHE)

This year, EHE stood out for developing key research initiatives that address contemporary challenges in the educational, social, and technological fields.

RESEARCH IN NUMBERS

26 **RESEARCH PROFESSORS AND 4 POSTDOCTORAL RESEARCHERS**

3 **RESEARCH GROUPS ORGANIZED INTO 12 SUBGROUPS**

7 **RESEARCH PROJECTS IMPLEMENTED**

118 **SCOPUS PUBLICATIONS**
(as of October)

MAIN LINES OF RESEARCH

With three research groups and twelve subgroups, the main research lines focus on:

- Digital Humanities and Artificial Intelligence
- Education, Sustainable Development, and Indigenous Communities
- Educational Innovation in Underprivileged Contexts

During this period, EHE strengthened and increased the visibility of the Digital Humanities Research Group, made up of 19 research professors and 14 collaborators.

OUTSTANDING RESEARCH PROJECTS

Among the most relevant projects led by its research groups are:

Creation of the Digital Media Observatory for Disinformation

- Monitors and identifies dominant and emerging narratives in digital media in Mexico and internationally.
- Contributes to expose disinformation mechanisms that aim to manipulate public opinion and mislead the population.

Creation of the Digital Humanities Laboratory

- An innovative space dedicated to the interdisciplinary analysis of social phenomena using advanced digital tools.
- Promotes media and information literacy to tackle challenges such as the proliferation of hate speech and the loss of trust in conventional media.

Consolidating the Feminist AI Research & Innovation

- In collaboration with the International Development Research Centre (IDRC), this project studies and develops artificial intelligence applications with gender perspective.
- Positions the EHE as a key player in discussions about the social and ethical impact of artificial intelligence in the 21st century.

These research initiatives have had a significant impact in educational, social, and technological areas by strengthening digital literacy, fighting disinformation, and responding to the challenges of an increasingly complex environment.

INTERNATIONAL RECOGNITION

EHE strengthened collaborative networks and positioned its research work in Latin America, reinforcing the School's role as a leading center in digital humanities and educational innovation.

OUTSTANDING RECOGNITIONS

Level 2 recognition from the National System of Researchers (SNI) of Conahcyt awarded to:

- Dr. Manuel Cebral-Loureda
- Dr. Sergio Bárcena Juárez
- Dr. Jacob Bañuelos Sacristán
- Dr. Gabriel Valerio Ureña

RESEARCH

RESEARCH IN SCHOOLS

SCHOOL OF ENGINEERING AND SCIENCES (EIC)

EIC has established itself as a research leader by addressing strategic challenges in health, sustainability, and industrial transformation. In 2024, it restructured its research areas by creating new hubs and groups that reinforce its commitment to developing innovative and collaborative solutions.

RESEARCH IN NUMBERS

204 **RESEARCH PROFESSORS AND 18 POSTDOCTORAL RESEARCHERS**

8 **RESEARCH GROUPS DISTRIBUTED ACROSS:**

- Aging
- Food Security
- Water 360°
- Sustainable Energy
- Industry 5.0
- Mobility
- Nanotechnology and Semiconductors
- Artificial Intelligence

27 **RESEARCH PROJECTS IMPLEMENTED**

1,292 **SCOPUS-INDEXED PUBLICATIONS**
(as of October)

64 **PROJECTS IMPLEMENTED WITH THE PARTICIPATION OF 287 AFFILIATED FACULTY MEMBERS**

RESEARCH GROUPS

In 2024, the EIC created three Research Hubs focused on:

HEALTH

CLIMATE AND SUSTAINABILITY

INDUSTRIAL TRANSFORMATION

Moreover, two initiatives were launched in Nanotechnology and Semiconductors and Artificial Intelligence, with the consolidation of eight research groups to develop flagship projects. To support this growth, 45 professors were incorporated into the Research Faculty model, with the goal of strengthening the scientific community and fostering interdisciplinary collaboration in key areas.

RESEARCH COLLABORATIONS

EIC excelled in establishing strategic alliances with international institutions and leading companies

Health

- Nestlé: development of strategies to minimize carbon emissions on dairy farms, with a focus on CO2mitigation and environmental management.
- Harvard Medical School: postdoctoral stays and collaboration with renowned professor Shrike Yu Zhang, where biomedical engineers participated in semester-long projects.

Climate and Sustainability

- USAID y UToronto: creation of a traffic simulation model in Monterrey to assess health impact of emissions under different mobility scenarios.
- UNAM-TEC (BBVA): joint projects with the goal of solving water-related challenges through research partnerships.

Industrial Transformation

- MIT: development of the FrED (Fiber Extrusion Device) project, a low-cost fiber extrusion system to enhance smart manufacturing education.
- Michelin: fuel efficiency assessment through telemetry and simulations, testing tires on 40 heavy-duty vehicles.

LINES OF RESEARCH

EIC leads research in five strategic areas, integrating interdisciplinary perspectives and advanced technologies:

Health

- Aging
- Biological and Biomedical Engineering
- Food Security and Nutrition
- Artificial Intelligence and Image Analysis
- Public Policies on Food Systems

Climate and Sustainability

- Water 360°: Circular and Resilient Technologies
- Sustainable Energy and Mobility
- Resilient Infrastructure and Climate Change Adaptation
- Circular Economy and Resource Recovery

RESEARCH IN SCHOOLS

Industrial Transformation

- Mobility: electrification, autonomy, and automation
- Industry 5.0: advanced manufacturing and plastic circularity
- Cybersecurity in 5G/6G environments

Nanotechnology and Semiconductors

- Nanomaterials and Devices
- Microfluidics, Photonics, and Quantum Systems

Artificial Intelligence

- Time, Memory, and Energy Efficiency
- Ethics, Regulation, and Human-AI Collaboration
- Social and Economic Impact

RESEARCHER RECOGNITIONS

The research community received multiple national and international awards in strategic areas:

Health

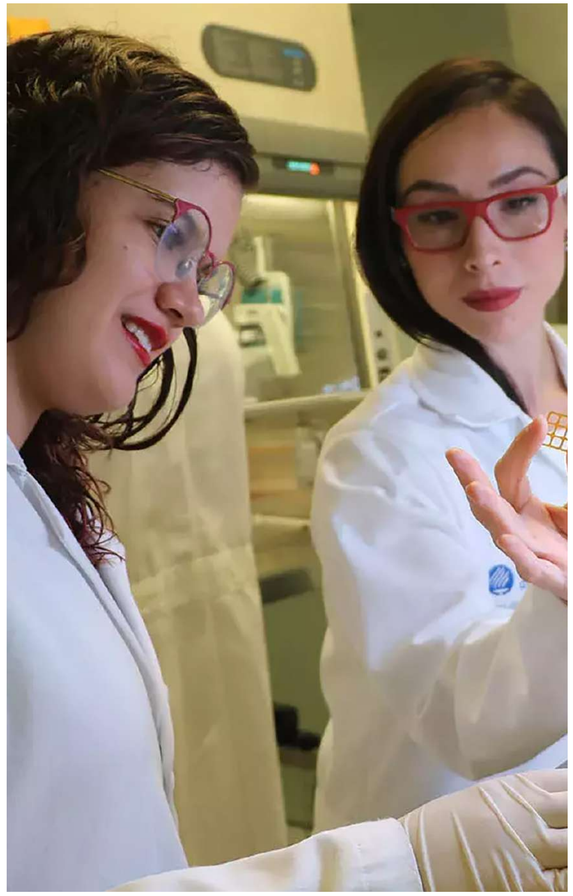
- Grissel Trujillo: recognized as an Emerging Women Leader by the American Chemical Society, awarded the Entrepreneurial Merit Award, and named a Member of the Mexican Academy of Sciences.
- Danay Carrillo: winner of the 3M 25 Women in Science Award 2024.
- Alejandra Chávez Santoscoy: Member of the Global Young Academy.

Industrial Transformation

- Andrés Antonio Torres Acosta: awarded for Professional and Applied Research Career by the Latin American Association for Quality Control, Pathology, and Rehabilitation of Constructions.
- Boris Christian Herbas Torrico: Best Paper Award at the Industrial Engineering and Operations Management Society (United States).

Artificial Intelligence

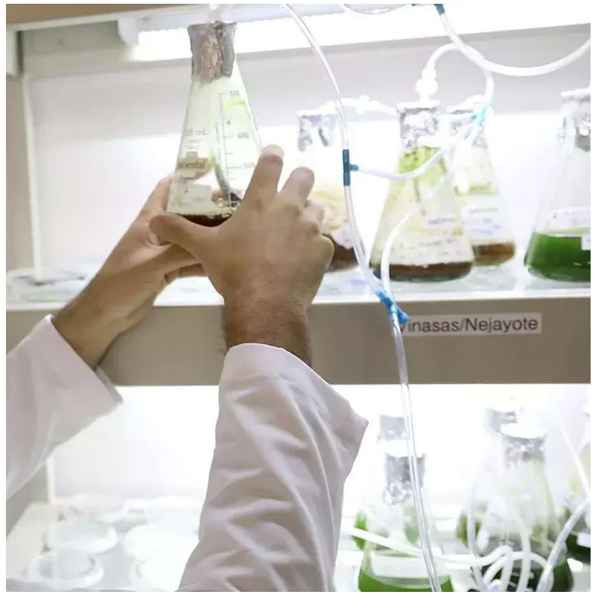
- Antonio Cedillo Hernández: Best Presentation Award at the ICETC 2024 International Conference, organized by the University of Porto, Portugal.



HIGHLIGHTED INITIATIVES

Sustainability and Climate Change Laboratory (LSCC)

LSCC has become a leading center for applied research dedicated to developing innovative solutions to mitigate climate change and promote sustainability. In collaboration with industry, government, and society, it drives projects that address the most pressing environmental challenges.



RESEARCH

RESEARCH IN SCHOOLS

SCHOOL OF MEDICINE AND HEALTH SCIENCES (EMCS)

Research has become a strategic pillar at the EMCS, focusing on transforming the healthcare sector through innovative projects, national and international collaborations, and infrastructure development. These initiatives address critical areas such as child well-being, biomarkers, metabolic diseases, and prevention.

RESEARCH IN NUMBERS

20 **RESEARCH PROFESSORS UNDER THE MODEL**

5 **RESEARCH GROUPS**

10 **RESEARCH PROJECTS IMPLEMENTED IN 2024**

43 **SCOPUS PUBLICATIONS**

181 **(AVERAGE 12.92) FIVE-YEAR H-INDEX (2019–2023)**

KEY RESEARCH INITIATIVES

EMCS developed projects across four research groups that generated significant impact at national, regional, and global levels:

- Child Well-being and Development: conducted the First National Survey on the Prevalence of Adverse and Benevolent Childhood Experiences, providing a fundamental database for future public policy initiatives.
- Biomarkers and Advanced Therapies: established a laboratory at CITES to develop a platform focused on CAR T cell discovery and validation.
- Metabolic Diseases: created the Biobank for the Metabolic Diseases Research Unit, approved by COFEPRIS.
- Prevention: built the Prevention Laboratory at Chihuahua Campus and formed a local research group focused on prevention initiatives.

NATIONAL AND INTERNATIONAL COLLABORATIONS

The EMCS strengthened its global impact through partnerships with prestigious international institutions, highlighting the following collaborations:

- Ragon Institute (Harvard, MIT, and Massachusetts General Hospital): for the training of five postdoctoral researchers and the development of joint projects in areas such as immunology and advanced therapies.
- University of Texas, Austin Campus (UT Austin): for the creation of a research laboratory focused on the study of obesity and metabolic diseases in the Latino population of the United States and Mexico.

RESEARCH IN SCHOOLS

RESEARCH LABORATORY AT CHIHUAHUA CAMPUS

As part of its commitment to multidisciplinary research and innovation, EMCS inaugurated the Research Laboratory at the Chihuahua Campus.

- Goal: to generate transnational research, connecting basic research with practical applications in biosciences and bioengineering to develop integral health solutions.
- Approach: study of diseases such as breast cancer, Alzheimer's, and Parkinson's, promoting significant advancements in life sciences.
- Services: consulting in design, prototyping, and validation of biological devices, pharmaceuticals, cosmetics, and functional foods.

RESEARCH ETHICS COMMITTEE

EMCS ensures that all studies adhere to the highest standards of safety, quality, and responsibility through its Research Ethics Committee. This committee evaluates the ethical and methodological implications of research projects, ensuring their alignment with international regulations.

SCHOOL OF BUSINESS & EGADE BUSINESS SCHOOL

In the fields of business, management, and economics, the School of Business and EGADE Business School stand out for leading research initiatives that generate knowledge with a direct impact on companies, organizations, and the education sector.

150 SCOPUS PUBLICATIONS

150 RESEARCH PROFESSORS

4 RESEARCH GROUPS

107 AFFILIATED FACULTY

11 RESEARCH PROJECTS DESIGNED

EGADE BUSINESS SCHOOL

49 SCOPUS PUBLICATIONS

26 FULL-TIME RESEARCH PROFESSORS AT EGADE BUSINESS SCHOOL WITH REDUCED TEACHING LOADS

4 RESEARCH GROUPS (SAME AS THOSE AT THE SCHOOL OF BUSINESS / CROSS-DISCIPLINARY)

46 AFFILIATED FACULTY MEMBERS

5 **RESEARCH PROJECTS IMPLEMENTED** (led by full-time EGADE Business School professors)

RESEARCH IN SCHOOLS

LINES OF RESEARCH

Faculty members at the School of Business and EGADE focus their efforts on four strategic research lines, addressing key issues for organizational transformation and social impact:

- Leadership and effective and efficient organizations
- Development of responsible companies
- Entrepreneurship and innovation with impact
- Organizational strategy and idustry transformation

HIGH-IMPACT RESEARCH: HIGHLIGHTED PUBLICATIONS

Publications in Scopus Q1 Journals

In 2024, the School produced highly relevant research published in Q1 Scopus journals, addressing critical topics such as labor immigration, Chinese enterprises entry into Latin America, and investment strategies in emerging markets. The three most notable publications are:

PUBLICATION	AUTHORS	JOURNAL
"Undocumented immigrants at work: invisibility, hypervisibility, and the making of the modern slave"	Segarra, P. Prasad, A.	Humanities and Social Sciences Communications
"Entry modes for Chinese enterprises in Latin America"	Valderrey, F. Trigos, F. Kaltenecker, E.	Thunderbird International Business Review
"Interaction of home and host countries' institutional conditions: An analysis of greenfield projects by Latin American firms"	Alcaraz, J. Mazé, D. Buitrago R., R.E	Thunderbird International Business Review

INTER-SCHOOL COLLABORATION

In 2024, more than twenty professors from the School of Business, EGADE Business School, and the School of Government and Public Transformation collaborated on the report "Nearshoring: challenges and opportunities for the integration and strengthening of global value chains in Mexico."

This report analyzes the nearshoring phenomenon and its impact in Mexico by addressing key aspects such as:

- Economic and geopolitical implications of nearshoring.
- Strengthening global value chains and attracting foreign direct investment in strategic sectors.
- Legal framework analysis, with a focus on T-MEC and its opportunities for Mexico.
- Assessment of the logistical and energy capacities needed to position Mexico as a competitive investment destination.

The report provides valuable tools for decision-making in business, government, and organizations, positioning the School as a reference in applied research on contemporary economic challenges.

NATIONAL AND INTERNATIONAL COLLABORATIONS

The School strengthened its partnerships with institutions and international organizations to promote collaborative research and knowledge generation.

Among the most notable partnerships are:

- Pennsylvania State University: collaboration on business innovation and global strategy projects.
- Babson College: partnership for entrepreneurship and organizational transformation research.
- Strategic Management Latin America (Strategic Management Society): agreement signed in 2024 to promote research in strategic management in the region.

RESEARCH INSTITUTES

The interdisciplinary research institutes at Tecnológico de Monterrey play a crucial role in fulfilling our mission of generating knowledge in critical areas. Each institute has a specific purpose that drives scientific advancement and addresses key challenges in today's society.

INSTITUTE FOR THE FUTURE OF EDUCATION (IFE)

IFE aims to transform education through research-based educational innovations with the purpose of improving the quality of higher education and lifelong learning. It also supports faculty development and facilitates experimentation and data analysis through specialized platforms and resources.

> **IFE AIMS TO IMPROVE THE LIFE OF MILLIONS OF PEOPLE THROUGH TRANSFORMING HIGHER EDUCATION AND LIFELONG LEARNING AROUND THE WORLD**

Key Achievements:

- Publication of over 500 academic articles, including 166 in international scientific journals.
- Secured $11.3 million MXN for research and innovation projects.
- Funded 130 Novus projects, generating 122 scientific publications.
- Relocation of IFE Europe to Bilbao, in partnership with Mondragon University.
- Establishment of the Cyber-Physical Learning Alliance Summit (CPLA), a network of 145 researchers from 40 universities.

Highlighted Projects:

- Simulating for Learning: a 4.0 education platform promoting scientific and social entrepreneurship.
- i-Classroom: a non-invasive monitoring system for analyzing student engagement in real-time.
- Dynamic Model of Future Skills for Industry 4.0: a global taxonomy of skills and labor market needs.
- DigiUGov: inclusive digital transformation in universities across Colombia, Mexico, and Europe.

Collaborations:

- EcoEmprende Project in collaboration with the Instituto Politécnico Nacional IPN
- Partnership with the University of Texas in San Antonio for STEM laboratory learning projects supported by VR

Innovation:

- Development of inclusive learning platforms and systems such as i-Classroom

Key Figures:

- Scopus Publications:
  - 2023: 184 publications
  - 2024: 200 publications
- Researchers with reduced teaching load:
  - 2023: 18 researchers
  - 2024: 14 researchers
- Researchers in SNI (National System of Researchers):
  - 2023: 14 researchers
  - 2024: 11 researchers

RESEARCH

RESEARCH INSTITUTES

INSTITUTE OF ADVANCED MATERIALS FOR SUSTAINABLE MANUFACTURING (IAMSM)

IAMSM seeks to lead the development of sustainable solutions in materials and industrial processes, accelerating the transition to a carbon-neutral economy.

Key Achievements:

- Published over 1,500 articles since 2020, accumulating more than 22,500 citations.
- Funded by Fundación FEMSA for the Materials of the Future project.
- Managed 14 projects in 2024, including collaborations with Cemex, FRISA, and other companies.

Highlighted Projects:

- Development of biodegradable materials, sustainable polymers, and nanomaterials.
- Collaborations with companies in additive manufacturing and carbon footprint reduction.

Collaborations:

- Partnerships with MIT, Southwest Research Institute, and the University of Alberta, focusing on manufacturing and sustainable materials.
- Research on sustainable manufacturing and corporate relocation with the University of Texas at Austin.

Innovation:

- Synthesis of polyols for new polymer materials.
- Development of a modular shading and rainwater collection device.

Key Figures:

- Scopus Publications:
  - 2023: 226 publications
  - 2024: 128 publications
- Researchers with reduced teaching load:
  - 2023: 22 researchers
  - 2024: 21 researchers
- Researchers in SNI (National System of Researchers):
  - 2023: 20 researchers
  - 2024: 19 researchers

INSTITUTE FOR OBESITY RESEARCH (IOR)

IOR provides comprehensive solutions based on scientific evidence to address obesity in Mexico and Latin America, aiming to improve quality of life and promote public health.

Key Achievements:

- Published over 650 articles, with nearly 6,000 citations since 2020.
- Secured $32.4 million MXN in external funding.
- Maintains over 20 active national and international research networks.

Highlighted Projects:

- Validation of FIBROQUEL®
- Food policy with UNICEF
- Genetic identification of obesity risk factors

Collaborations:

- Projects with INTA (Chile), CONICET (Argentina), and FINBA Foundation (Spain).
- Participation in international consortia and studies on obesity-related cancers.

Innovation:

- Development of SeProtect, an antioxidant beverage.
- Early diagnosis of metabolic disorders.

Key Figures:

- Scopus Publications:
  - 2023: 159 publications
  - 2024: 108 publications
- Researchers with reduced teaching load:
  - 2023: 23 researchers
  - 2024: 25 researchers
- Researchers in SNI (National System of Researchers):
  - 2023: 19 researchers
  - 2024: 21 researchers

RESEARCH

COLLABORATIVE RESEARCH

DISTRITOTEC

Distritotec is an urban community sponsored by Tecnológico de Monterrey, designed to generate a positive impact on people's lives through meaningful encounters. It acts as a strategic platform that connects the institution with the community and industry through social service projects, tactical urbanism and community activities.

distritotec served as a setting for various research projects focused on urban and social issues.

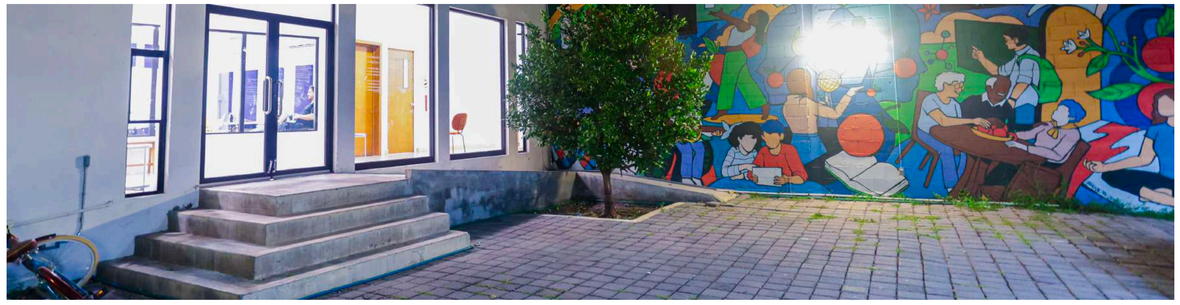
- Risk Culture in distritotec and Campana Altamira: in collaboration with the Universidad Autónoma de Nuevo León this project implemented participatory strategies to reduce urban risks through social mapping

- Public Space Usage Monitoring: in partnership with the Center for the Future of Cities, technology was developed to analyze usage patterns, identify areas for improvement, and optimize space management in locations such as Parque Central and Galería Abierta.

EXPEDITION FEMSA

In 2024, Tecnológico de Monterrey set a milestone in the promotion of interdisciplinary innovation with the creation of a space for transforming ideas into solutions of global impact. EXPEDITION FEMSA is positioned as a center where researchers, entrepreneurs and creative leaders will work together to address social and economic challenges through science- and technology-based projects. This environment will foster the connection between academia, industry and society, strengthening the ditritotec innovation ecosystem.

The activities developed inside will be oriented towards applied research and collaboration in strategic areas such as integrated health, sustainable manufacturing and education of the future. With initiatives such as the Science Gallery, which integrates science and art to inspire new ideas, and specialized laboratories that promote advanced experimentation, this center will become an engine for the development of high-impact projects. The presence of institutes such as the Institute for the Future of Education (IFE) and the Institute for Obesity Research (IOR) reinforces its purpose of leading the creation of relevant knowledge and innovative solutions.



“WE CELEBRATE THE INAUGURATION OF EXPEDITION FEMSA, AN ICONIC SPACE LOCATED IN DISTRITOTEC THAT CONNECTS THE TECNOLÓGICO DE MONTERREY COMMUNITY WITH INDUSTRY AND SOCIETY. THIS BUILDING BECOMES A MEETING POINT TO FOSTER APPLIED RESEARCH, TECHNOLOGICAL INNOVATION, AND TECHNOLOGY-BASED ENTREPRENEURSHIP, CONSOLIDATING OUR ROLE AS A CATALYST FOR SOLUTIONS TO THE GREAT CHALLENGES OF HUMANITY.”

DAVID GARZA
EXECUTIVE DIRECTOR, TECNOLÓGICO DE MONTERREY

RESEARCH

FACULTY IN RESEARCH

The role of the faculty is essential for promoting research within the Tecnológico de Monterrey Education Group. As project leaders and generators of knowledge, they are decisive contributors to the development and implementation of initiatives that address local and global challenges.

Additionally, their efforts to engage in global academic networks and produce cutting-edge research strengthens the academic and professional ecosystem, positioning Tec de Monterrey as a benchmark in educational excellence.

This year, significant efforts were made to continue to enhance the academic and professional profile of the faculty members to ensure our position as one of the best faculties in the region.

Among the key initiatives for attracting and developing academic talent was the 2024 Faculty Classification, a process that allows professors to advance in their professional careers based on academic performance, research, and teaching impact.

Also, in 2024, 14 sabbatical periods were granted to support faculty development by enabling their engagement in educational innovation, research, and collaboration with international institutions.

Faculty of Excellence

The Faculty of Excellence program, aimed to attract exceptional talent to Tecnológico de Monterrey with the goal of enhancing the academic and research ecosystem, kickstarted several projects. The most important ones are:

- "A Futuristic Perspective for Water Security in Mexico" (Manish Kumar, EIC): use of machine learning to predict nitrate pollution, focusing on sustainable water management and public health.

- "Analysis of Nearshoring Impact in Mexico" (Ernesto Stein, ECSG): evaluation of economic and labor effects of nearshoring in collaboration with the Inter-American Development Bank and the World Bank.

- "Development of a CAR-T Cell Preclinical Discovery and Validation Platform" (Alejandro Madrigal, EMCS): aimed at combating pediatric leukemia through advanced cellular therapy.

- "Biobank of the Metabolic Diseases Research Unit" (Floyd Chilton and Carlos Aguilar, EMCS): research on the genetic-diet relationship in Mexico to prevent cardiometabolic diseases.

- "Civic Wealth Creation for Social Entrepreneurs in Mexico" (Jill Kickul, EN/EGADE): investigates how social entrepreneurs can generate civic wealth and strengthen communities in Mexico.

- "Soundmasters Festival" (Allan Tucker, EHE): event that strengthens the connection between Technology and Music Production students and the audio industry.

RESEARCH IN TECSALUD

In 2024, TecSalud strengthened its leadership in research through flagship projects, strategic partnerships, and advancements in key priority areas. These initiatives have positioned TecSalud as a benchmark in innovation and knowledge generation, with a significant impact both in Mexico and internationally.

PROYECTOS DESTACADOS

Among the most outstanding projects of the year are the ten clinical research protocols developed in collaboration with leading pharmaceutical companies, including Roche, Amgen, Merck, GSK, Novartis, Novo Nordisk, and Gilead. These protocols, focused on oncology, neurology, and cardiology, represent a significant advancement in the treatment of complex diseases. So far, 42 participants have been recruited to contribute to the development of advanced therapies, further consolidating TecSalud's role in clinical research.

Another key pillar was the oriGen Project, a large-scale initiative with the goal of creating a repository of genetic and clinical-epidemiological information from 100,000 Mexican individuals. This year, the project reached 68,587 participants and successfully sent 30,000 samples for sequencing to Regeneron. These developments have made its database an essential tool for researching and developing solutions to Mexico's most pressing health challenges, while also contributing to global knowledge on human genetic diversity. The project's impact is also evident in the growing interest from academic and scientific institutions, as well as local and national governments, which seek to collaborate in this transformative effort.

Regarding strategic partnerships, TecSalud signed an agreement with the Ragon Institute, together with Mass General Brigham, MIT and Harvard, with the goal of promoting scientific advances in key areas such as immunology and oncology. This agreement has provided access to state-of-the-art laboratories and established postdoctoral fellowship programs in immunology, laying the foundation for the creation of a world-class immunology center in Mexico. It also fostered academic and scientific exchange through activities such as shared symposiums, collaborative projects and student mobility programs, focused on addressing the most urgent challenges in the field of health.

In 2024, TecSalud's Early Childhood Center implemented key initiatives for the comprehensive development of children in their early years.

In the area of research, the National Survey of Adverse Childhood Experiences (ACEs) was completed, in collaboration with the National Institute of Public Health (INSP) and the Cuida Center of the Catholic University of Chile. In addition, the Leo Project in Chiapas showed that the use of digital tools contributes significantly to the development of literacy skills in preschool and elementary school children. These actions were complemented by scientific dissemination activities, such as the International Early Childhood Forum and participation in the Monterrey International Book Fair, which had an impact on children and caregivers. Lastly, the launch of the Certificate in Early Childhood Policy and the linkage with institutions such as the Stanford Center on Early Childhood underscored TecSalud's commitment to children's education and well-being.

"OUR COMMUNITY IS THE ENGINE THAT DRIVES OUR PURPOSE"

"WE HAVE ALSO MADE SIGNIFICANT PROGRESS IN CLINICAL RESEARCH IN COLLABORATION WITH NATIONAL AND INTERNATIONAL INSTITUTIONS. WE FIRMLY BELIEVE THAT A CULTURE OF KNOWLEDGE NOT ONLY STRENGTHENS INNOVATION BUT ALSO TRANSFORMS THE GLOBAL MEXICO'S PERCEPTION."

Dr. Guillermo Torre Amione
Rector, TecSalud

2024 ANNUAL REPORT

2024 ANNUAL REPORT

Research at Tecnológico de Monterrey is much more than an academic component; it is a pillar that drives the institutional vision of transforming lives and communities through knowledge. Each project reflects the institution's commitment to excellence and the search for solutions to the world's most pressing challenges. With an interdisciplinary and collaborative approach, research is integrated into academic training, the links with various sectors and the generation of impact at local, national and international level. This ongoing commitment makes Tecnológico de Monterrey a benchmark in the creation of knowledge that inspires actions to build a more prosperous, sustainable and inclusive future for all.

The information presented in this report has been provided by the different entities that are part of Tecnológico de Monterrey Education Group. There were different consultations to the National and Graduate Schools, as well as the rector's office of TecSalud. We are deeply grateful for the collaboration and commitment of all the areas involved in the preparation of this report. Their contribution has been cornerstone to comprehensively reflect the achievements and progress of the educational group in 2024.