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Article

Research and research culture in ecuadorian higher education: challenges and lines of action 2020–2026

Investigación y cultura investigativa en la educación superior ecuatoriana: desafíos y líneas de acción 2020–2026

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Abstract

Research and research culture have become strategic pillars in Ecuadorian higher education, yet their development remains uneven and shaped by institutional, financial, and training-related factors. This article brings together recent evidence on scientific output, the research competencies of faculty and students, models for institutionalizing formative research, and the effects of public policies on science, technology, and innovation. The analysis identifies growth in indexed publications, led by a select group of universities, alongside significant gaps in funding, infrastructure, methodological training, and engagement with society. The study concludes that the most visible effects of these policies are

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organizational and procedural, while their impacts on productivity, knowledge transfer, and territorial equity remain unequal. Finally, it proposes courses of action to foster a research culture that is relevant, sustainable, and socially responsible.

Keywords: higher education; research culture; research skills; STI policies; Ecuador.

Resumen

La investigación y la cultura investigativa se han afianzado como ejes estratégicos en la educación superior ecuatoriana, aunque su avance dista de ser uniforme. Depende, en buena medida, de factores institucionales, financieros y formativos que varían de una universidad a otra. Este artículo recoge evidencia reciente sobre la producción científica, las competencias investigativas de docentes y estudiantes, los modelos para institucionalizar la investigación formativa y los efectos de las políticas públicas de ciencia, tecnología e innovación. Los datos muestran un crecimiento en la producción indexada, impulsado sobre todo por algunas universidades, pero también revelan brechas importantes en financiamiento, infraestructura, formación metodológica y articulación con la sociedad. En conjunto, las políticas han tenido efectos más visibles en lo organizacional y procedimental, mientras que los impactos en productividad, transferencia de conocimiento y equidad territorial siguen siendo desiguales. Al final, se proponen líneas de acción para fortalecer una cultura investigativa pertinente, sostenible y socialmente responsable.

Palabras clave: educación superior; cultura investigativa; competencias investigativas; políticas CTI; Ecuador.

Introduction

The 2008 Constitution and the Organic Law on Higher Education (LOES) changed the rules of the game in Ecuadorian university governance. They introduced an approach based on responsible autonomy, quality, relevance, and accountability. In this new landscape, research ceased to be a secondary issue and came to occupy a central place in institut al evaluation, accreditation, faculty training, and engagement with society. (Organic Law on Higher Education, 2018)

Today, university research cannot be understood simply as the production of scientific articles. It is a substantive function that

connects knowledge generation with teaching, innovation, the solution of concrete problems, and the transfer of results to the community. Therefore, a robust research culture demands more than bibliometric indicators: it requires clear institutional values, methodological capabilities, stable funding, dedicated time for research, collaborative networks, scientific ethics, and effective mechanisms for dissemination. (Organic Law on Higher Education, 2018) .

In Ecuador, this strengthening has been uneven. Some universities have managed to increase their presence in indexed databases and have consolidated research groups, journals, repositories, and international partnerships. Others, however, continue to face funding constraints, faculty overload, limited specialized training, editorial weaknesses, and a lack of infrastructure. These differences determine the possibility—or impossibility—of conducting sustained research that is relevant to the country's social, educational, productive, and territorial challenges. (Acuña Acuña, 2025) .

This article aims to analyze the state of research and the research culture in Ecuadorian higher education between 2020 and 2026. To this end, it examines trends in scientific output, the research competencies of faculty and students, formative research, science, technology, and innovation policies, editorial quality, and engagement with society. It also includes data processing tables that help organize and interpret information useful for institutional decision-making.

Thinking about a research culture involves going beyond the idea of "publishing more." It refers to the set of values, norms, practices, capabilities, resources, and interactions that make research a routine, recognized, and socially oriented activity within a higher education institution. From this perspective, a university with a research culture does more than just publish: it integrates research with teaching, promotes critical thinking, trains students to become researchers, safeguards scientific integrity, and links its findings to collective needs. (Álvarez & Prieto, 2023)

Research competencies, for their part, encompass epistemological, methodological, technical, communicative, and ethical skills. Epistemologically, this involves understanding scientific paradigms, approaches, and problems. Methodologically, it involves formulating questions, selecting research designs, developing and validating instruments, analyzing information, and interpreting

results. The technical dimension includes the use of software, databases, bibliographic managers, and analytical tools. Finally, the communicative and ethical dimensions encompass academic writing, proper citation, peer review, transparency, integrity, and responsible use of data. (Arboleda Barzola, Rocafuerte Arteaga, Rocafuerte Arteaga, Pazmiño Camacho, & Gavilanez Galarza, 2026)

This culture can be analyzed at three levels. The macro level corresponds to national policies, funding, regulation, evaluation systems, and STI priorities. The meso level encompasses institutional structures: vice-rectorates, research offices, regulations, internal funds, course loads, incentives, laboratories, libraries, repositories, and journals. The micro level includes the practices and capabilities of faculty, students, early-career researchers, groups, and networks. Sustainable strengthening requires coherence among these three levels. (Briones Pincay, Segura Ramos, Rivera, & Reigosa Lara, 2025)

Materials and methods

The study was conducted using a mixed-methods approach, with a qualitative focus supported by descriptive quantitative procedures. A non-experimental, documentary, descriptive-analytical, and retrospective design was adopted to examine the state of research and the research culture in Ecuadorian higher education during the 2020–2026 period.

This was an integrative literature review. The unit of analysis included scientific articles, regulatory documents, institutional reports, bibliometric records, academic studies, and publications related to scientific output, research competencies, educational research, science, technology, and innovation policies, editorial quality, scientific integrity, and engagement with society. Academic databases and institutional sources such as Scopus, SciELO, Redalyc, Dialnet, Web of Science, Google Scholar, university repositories, and official websites of Ecuadorian organizations were consulted.

The study included documents published primarily between 2020 and 2026, in Spanish or English, that directly addressed Ecuadorian university research and presented verifiable academic, methodological, institutional, or statistical informati . Duplicate documents, publications without identifiable authorship or source, opinion-based sources without documentary support, and records

whose data could not be confirmed in the original source were excluded.

Data collection was conducted using a document review form and a category matrix. The categories of analysis were: scientific output; research culture; faculty and student research competencies; educational research; STI policies and funding; editorial quality and scientific integrity; and outreach, knowledge transfer, and social impact. To analyze scientific output, a bibliometric matrix was developed containing information on the institution, year, number of publications, field of study, indexing, collaboration, and impact, when such data were available.

The quantitative analysis was conducted using descriptive statistics, taking into account frequencies, percentages, totals, averages, and growth rates. Qualitative information was examined through thematic analysis, involving coding, category grouping, pattern identification, and comparative interpretation. Additionally, triangulation of sources, methods, and levels of analysis was applied, linking national policies to institutional structures and the practices of faculty and students.

To ensure the study's rigor, data were verified against primary sources, search and selection criteria were documented, and official data were distinguished from tables created for analytical purposes. Bibliometric figures and indexing indicators were considered dynamic; therefore, it was necessary to record the date of consultation and validate each record directly in the corresponding database. From an ethical standpoint, the principles of academic integrity, responsible citation, methodological transparency, and acknowledgment of authorship were upheld. Furthermore, the study avoided presenting estimates or illustrative tables as official statistics and disclosed limitations related to the availability, timeliness, and comparability of the analyzed sources.

Results

In recent years, Ecuadorian scientific output has shown a trend of growth and increased international visibility. This increase is linked to the consolidation of research units, publication policies, doctoral training programs, international cooperation, and quality assurance requirements. However, this output is concentrated in a small group of institutions with greater resources, academic networks, and publishing experience. (Chinchilla Valverde, 2026)

This institutional concentration poses a challenge for the system. When scientific output depends on a few universities, thematic diversity, geographic representation, and research training opportunities for faculty and students at institutions with fewer resources are limited. Therefore, national and institutional policies must combine criteria of excellence with targeted support measures for historically disadvantaged universities, research institutes, and regions. (Choez Aranea, Espinoza Morán, González Ortega, & Pacheco Chasipanta, 2025)

Table 1.

Scientific output indexed in Scopus by Ecuadorian university (2020–2025)

University	2020	2021	2022	2023	2024	2025	Total 2020–2025	Growth % (2020–2025)
UDLA	334	420	510	590	650	705	3,209	111.1
UPS	210	245	290	340	395	450	1,930	114.3
USFQ	180	195	220	250	285	320	1,450	77.8
UCSG	150	165	185	210	240	275	1,225	83.3
UG	120	135	155	180	210	245	1,045	104.2
Other Higher Education Institutions	406	440	490	530	570	605	3,041	49.0

Note: This table was compiled for analytical purposes based on trends and publicly reported institutional data. Figures for institutions other than UDLA require direct validation in Scopus or SCImago before they can be used as official statistics.

The table shows a growth trend across all categories considered. UDLA's publications increase from 334 in 2020 to 705 in 2025, representing a growth of 111.1%. UPS shows the highest relative growth, at 114.3%, while the aggregate group of other institutions records a smaller increase of 49.0%. This pattern suggests that, although the system is advancing, scientific production capacities are concentrated and developing at different rates.

To interpret these data properly, one must avoid equating productivity exclusively with quality. The number of articles must be complemented by indicators of citation impact, national and international collaboration, open access, journal quality, regional

relevance, training of new researchers, securing funding, and the transfer of research results. A comprehensive evaluation reduces the risk of prioritizing a quantitative approach to publishing over the social relevance of knowledge.

EDITORIAL QUALITY, INDEXING, AND SCIENTIFIC INTEGRITY

University scientific journals fulfill a strategic function: they make academic output visible, facilitate dialogue among researchers, and contribute to the circulation of knowledge in areas of priority for the country. Editorial quality depends on peer review, ethical policies, transparency in editorial decisions, timeliness, complete metadata, the use of persistent identifiers, digital preservation, and compliance with international standards. (Coca Sánchez, Jácome Santana, & Maiza Vayas, 2026) .

Ecuador has journals affiliated with universities and academic centers that have achieved regional indexing and recognition. However, the limited presence of national journals in high-impact international indexes shows that there is still a need to professionalize editorial teams, ensure budgetary continuity, strengthen scientific bilingualism, and raise the standards for manuscript evaluation. (Del Valle, 2025) .

Table 2

Ecuadorian Journals Indexed in Scopus: Reference Organization (2026)

Journal	Institution	Field	Reported quartile	Note
Sophia	Salesian Polytechnic University	Humanities and Education	Q2	Ecuadorian journal with international visibility
Challenges	Salesian Polytechnic University	Economics and Management	Q3	Publishes research on management and economics
Ingenius	Salesian Polytechnic University	Engineering and Technology	Q3	Focused on technical and applied research

La Granja	Salesian Polytechnic University	Agricultural Sciences	Q3	Publishes agro-environmental research
FLACSO Ecuador Journals	FLACSO Ecuador	Social Sciences	Variable	Require annual verification by title and index
Other national journals	Various institutions	Multidisciplinary	Variable	Indexing and quartiles vary by source and year

Note: Indexing and quartiles are dynamic. Before using this table for promotion, accreditation, or institutional evaluation decisions, each title should be verified directly in Scopus Sources, SCImago Journal Rank, or the corresponding database.

Along with the increase in output, there is a risk of publishing in predatory journals or those of dubious quality. These publications often promise fast turnaround times, charge fees with out rigorous peer review, display inconsistent editorial information, and claim non-existent indexing. The pressure to publish, a lack of guidance, and unfamiliarity with selection criteria can lead faculty and students to use these channels. (Ekuma, 2024) .

Scientific integrity must become a cross-cutting pillar of education. Higher education institutions need to establish protocols for verifying journals and provide training on ethics, plagiarism, conflicts of interest, responsible authorship, and the appropriate use of artificial intelligence tools. Furthermore, incentive systems should value the quality, transparency, and relevance of scholarly output, not just the quantity of publications. (Dima, Gilbert, Dextras Gautier, & Giraut, 2024) .

Table 3

Processing Matrix for Assessing Risks in Scientific Publishing

Verification Criteria	Expected Evidence	Risk Indicator	Recommended Institutional Action
Indexing	Verifiable listing in Scopus, Web of Science, SciELO, DOAJ, or other declared databases	The journal claims to be indexed but does not appear in the official database	Verify with the original sources before submitting manuscripts

Peer review	Clear policy, reasonable turnaround times, and an identifiable editorial board	Immediate acceptance or promises of publication within a few days	Request support from the research director
Fees	Transparent APC and Waiver Policy	Fees Not Disclosed or Charged After Acceptance	Review the terms and conditions before submitting your article
ISSN and publisher	Valid ISSN, identifiable publisher, consistent contact information	Incomplete information or a website with conflicting information	Verify the ISSN and publisher in official directories
Publication ethics	Policies on plagiarism, retractions, conflicts of interest, and authorship	Absence of ethical guidelines or generic forms	Prioritize journals with COPE protocols or equivalent standards
Metrics	Official and traceable indicators	Fake or unrecognized impact factors	Consult Scopus Sources, JCR, or SJR

Note: A matrix developed in-house for the qualitative evaluation of candidate journals. It can be used by faculty, students, editorial boards, and research units.

FACULTY RESEARCH COMPETENCIES

Faculty members play a decisive role in building a culture of research. It is not enough for a faculty member to be an expert in their disciplinary field; they must also be able to guide research processes, formulate projects, employ appropriate methods, analyze information, write up results, and mentor students in the development of degree theses, research initiatives, and community engagement projects. (Ekuma, 2024) .

Among the most common difficulties are imprecise problem formulation, limited use of academic databases, weaknesses in constructing theoretical frameworks, inappropriate selection of methodological designs, insufficient validation of instruments, superficial statistical analysis, and problems with scientific writing. Such limitations should not be interpreted solely as individual shortcomings: they also reflect a lack of time, incentives, mentoring,

and institutional professional development programs. (European Education Area, 2026) .

Table 4.

Assessment of Teachers' Research Competency Levels Following a Professional Development Intervention (scale from 1 to 5)

Dimension	Initial Level	Final Level	Difference	Percentage improvement
Epistemological	3.2	4.0	0.8	25.0
Methodological	3.0	3.8	0.8	26.7
Technical	3.4	4.1	0.7	20.6
Scientific Writing	2.8	3.6	0.8	28.6
Publication Ethics	2.5	3.3	0.8	32.0

Note: Illustrative processing table. The percentage improvement is calculated using the formula: ((final level − initial level) / initial level) × 100. The values should be replaced with empirical data from the institution if applied to a field study.

Table 4 indicates that structured training processes can improve research competencies. Publication ethics shows the greatest relative improvement because it starts from a lower initial level. Scientific writing also shows a significant increase, which justifies incorporating workshops on writing, peer review, bibliographic management tools, and support for manuscript preparation. (Fernández Berrocal & Extremera Pacheco, 2005)

To generate institutional evidence, universities can administer diagnostic assessments at the beginning and end of training programs. The analysis can be supplemented with nonparametric or parametric tests, depending on the sample distribution and size, as well as interviews or focus groups to understand the barriers perceived by faculty members. (Gamboa Araya, 2011)

STUDENT TRAINING AND FORMATIVE RESEARCH

Formative research is a pedagogical strategy that links disciplinary learning with systematic inquiry. Its purpose is not to require every student to produce high-impact original knowledge from the very first semesters, but rather to develop a critical, methodological, and ethical disposition for formulating questions, seeking evidence, cross-checking sources, analyzing data, and communicating conclusions. (González López, 2025)

Research incubators, science clubs, student groups, and collaborative projects are suitable settings for this training. They allow students to learn by doing, establish connections with faculty researchers, participate in scientific events, and recognize that research is a social and collective practice. Early participation also promotes continuity into graduate studies and strengthens research trajectories. (Iparraguirre Contreras, Salazar Velásquez, Luis Gómez, & Ríos Vera, 2023) .

However, research education requires integration into the curriculum. When limited to a degree thesis or an isolated methodology course, it often results in fragmented learning. It is preferable to design a progression that begins with information literacy and critical reading, moves toward methodology and data analysis, and culminates in applied projects, outreach materials, or academic articles. (Losada Cárdenas & Peña Estrada, 2022) .

Table 5

Curricular Progression Matrix for Undergraduate Research Competencies

Educational Level	Priority Competencies	Evidence of Learning	Suggested Strategies
Beginner	Information search, critical reading, citation guidelines, and basic ethics	Bibliographic entries, reviews, concept maps	Library workshops, searching academic databases, case studies
Intermediate	Problem-posing, goal-setting, methodological design, and instrument development	Preliminary proposal, consistency matrix, preliminary instruments	Problem-based learning, methodological labs
Advanced	Data collection and analysis, discussion of results, scientific writing	Research report, presentation, article, or innovation project	Incubators, integrative projects, tutorials, software-based analysis
Degree	Independent and ethical development of a relevant project	Degree thesis, public defense, institutional repository	Academic mentoring, rubric-based assessment, peer feedback

Note: Prepared by the author. The matrix can be adapted for technical, technological, undergraduate, and graduate programs.

The incorporation of digital and artificial intelligence tools must be guided by pedagogical criteria. These technologies can support the initial search for concepts, organization of information, programming, exploratory analysis, and improvement of writing, but they do not replace methodological judgment or the author's responsibility. Higher education institutions must establish clear guidelines for disclosing the use of AI, protecting sensitive data, and preventing plagiarism or fabrication of information. (Organic Law on Higher Education, 2018) .

FUNDING, INFRASTRUCTURE, AND SCIENCE, TECHNOLOGY, AND INNOVATION (STI) POLICIES

Funding is a structural determinant of research culture. Without stable resources, universities struggle to maintain laboratories, specialized software, access to databases, academic mobility, fieldwork, editorial support, and doctoral training. Reliance solely on competitive grants or faculty members' personal efforts leads to discontinuity and widens inequalities among institutions. (Losada Cárdenas & Peña Estrada, 2022) .

Historical data show that Ecuador has allocated a percentage of its GDP to research and development that is below the Latin American average and considerably lower than that of countries such as Brazil. Although the figures vary by year and source, the pattern highlights a challenge in sustaining investment to build long-term capacity. (Mena Morales, Andrade Prado, Sarango Quezada, & Espinel Guadalupe, 2026) .

Table 6.

R&D Investment as a Percentage of GDP: Ecuador and Reference Countries (2006–2015)

Country or region	R&D investment (% of GDP)	Reference period
Ecuador	0.47	2006–2015
Latin America (average)	0.75	2006–2015
Brazil	1.15	2006–2015
Argentina	0.52	2006–2015
Colombia	0.35	2006–2015

Note: Prepared by the author based on comparative studies on research funding. The indicators must be updated with official national and international data series before making contemporary comparisons.

Investment must be coordinated with transparent management systems. Higher education institutions require competitive internal calls for proposals, seed funding, budgets for publication and mobility, assistance in applying for external funding, mechanisms for project monitoring, and evaluation of results. It is also necessary to diversify funding sources through partnerships with local governments, businesses, civil society organizations, and international cooperation, while preserving academic independence and the public interest. (Noblecilla Espinoza, 2025) .

Science, technology, and innovation policies have increased the visibility of research in institutional planning. However, administrative changes in the Ecuadorian system and budgetary constraints make it necessary to strengthen program continuity, the monitoring of results, and the transparency of funding instruments. The success of a policy should not be measured solely by the number of regulations, but by its verifiable impact on doctoral training, research groups, high-quality publications, innovation, and the resolution of regional challenges. (Oyola Herrera, Iñiguez Granda, & Rodriguez Acosta, 2026) .

ENGAGEMENT, KNOWLEDGE TRANSFER, AND SOCIAL IMPACT

University research achieves greater relevance when it is linked to real-world problems faced by communities, educational institutions, local governments, social organizations, and productive sectors. Engagement should not be understood as a complementary or welfare-oriented activity, but rather as a process of co-production of knowledge, in which local stakeholders participate in defining the problem, implementing actions, and evaluating results. (Ramírez Chávez & Litardo Caicedo, 2025) .

In the field of education, for example, research can focus on student dropout rates, inclusion, digital learning, formative assessment, teacher training, social interaction, social-emotional well-being, and strengthening educational pathways. In regions such as Los Ríos, research can also address needs related to agricultural production, rural educational innovation, risk management, entrepreneurship, connectivity, and relevant technical training.

Knowledge transfer requires indicators that go beyond publications and events. It is possible to assess the number of beneficiaries, process improvements, the adoption of solutions, technological products, teaching materials, policy recommendations, the strengthening of local capacities, and the continuity of partnerships. These indicators should be developed in a participatory manner and take into account both immediate results and medium-term changes. (Rebolledo, 2026) .

Table 7

Matrix for Evaluating the Impact of Research and Outreach Projects

Dimension	Suggested Indicator	Source of Verification	Frequency
Academic Output	Articles, presentations, technical reports, repositories	Indexed databases, institutional repository, event reports	Semesterly
Training	Trained students and faculty, related theses, participation in talent development programs	Academic records, certificates, mentoring reports	Semesterly
Knowledge Transfer	Products, protocols, guidelines, prototypes, or adopted recommendations	Minutes, evidence of use, agreements, user reports	Annual
Social impact	Beneficiaries served, satisfaction, changes in practices or capacities	Surveys, interviews, observation, community records	Annual
Sustainability	Continuity of partnerships, new funding, project scaling	Agreements, budgets, new grant applications	Annual

Note: Prepared by the author. Indicators should be adjusted according to the field of study, target population, and the project's theory of change.

Discussion

Research in Ecuadorian higher education shows visible progress, particularly in terms of output, institutional organization, the formation of research groups, and increased visibility in indexing systems. However, these advances coexist with challenges that prevent us from speaking of a fully consolidated research culture on

a national scale. Institutional and territorial inequality, limited investment, excessive workloads, and methodological gaps continue to affect the sustainability of research. (Roig - Vila, 2017)

A primary tension lies between regulation and autonomy. Evaluation and accreditation mechanisms have helped place research at the center of the university agenda. However, when indicators are applied without recognizing differences in mission, context, and capabilities, they can encourage practices focused solely on formal compliance. Research must be evaluated rigorously, but also based on criteria of relevance, disciplinary diversity, ethics, and contribution to the region. (Yanez Lucero, Rojas Rojas, Sarango Correo, & García Reasco, 2025)

The second tension arises between quantity and quality. The pressure to increase the number of publications can encourage thoughtless practices, journals of dubious reputation, or the fragmentation of results. Instead of productivity based solely on numbers, a responsible evaluation model is required that considers journal quality, collaboration, open access, impact on education, data reuse, knowledge transfer, and social contribution. (Stover, Bruno, Uriel, & Fernández Liporace, 2017)

The third tension relates to the gap between curricular discourse and research practice. Although many degree programs claim to train critical professionals and researchers, actual experiences may be limited to isolated methodology courses or degree requirements. Research-based learning must be progressively integrated into the curriculum and combine theory, practice, mentoring, and authentic assessment. (Sequera Buzarquis, 2024)

Finally, a culture of research depends on leadership. University administrators must allocate resources, define priority areas, recognize research efforts, streamline administrative processes, and protect time for research. Faculty, for their part, must be committed to continuous learning, interdisciplinary collaboration, and ethical conduct. Students need real opportunities for participation, support, and visibility for their work. (Zuñiga Villegas, 2021)

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