Vol. 6, No. 1, 2026, 1-12. DOI: 10.47909/ijsmc.287

pro-metrics

ORIGINAL ARTICLE

The gap in scientific production between Andean countries: A longitudinal analysis of publications in Scopus (2000-2024)

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ABSTRACT

Objective. The objective of this study was to examine the evolution and disparities in scientific production in Bolivia, Colombia, Ecuador, and Peru between 2000 and 2024. The specific aims of this study were to identify the factors that explain the differences in volume, impact, and collaboration patterns.

Design/Methodology/Approach. A longitudinal bibliometric approach was applied using the Scopus database. The analysis encompassed indicators of productivity, citation, international collaboration, and temporal growth, supplemented by a review of public policies and investment in research and development (R&D).

Results/Discussion. Andean scientific production exhibited exponential growth, albeit with marked heterogeneity. Colombia solidified its standing as the regional leader, with a total of 207,998 documents recorded. Notably, Ecuador demonstrated the highest relative acceleration, with an increase of 756% from 2011 to 2020. Despite its relatively low volume, Bolivia obtained the highest citation average (27.42). The study revealed that investment in R&D, the existence of sustained scientific policies, and the intensity of international cooperation were determining factors in the divergent trajectories observed.

Conclusions. The disparities among Andean countries can be attributed to a variety of structural and strategic factors. There is an evident necessity for a concerted and diversified array of public policies that encourage investment, fortify South-South cooperation, and nurture a more equitable and competitive regional scientific ecosystem.

Originality/Value. This study presents the inaugural longitudinal and comparative bibliometric analysis of Andean scientific production, thereby offering empirical evidence to inform the development of public policies and regional integration strategies in science, technology, and innovation.

KEYWORDS: scientific production; Andean countries; science gap; science and technology policies.

Received: 10-09-2025. **Accepted:** 08-12-2025. **Published:** 07-01-2026.

How to cite: García Sarria, J. J., Flórez Guzmán, L. H., Salazar Soplapuco, J. L., Acosta Miraval, E. O., & Haro Zea, K. L. (2026). The gap in scientific production between Andean countries: A longitudinal analysis of publications in Scopus (2000-2024). *Iberoamerican Journal of Science Measurement and Communication; 6*(1), 1-12. DOI: 10.47909/ijsmc.287

INTRODUCTION

Scientific production serves as a critical metric for evaluating a nation's economic and social progress, as it mirrors its potential to produce knowledge, innovate, and compete on the global stage (Tunqui Cruz, 2025a; Vessuri, 2022). Within the broader context of national innovation systems, scientific activity extends beyond the mere generation of academic publications, establishing itself as a pivotal facilitator of knowledge ecosystems that connect universities, research centers, the productive sector, and public policies (Lundvall, 2016). This systemic perspective is particularly relevant in the context of developing countries, where science must confront structural challenges related to limited resources, inadequate infrastructure, and institutional systems in the process of consolidation. A substantial body of research has repeatedly attested to the presence of a notable disparity in scientific productivity between nations in the South American region. A study by da Costa (2024), which analyzed a substantial corpus of over 33,000 documents, has already indicated Colombia's leadership and Ecuador's noteworthy growth. The analysis also highlights the region's specialization in areas such as health sciences. Other bibliometric analyses have corroborated these asymmetries, highlighting the influence of factors such as investment in research and development (R&D), human capital, and research promotion policies (Condor Surichaqui *et al.,* 2025; Narayan *et al.,* 2023). A more specific investigation, such as that conducted by Mayta-Tovalino *et al.* (2021) on dental schools in Peru, demonstrates how these macro trends are reflected at the institutional level.

Notwithstanding these advances, knowledge gaps persist. A significant body of research has been conducted on shorter time periods or specific countries. However, there is a paucity of comparative longitudinal analyses covering the last two decades. Such analyses are necessary to allow for a clearer identification of divergent trajectories and patterns of convergence or divergence among Andean countries. The necessity for this type of analysis is highlighted by studies that emphasize the importance of a more profound comprehension of research trends to inform science policy, as evidenced by the work of Arcila-Diaz *et al.* (2025). In the domain of bibliometrics applied to developing countries, studies have demonstrated that conventional metrics of scientific productivity must be interpreted with consideration for specific contextual factors (Arencibia-Jorge & Rousseau, 2009). The Latin American region, particularly the Andean region, exhibits distinctive characteristics that include inherited technological dependencies, asymmetries in the distribution of scientific capabilities, and patterns of international collaboration influenced by historical power relations (Velho, 2011). Consequently, the bibliometric analysis of these contexts necessitates methodological approaches that integrate both quantitative indicators and qualitative explanatory factors, thereby facilitating a comprehensive understanding of regional scientific dynamics. This approach is consistent with the findings of studies that analyze science, technology, and innovation (STI) policies in the Andean region and their correlation with scientific production (Olivares Álvares, 2024). Bolivia has the most complex trajectory, characterized by limited resources but scientific specializations that have allowed it to join international research networks, particularly in areas related to Andean biodiversity, traditional medicine, and sociocultural studies (Hernández Lara, 2024). These historical differences have shaped the contemporary disparities observed in regional scientific production. Therefore, an analysis is needed that considers both institutional trajectories and underlying structural factors.

Comparative studies on Latin American scientific production have evolved significantly since the pioneering work of Licha (1996) to contemporary analyses that incorporate advanced bibliometric methodologies. Russell *et al.* (2007) established fundamental comparative frameworks for the analysis of regional scientific systems, demonstrating that disparities in productivity reflect both installed capacities and strategic policy decisions. For instance, the historical analysis of Uruguayan scientific production reported by Fernández Pardo *et al.* (2005) demonstrated a significant increase in publications beginning in 1985, which was associated with institutional reforms in the science and technology system. This increase was followed by a decline in 2001, which coincided with the termination of international funding

programs. In a similar vein, indicators from the Red Iberoamericana de Indicadores de Ciencia y Tecnología (RICYT, 2019) demonstrate that, by 2017, Brazil was allocating approximately 1.27% of its GDP to R&D, Argentina 0.55%, Uruguay 0.49%, and Ecuador 0.44%, while the regional average stood at around 0.64%. These disparities in financial investment underscore the influence of installed capacities and public policy decisions on the scientific productivity of Latin American countries. A study by Betancourt Duno (2024) on international collaboration in Andean countries documents that 40% of extra-regional collaborations are concentrated in Europe (mainly Spain) and 38% in North America (especially the United States), evidencing a structure of scientific dependence that limits regional autonomy. Concurrently, this research identifies emerging opportunities to strengthen South-South cooperation networks, a crucial aspect for building a more equitable and robust scientific ecosystem in the Global South (Olivares Alvares, 2025a), particularly in areas of knowledge where Andean countries have comparative advantages.

Analyses of regional scientific specialization have identified distinctive thematic patterns that reflect both natural resources and national development priorities. Health sciences have emerged as the predominant field, consistently ranking in the top three in all four Andean countries, with agriculture, engineering, and environmental sciences following closely behind (da Costa, 2024). This specialization addresses both pressing social needs and the institutional capacities that have been cultivated historically in regional universities and research centers. The theoretical framework of national innovation systems (Lundvall, 2016) provides crucial conceptual tools for understanding Andean scientific dynamics. Colombia has developed a comprehensive system, characterized by the integration of long-term policies that link human resources training, research funding, and incentives for business innovation. The National Plan for Scientific, Technological, and Innovation Development 2007-2019 established specific growth targets for scientific publications, doctoral training, and technology transfer, results that are reflected in its quantitative regional leadership (García Vallejo, 2006). Ecuador implemented a series of transformative policies during the decade from 2007 to 2017. These policies included the "Open Call" Scholarship Program, which provided funding for postgraduate studies to over 11,000 Ecuadorian professionals at prominent international universities. This substantial investment in human capital, in conjunction with the establishment of the Yachay Experimental Technology Research University project, resulted in the exponential growth that has been documented in national scientific production (SENESCYT, 2018).

Peru underwent a significant institutional transformation with the enactment of University Law 30220 (Congreso de la República del Perú, 2014), which established more demanding quality standards for university research and strengthened the regulatory capacities of the National Superintendency of Higher University Education (SUNEDU, in Spanish). Concurrently, CONCYTEC implemented specific programs to finance research, doctoral training, and the repatriation of researchers, thereby catalyzing the accelerated growth observed after 2014 (Millones-Gómez *et al.,* 2021). Bolivia's institutional framework is less consolidated, with the National System of Science, Technology, and Innovation (SNCTI, in Spanish) operating with limited resources but developing strategic specializations in specific niches. The Patriotic Agenda 2025 encompasses objectives aimed at fortifying scientific and technological capabilities. However, the realization of these objectives is encumbered by budgetary and institutional coordination impediments. Moreover, the quality and visibility of national scientific journals are foundational to the dissemination of knowledge. Significant disparities exist in this domain between countries such as Peru and Ecuador, which reflect variations in research and scientific development policies (Olivares Alvares, 2025b). The theoretical foundation for this research is predicated on three conceptual pillars. First, the necessity to implement bibliometric frameworks that are specifically adapted to developing country contexts, thereby overcoming the limitations of methodological approaches designed for established scientific systems, is paramount. Second, the necessity of longitudinal comparative analyses is paramount, as they facilitate the identification of evolutionary patterns and explanatory factors for the divergent trajectories observed in the Andean region.

From a pragmatic standpoint, this study addresses specific demands for information in the formulation of public science and technology policies in the Andean region. National science agencies require robust empirical evidence to justify investments, design human resources training programs, and establish priorities for international collaboration. Similarly, higher education institutions require comparative frameworks that facilitate the assessment of their relative positioning and the identification of areas for improvement in their research strategies. The practical relevance of this phenomenon extends to international cooperation organizations, which require detailed analyses of regional scientific capacities in order to design effective institutional strengthening programs. The Inter-American Development Bank, CAF-Development Bank of Latin America, and United Nations agencies have identified science and technology as priority sectors for regional cooperation. These agencies have called for studies that empirically support their intervention strategies. The objective of this study is to map and quantify the scientific production of Bolivia, Colombia, Ecuador, and Peru during 2000-2024, in order to identify asymmetries in publication volume, citation impact, and international collaboration networks. The fundamental inquiries that have guided this study are as follows: The objective of this study is to ascertain the magnitude and evolution of scientific productivity gaps between Andean countries during 2000-2024, examine the manner in which patterns of international collaboration influence the quality and impact of regional scientific production, and provide substantial empirical evidence that can inform the design of public policies aimed at strengthening science and technology systems in the Andean region. These policies should promote greater convergence, cooperation, and equity in regional scientific development.

2. METHODOLOGY

To guarantee the study's rigor and replicability, a quantitative bibliometric analysis methodology was developed, adhering to the standards established by Hallinger and Kovačević (2021) for longitudinal analyses. This approach enables an objective evaluation of scientific production and its dynamics over time, utilizing standardized and internationally recognized indicators. The selection of the Elsevier Scopus database as the primary data source was determined to be the most suitable option due to its comprehensive coverage of scientific journals, conference proceedings, and books. This selection was made on the basis of its ability to provide a more inclusive representation of global scientific production in comparison to other databases (Singh *et al.,* 2021). Despite its recognized limitations in covering Spanish-language literature and the social sciences and humanities (Tennant, 2020), Scopus provides the metadata necessary for large-scale bibliometric analysis. For this study, all types of documents indexed in Scopus were considered, with the exception of errata and retractions, in order to ensure data quality. Furthermore, a systematic search was conducted for the period between January 1, 2000, and December 31, 2024. The search strategy was meticulously designed to capture all documents in which at least one author was affiliated with an institution in one of the four Andean countries. The country affiliation field (AFFILCOUNTRY) was used with the following queries: AFFILCOUNTRY (Bolivia), AFFILCOUNTRY (Colombia), AFFILCOUNTRY (Ecuador), and AFFILCOUNTRY (Peru). The raw data were exported in CSV format, including complete information on authors, affiliations, titles, abstracts, keywords, citations, and journals. Furthermore, the exported data underwent a normalization process to unify variants in author names and institutional affiliations, ensuring consistency across records. The analysis focused on a set of key bibliometric indicators to assess each country's scientific production and impact:

- **Production indicators:**
  - *Total number of documents (ND):* It measures the total volume of scientific production. ND was enumerated in its entirety, with a point being allotted to each publication. For the purpose of evaluating collaboration indicators, a fractional count system was employed to allocate the weight of collaboration equally among participating countries.
  - *Annual growth rate (AGR):* It measures the evolution of production over time.
- **Impact indicators:**
  - *Total number of citations (TC):* It measures the recognition and influence of scientific production.

  - *Citations per document (CPD):* It measures the average impact of publications.
  - *H-index:* It measures the productivity and impact of citations from a set of works (Hirsch, 2005).
- **Collaboration indicators:**
  - *International collaboration (IC):* It measures percentage of documents with co-authors from different countries.
  - *Main collaborating countries:* It measures identification of the most frequent scientific partners.

During the preprocessing stage, author and institutional affiliation variables were normalized to standardize different name variants and avoid duplicate records. The exported data from Scopus were subsequently processed and analyzed using specialized software tools. The Bibliometrix package in R was utilized to conduct the scientometric analysis and visualization of collaboration networks (Aria & Cuccurullo, 2017). Quantitative data were analyzed using descriptive statistics to compare performance between countries and identify trends over the study period. To contextualize the quantitative findings, a review of the literature on science and technology policies in the Andean region was conducted, as well as reports from organizations such as RICYT and the Ibero-American Observatory of Science, Technology, and Society (OCTS-OEI, in Spanish). This complementary qualitative analysis facilitates the interpretation of the observed trends in light of each country's institutional frameworks and R&D investments, thereby enriching the discussion of the results.

3. RESULTS

A bibliometric analysis of scientific production in Andean countries between 2000 and 2024 reveals a dynamic but uneven growth pattern. The findings are presented below, organized according to the indicators of production, impact, and collaboration defined in the methodology.

3.1. Production indicators

The scientific production of the four Andean countries exhibits significant heterogeneity. Colombia has emerged as the uncontested leader in the region, with a total of 207,946 documents published during the period 2000-2024. Peru and Ecuador follow closely behind, with 78,291 and 60,927 documents, respectively. Bolivia has the lowest number of documents, with 8,170. Colombia's production level is 2.7 times higher than that of Peru and 24.7 times higher than that of Bolivia, indicating a substantial disparity in the research capacity of these nations (Figure 1).

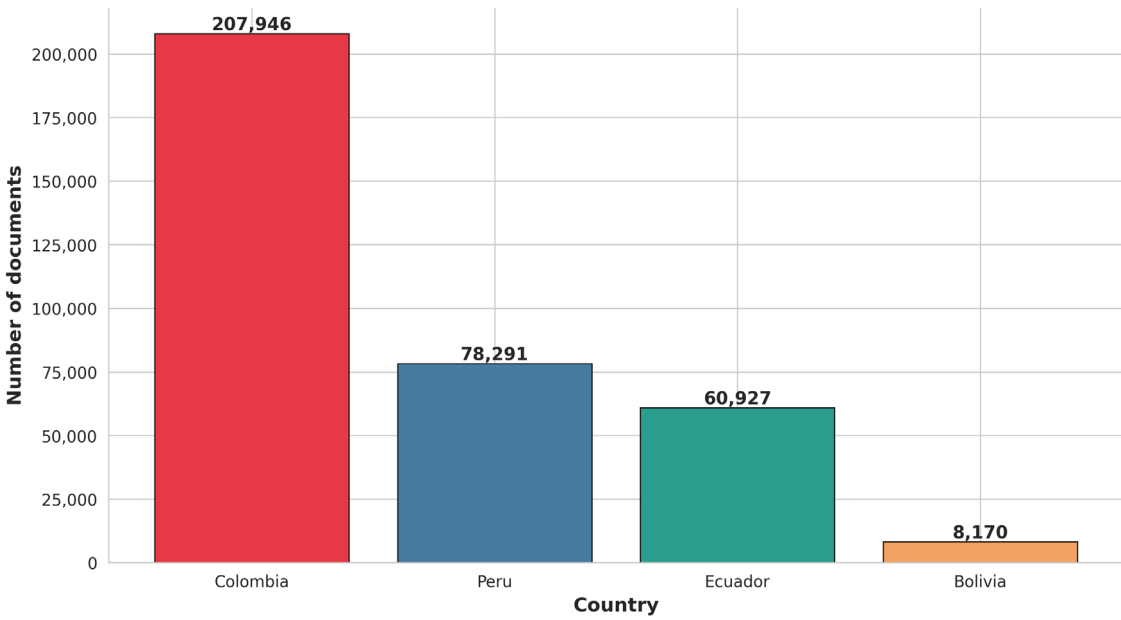

Figure 1. Total scientific production by Andean countries (2000-2024).

A longitudinal analysis of annual production reveals a general trend of sustained growth in all countries, albeit at markedly different rates. There has been a notable acceleration in scientific production in Ecuador and Peru over the last decade, coinciding with the implementation of science and technology investment policies in both countries. Colombia has exhibited consistent economic growth, thereby consolidating its position as a regional leader. In contrast, Bolivia has demonstrated more moderate but steady growth trends (Figure 2).

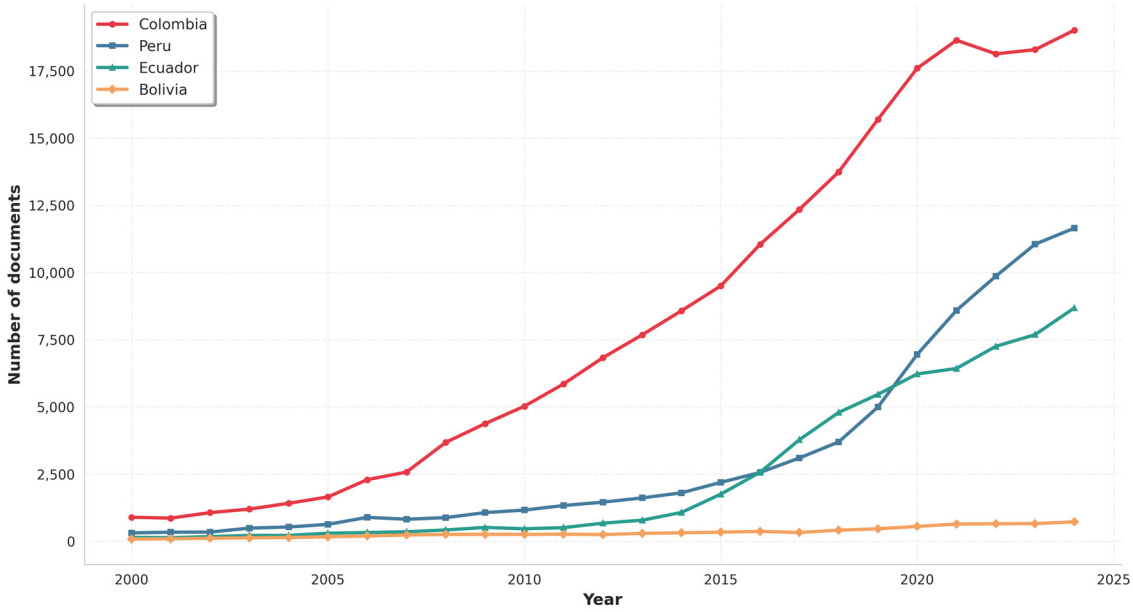

Figure 2. Evolution of annual scientific production by Andean countries (2000-2024).

3.2. Impact indicators

The impact, as measured by the total number of citations, reflects both the volume and quality of scientific production. Colombia has the highest number of citations, followed by Peru and Ecuador. Despite its comparatively lower volume of production, Bolivia exhibits a considerable impact in absolute terms (Figure 3).

The mean number of citations per document provides a different perspective on the scientific impact of the documents in question. Notably, Bolivia has the highest rate of citations per document at 27.42, indicating that its research, though not extensive in volume, is concentrated in areas of significant international importance. Peru is the second most-cited nation, with an average of 14.55 citations per document, followed by Colombia with 14.12, and Ecuador with 12.28. These findings suggest that average impact may not be directly proportional to production volume. The H-index, a metric that combines both productivity and impact, demonstrates a hierarchical structure that is aligned with total production volume. Colombia has the highest H-index, with 436, followed by Peru (340), Ecuador (243), and Bolivia (179). This metric is indicative of the cumulative influence and consolidation of each nation's scientific communities (Figure 4).

To complement the impact analysis, Field-Weighted Citation Impact (FWCI) data were utilized. It is imperative to acknowledge that the normalized impact indicators (FWCI) were retrieved from the SCImago Journal & Country Rank portal, as they are not calculated directly in Bibliometrix. Ecuador has the highest FWCI (1.71), indicating that its production exceeds the global average in its field by 71%. Colombia has the second-highest FWCI (0.98), which is close to the global average.

3.3. Collaboration indicators

The percentage of documents produced through international collaboration serves

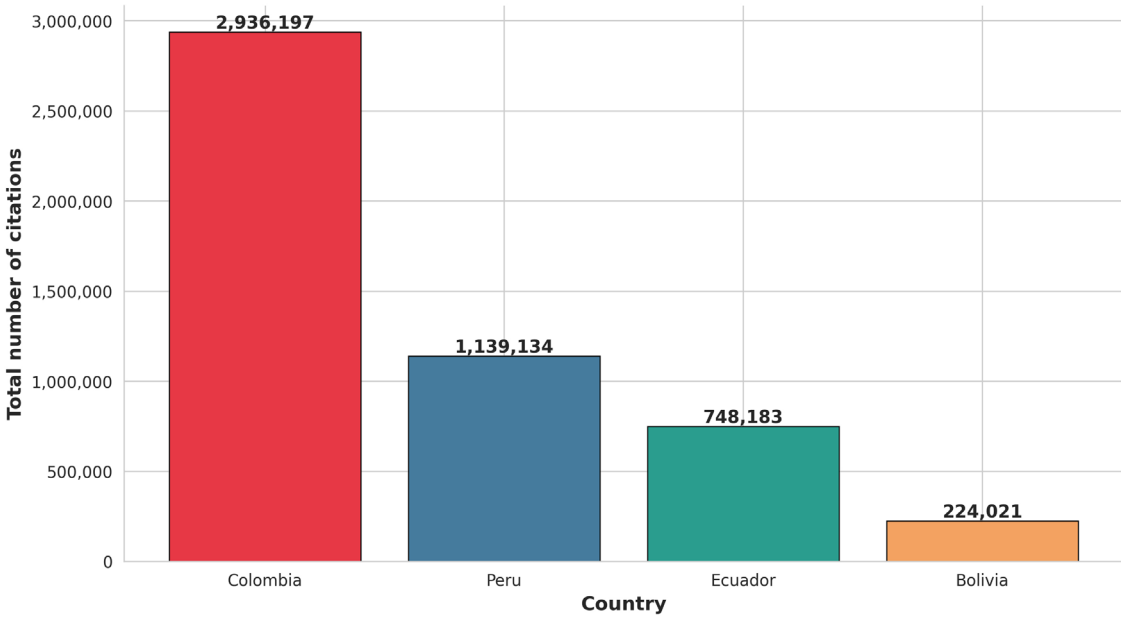

Figure 3. Total number of citations per Andean countries (2000-2024).

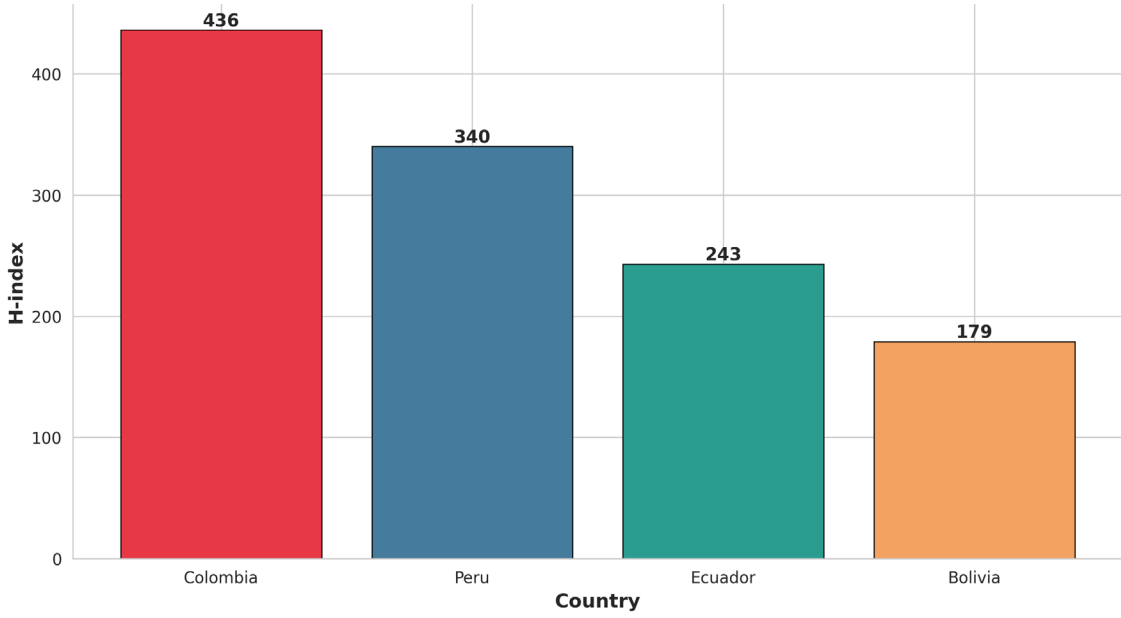

Figure 4. H-index by Andean countries.

as a key indicator of each country's integration into global scientific networks. Ecuador demonstrates the highest percentage of international collaboration, with 65.7% of its documents co-authored with researchers from other countries. Peru and Colombia follow with 60.1% and 46.2%, respectively. These results suggest that international collaboration is a determining factor in the scientific development of the region (Figure 5).

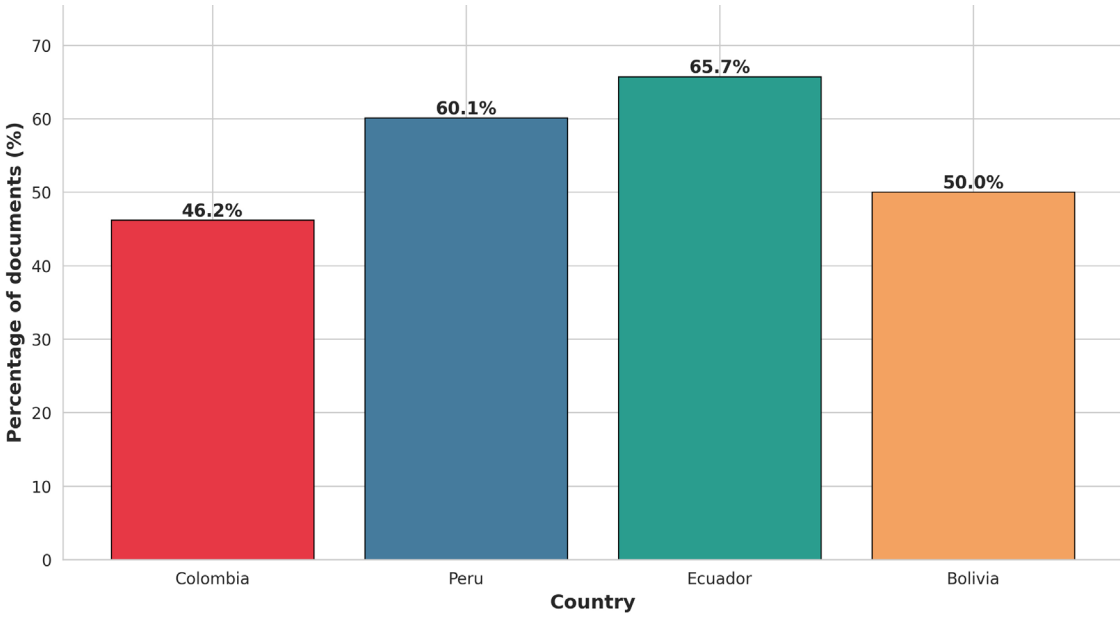

Figure 5. Percentage of documents with international collaboration by Andean countries.

The co-authorship analysis identifies the United States, Spain, and Brazil as the primary scientific collaboration partners for Andean countries. These three countries account for the majority of extra-regional collaborations, reflecting historical and linguistic patterns of scientific cooperation. As illustrated in Figure 6, the number of documents in collaboration with Andean countries exhibits a high frequency, particularly with countries in the Global North.

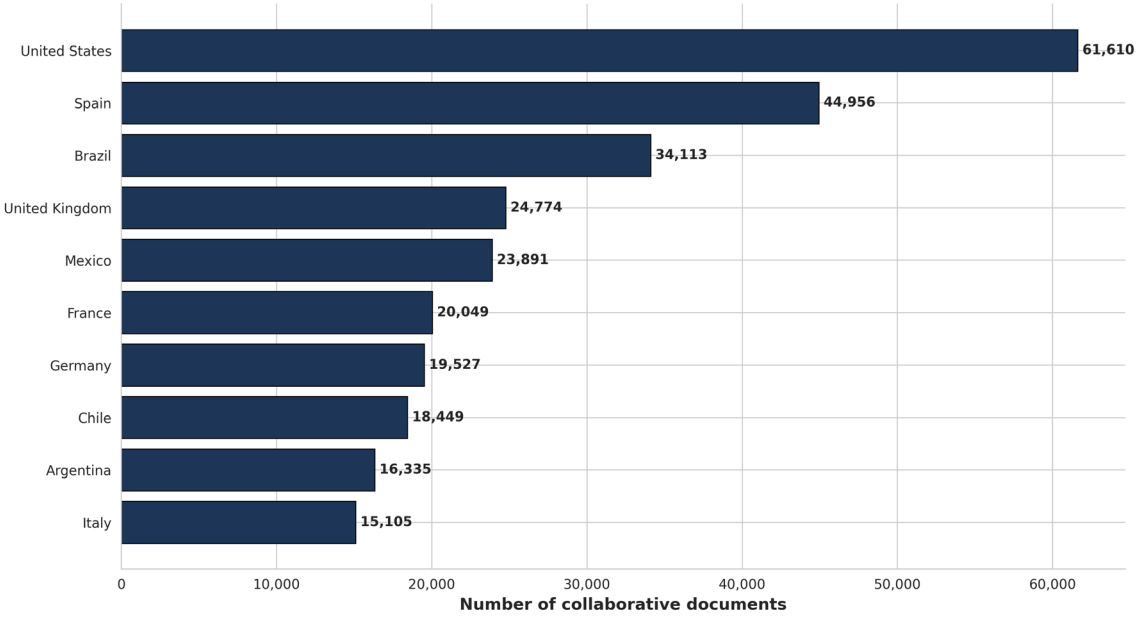

Figure 6. Main collaborating countries of Andean countries.

4. DISCUSSION

The findings of this study indicate significant heterogeneity in scientific production among Andean countries, thereby substantiating the existence of a structural gap that has been previously documented in the extant literature (Chávez-Canales and Aguilar-Arnal, 2025; Tunqui Cruz, 2025b). Colombia's predominant status, with production levels surpassing those of Peru by 2.7 times and Bolivia by 24.7 times, corroborates the conclusions of earlier research that underscores its regional preeminence (Limaymanta & Castillo-Tuesta, 2025). However, the rapid growth of Ecuador and Peru in the last decade suggests a dynamism that could be reshaping the Andean scientific landscape. A notable finding is that Bolivia's high average number of citations per document (27.42), despite its low production volume, is a remarkable finding. This phenomenon may be explained by greater specialization in high-impact research niches or by greater reliance on international collaboration, as suggested by Roa González (2025b) and Betancourt Duno (2024). These researchers found that countries with lower production tend to have higher rates of collaboration as a strategy to overcome structural limitations. Indeed, the substantial proportion of international collaboration in Ecuador (65.7%) and Peru (60.1%) substantiates this hypothesis, corroborating the findings of Castillo and Powell (2020) on Ecuadorian science.

The discourse surrounding the dichotomy between quality and quantity is pertinent in this context. While Colombia leads in volume, Ecuador's normalized impact (FWCI) (1.71) is significantly higher, indicating that its production has a greater impact in the global scientific context. This suggests that science policies should prioritize not only increasing the volume of publications but also enhancing the quality and relevance of research. This point has been emphasized by Martínez Rehpani *et al.* (2025) in their analysis of the relationship between research and educational quality. The analysis must also take into account gender disparities, which have been demonstrated to influence outcomes. The study by Roa González (2025a) indicates that Bolivia has 38% of female researchers below the regional average, suggesting the presence of structural and cultural barriers that hinder female participation in science. Despite the absence of gender-based analysis in this study, it is a pivotal contextual element that exerts a substantial influence on a nation's scientific production capacity. The strong reliance on collaboration with nations outside the region (e.g., the United States, Spain, and Brazil) underscores the need for enhanced intraregional scientific integration. This phenomenon, previously documented by Gutiérrez-Sánchez *et al.* (2025), underscores the imperative to fortify South-South collaboration networks and advocate for a regional research agenda that addresses shared challenges, as proposed by Burga Guevara and Tello Sánchez (2024) from the vantage point of higher education pedagogy.

5. CONCLUSIONS

This study corroborates the notion that the disparity in scientific production between Andean countries is a persistent yet dynamic and multifaceted reality. The primary conclusion of this study is that a uniform model of scientific development does not exist within the region; rather, there are multiple divergent trajectories that necessitate the implementation of customized public policies tailored to each national context. Three key implications for all science policy can be drawn from the results are as follows:

1. It is imperative to move beyond the utilization of volume metrics as the sole indicator of success. The case of Ecuador, which has the highest normalized impact (FWCI) despite not leading in terms of publication numbers, demonstrates the importance of promoting high-quality research with international relevance. Consequently, incentive policies must strike a balance between promoting productivity and cultivating excellence and specialization in strategic niches.
2. International collaboration should be managed as a strategic state policy, rather than as an organic outcome. For countries such as Bolivia and Ecuador, it is a vital tool for overcoming the limitations of their science and technology systems. Nevertheless, the inadequacy of intraregional collaboration networks signifies a neglected prospect. The establishment of regional funds and programs

that promote South-South cooperation to address shared challenges and cultivate a substantial Andean research community is advised.

3. Disparities in production and impact reflect underlying structural barriers, including investment in R&D and gender disparities. A comprehensive and sustainable science policy must necessarily include actions to promote equity and inclusion in the research community. It is imperative to recognize that strengthening the scientific system depends on mobilizing all available human capital.

Conflict of interest

The authors declare that there are no conflicts of interest in this work.

Contribution statement

Conceptualization, data curation, formal analysis, acquisition of funds, investigation, project administration, supervision, validation, visualization, writing – original draft, writing – review and editing: Juan José García Sarria, Leibniz Huxlay Flórez Guzmán, Jorge Luis Salazar Soplapuco, Esther Olivia Acosta Miraval, Karla Liliana Haro Zea.

Statement of data consent

The data generated during the study have been included in the article.

REFERENCES

Arcila-Diaz, J., Delgado-Caramutti, J., Millones-Gómez, P. A., Figueroa-Quiñones, J., & Valencia-Arias, A. (2025). Research trends in Peruvian universities: Proposal for a research agenda with a bibliometric approach. *Scientometrics, 130*(1), 489-514. https://doi.org/10.1007/s11192-024-05211-z

Arencibia-Jorge, R., & Rousseau, R. (2009). Influencia de la visibilidad de los investigadores individuales en el impacto institucional: un ejemplo del enfoque de Prathap para los índices h sucesivos. *Cienciometría, 79*(3), 507-516. https://doi.org/10.1007/s11192-007-2025-0

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics, 11*(4), 959-975. https://doi.org/10.1016/j.joi.2017.08.007

Betancourt Duno, Y., del C. (2024). Colaboración internacional y redes científicas en los países andinos: Análisis de coautorías en Scopus (2000-2024). *Revista de Propuestas Educativas, 6*(12), 88-109. https://doi.org/10.61287/propuestaseducativas.v6i12.6

Burga Guevara, S., & Tello Sánchez, V. (2024). Estudios latinoamericanos sobre el desarrollo de la investigación científica en instituciones de educación superior pedagógica. Horizontes. *Revista de Investigación en Ciencias de la Educación, 8*(34), 1801-1810. https://doi.org/10.33996/revistahorizontes.v8i34.834

Castillo, J. A., & Powell, M. A. (2020). Research productivity and international collaboration: A study of Ecuadorian science. *Journal of Hispanic Higher Education, 19*(4), 369-387. https://doi.org/10.1177/1538192718792151

Chávez-Canales, M., & Aguilar-Arnal, L. (2025). Unlocking Latin America's scientific potential: Challenges and opportunities in a globalized world. *Trends in Cell Biology, 35*(9), 723-728. https://doi.org/10.1016/j.tcb.2025.06.007

Condor Surichaqui, S. S., Condor Surichaqui, E. A., Matos Juarez, A. S., & Condor Surichaqui, W. E. (2025). Indicadores clave en la producción científica de docentes universitarios basado en el cuestionario ACRIN. Horizontes. *Revista de Investigación en Ciencias de la Educación, 9*(36), 344-356. https://doi.org/10.33996/revistahorizontes.v9i36.923

Congreso de la República del Perú. (2014). Ley Universitaria N.º 30220. Superintendencia Nacional de Educación Superior Universitaria (SUNEDU). https://www.sunedu.gob.pe/wp-content/uploads/2017/04/Ley-universitaria-30220.pdf

da Costa, M. G. (2024). Áreas temáticas dominantes en la producción científica andina: Un estudio de especialización disciplinaria en Perú, Ecuador, Bolivia y Colombia. Horizontes. *Revista de Investigación en Ciencias de la Educación, 8*(35), 2659-2669. https://doi.org/10.33996/revistahorizontes.v8i35.895

Fernández Pardo, M., Frank, C., & Pittaluga, L. (2005). *El conocimiento científico uruguayo publicado en revistas internacionales 1981-2002*. Serie Documentos de Trabajo/FCEA-IE; DT05/05. https://iecon.fcea.udelar.edu.uy/images/publicaciones/94/dt-05-05.pdf

García Vallejo, F. (2006). *Plan Nacional de Desarrollo Científico, Tecnológico y de Innovación 2007-2019*. Instituto Colombiano para el Desarrollo de la Ciencia y la Tecnología Colciencias. https://repositorio.minciencias.gov.co/server/api/core/bitstreams/a307f997-5c3e-4045-b893-2834a5e66668/content

Gutiérrez-Sánchez, G., Álvarez-Muñoz, P., Galindo-Villardón, P., & Vicente-Galindo, P. (2025). Scientific collaboration and sustainable development: A bibliometric analysis of the Andean region, Panama, and Spain. *Publications, 13*(1), 10. https://doi.org/10.3390/publications13010010

Hallinger, P., & Kovačević, J. (2021). Science mapping the knowledge base in educational leadership and management: A longitudinal bibliometric analysis, 1960 to 2018. *Educational Management Administration & Leadership, 49*(1), 5-30. https://doi.org/10.1177/1741143219859002

Hernández Lara, P. (2024). Tecnociencia emergente en Bolivia: Retos y oportunidades para la inclusión de mujeres en áreas STEM. *Revista Boliviana de Educación, 6*(11), 62-74. https://doi.org/10.61287/rebe.v6i11.1183

Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. *Proceedings of the National Academy of Sciences, 102*(46), 16569-16572. https://doi.org/10.1073/pnas.0507655102

Licha, I. (1996). *La investigación y las universidades latinoamericanas en el umbral del siglo xxi: Los desafíos de la globalización*. Udual. http://dspaceudual.org/handle/Rep-UDUAL/15

Limaymanta, C. H., & Castillo-Tuesta, P. (2025). Productividad y colaboración científica de países sudamericanos. *Revista Cubana de Información en Ciencias de la Salud, 36*. https://acimed.sld.cu/index.php/acimed/article/view/2263

Lundvall, B. Å. (2016). Sistemas nacionales de innovación y globalización. *La economía del aprendizaje y la economía de la esperanza, 351*. https://library.oapen.org/bitstream/handle/20.500.12657/31613/1/626406.pdf#page=368

Martínez Rehpani, C. G., Calero Zea, M. A., Veloz Escudero, M. M., & Posligua Chica, M. A. (2025). La investigación como herramienta de mejora en la calidad educativa universitaria. *Revista Simón Rodríguez, 5*(10), 154-168. https://doi.org/10.62319/simonrodriguez.v.5i10.52

Mayta-Tovalino, F., Pacheco-Mendoza, J., Diaz-Soriano, A., Perez-Vargas, F., Munive-Degregori, A., & Luza, S. (2021). Bibliometric study of the national scientific production of all Peruvian schools of dentistry in Scopus. *International Journal of Dentistry,* 2021, 1-8. https://doi.org/10.1155/2021/5510209

Millones-Gómez, P. A., Yangali-Vicente, J. S., Arispe-Alburqueque, C. M., Rivera-Lozada, O., Calla-Vásquez, K. M., Calla-Poma, R. D., Requena-Mendizábal, M. F., & Minchón-Medina, C. A. (2021). Research policies and scientific production: A study of 94 Peruvian universities. *PLOS ONE, 16*(5), Article e0252410. https://doi.org/10.1371/journal.pone.0252410

Narayan, A., Chogtu, B., Janodia, M., Radhakrishnan, R., & Venkata, S. K. (2023). A bibliometric analysis of publication output in selected South American countries. *F1000Research, 12,* 1239. https://doi.org/10.12688/f1000research.134574.1

Olivares Álvares, D. M. (2024). Políticas Públicas y Ciencia en la Región Andina: Un Análisis Cuantitativo Comparado. *Revista Simón Rodríguez, 4*(8), 61-69. https://doi.org/10.62319/simonrodriguez.v.4i8.34

Olivares Alvares, E. (2025a). Cooperación Sur-Sur en investigación: Un análisis cuantitativo de la producción científica y la inversión en I+D. *Revista Paraguaya de Pedagogía, 2*(5), 13-25. https://doi.org/10.33996/rpp.v2i5.21

Olivares Alvares, E. (2025b). Revistas científicas nacionales en Perú y Ecuador: Calidad editorial, indexación y rol en la difusión del conocimiento. Horizontes. *Revista de Investigación en Ciencias de la Educación, 9*(38), 2374-2382. https://doi.org/10.33996/revistahorizontes.v9i38.1059

Red Iberoamericana de Indicadores de Ciencia y Tecnología (RICYT). (2019). *El Estado de la ciencia. Principales indicadores de ciencia y tecnología iberoamericanos/interamericanos*. Altunas Impresores. http://biblioteca.ucf.edu.cu/biblioteca/libros_digitales/cts/El_estado_de_la_ciencia_2009.pdf

Roa González, D. M. (2025a). Perspectivas de género en la producción científica: Un análisis comparativo entre Bolivia y América Latina. *Revista Boliviana de Educación, 7*(12), 69-81. https://doi.org/10.61287/rebe.v7i12.1190

Roa González, D. M. R. (2025b). Internacionalización de la Ciencia en los Andes: Un Análisis Cuantitativo de la Colaboración y Producción Científica. *Revista Paraguaya de Pedagogía, 2*(5), 2-12. https://doi.org/10.33996/rpp.v2i5.20

Russell, J. M., Ainsworth, S., Del Río, J. A., Narváez-Berthelemot, N., & Cortés, H. D. (2007). Colaboración científica entre países de la región latinoamericana. *Revista española de documentación científica, 30*(2), 180-198. https://doi.org/10.3989/redc.2007.v30.i2.378

SCImago. (2025). SCImago Journal & Country Rank. https://www.scimagojr.com

Secretaría de Educación Superior, Ciencia, Tecnología e Innovación (SENESCYT). (2018). *Programa de Becas Internacionales de Posgrado 2018*. https://www.educacionsuperior.gob.ec/wp-content/uploads/2018/05/BASES-DE-POSGRADO-INTERNACIONAL_16.05.18_Aprobadas-por-Comite%CC%81.pdf

Singh, V. K., Singh, P., Karmakar, M., Leta, J., & Mayr, P. (2021). The journal coverage of Web of Science, Scopus and Dimensions: A comparative analysis. *Scientometrics, 126*(6), 5113-5142. https://doi.org/10.1007/s11192-021-03948-5

Tennant, J. P. (2020). Web of Science and Scopus are not global databases of knowledge. *European Science Editing, 46,* Article e51987. https://doi.org/10.3897/ese.2020.e51987

Tunqui Cruz, R. C. (2025a). Impacto de la Producción Científica en el Desarrollo Socioeconómico: Un Análisis Cuantitativo Global. *Revista Boliviana de Educación, 7*(13), 125-135. https://doi.org/10.61287/rebe.v7i13.1199

Tunqui Cruz, R. C. (2025b). Factores institucionales y políticas públicas que inciden en la producción científica en países andinos: Un enfoque comparativo entre 2000 y 2024. *Revista de Propuestas Educativas, 7*(13), 91-105. https://doi.org/10.61287/propuestaseducativas.v7i13.6

Velho, L. (2011). Conceitos de ciência e a política científica, tecnológica e de inovação. *Sociologias, 13,* 128-153. https://doi.org/10.1590/S1517-45222011000100006

Vessuri, H. (2022). *Conocimientos, sociedades y tecnologías en América Latina: Viejos modelos y desencantos, nuevos horizontes y desafíos*. Universidad de los Andes. https://doi.org/10.51573/andes.9789585197169