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SCIENTIFIC PRODUCTION IN HIGHER INSTITUTIONS: A SYSTEMATIC REVIEW

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ABSTRACT:
This work provides a general visualization of scientific production in higher institutions through a systematic review of different sources and databases. Firstly, the data were analyzed using Excel to organize the information of the documents compiled. Secondly, the tools were analyzed to evaluate scientific production around the world and how scientific production has been growing. Finally, the results exposed that scientific production is a product of research developed mainly in Higher Education Institutions and/or universities. Through its research mission, developed by university professors, it has become a fundamental instrument for the improvement of academic quality in HEIs worldwide, where publications are considered the main component of scientific activity and a fundamental pillar in higher education

INTRODUCTION

Scientific production is the direct result of research activity, in which products such as scientific research articles, books, book chapters, patents, utility models and technological products, architecture, and design, among others, are derived Minciencias (2021), occurring mainly in Educational Institutions such as universities in their research processes because they are creators and disseminators of knowledge. Piedra & Martínez (2007); Arechavala (2011); and Peralta *et al.* 2011 affirm that Higher Education Institutions (HEIs) are educational organizations that establish scientific production in their mission through publications that constitute the main component of scientific activity, it is also associated with the quality of the universities associated with the teaching processes and social projection, promoting the dissemination of the knowledge generated in its investigative processes.

On the other hand, García de Fanelli (2014); and Bastidas & Benites (2016) argue that scientific production in educational institutions has increased considerably in recent years thanks to its eminently social mission through the scientific productivity of researchers, whose research results constitute an instrument that improves academic quality in the HEIs globally. Another important aspect, according to Ordorika & Rodríguez (2010), is the quality of scientific production measured through indicators in the different rankings that establish institutional positioning and prestige, such as Times Higher Education in the global sphere, which is one of the most popular and influential, in the same way, according to Gómez & Gerena (2017) Scimago Institution Rankings, which weights the universities according to their publications using eight evaluation criteria. To O'Loughlin *et al.* (2015), Universities are classified according to their scientific productivity and academic indicators, which serve as the basis for financing and decision-making, which contribute to the academic quality and reputation of the institutions.

The present work aims to present a general visualization of scientific production in higher institutions using a systematic review of different sources and databases considering the topic of scientific production in higher institutions as an essential subject that has grown in recent years.

Tools to evaluate Scientific Production

According to Frangopol (2005), a statistical analysis was developed to compare various countries' scientific productivity at the beginning of the 20th century. Later, in 1963, the Science Citation Index (ISI) database was created, which provided a quantitative method to evaluate studies on the development of science. Later in 1969, the concept of bibliometrics was used for the first time as a statistical method to compare the scientific publications found in databases. In the same way, the term scientometrics was generated in this period, considered the quantitative method for generating, disseminating, and using scientific information. On the other hand, according to Rauhvargers (2011); and Salmi & Saroyan (2007), university rankings classify the quality of scientific production whose origin was between 1870 and 1890 by the Commission of the U.S. Bureau of Education. Subsequently, different systems for classifying universities worldwide originated, such as the "American Best Colleges" ranking published in the United States for the first time in 1983 by the United States. News and World Report. Similarly, in Germany, since 1998, the Center for the Development of Education (Centrum für Hochschulentwicklung-CHE) has offered a system of quality indicators for universities. Likewise, since 2002 in Pakistan, a university ranking has been developed to promote the rapid and comprehensive development of the tertiary education system.

Concerning the above, Buela et al. (2007) published the first global university ranking in 2003, called the Academic Ranking of World Universities (ARWU or Shanghai Ranking). Later other global university rankings were developed by other entities based on academic data that can be compared internationally using different methodologies, evaluation criteria, and indicators. For this reason, there is a wide variety of classifications of the scientific production of universities. Complementary to the above, Rauhvargers (2011) states that global rankings can be classified into four groups according to the object of measurement: rankings that classify world-class universities; the rankings that evaluate research results; those that measure the impact on the web and those that make comparisons between universities. To King *et al.* (2020), From the last decade of the 20th century, scientific research began to emerge around university rankings. Until 2004, these publications were scarce, increasing significantly in subsequent years (1988 to 2018 period), when 557 articles were published in journals indexed in WOS related to this topic. According to Aranguren *et al.* (2016), In recent decades, interest in scientific production in the educational field has increased, driven by academic research that contributes to the educational quality of universities, which contributes to sustaining the eminently social mission of these institutions.

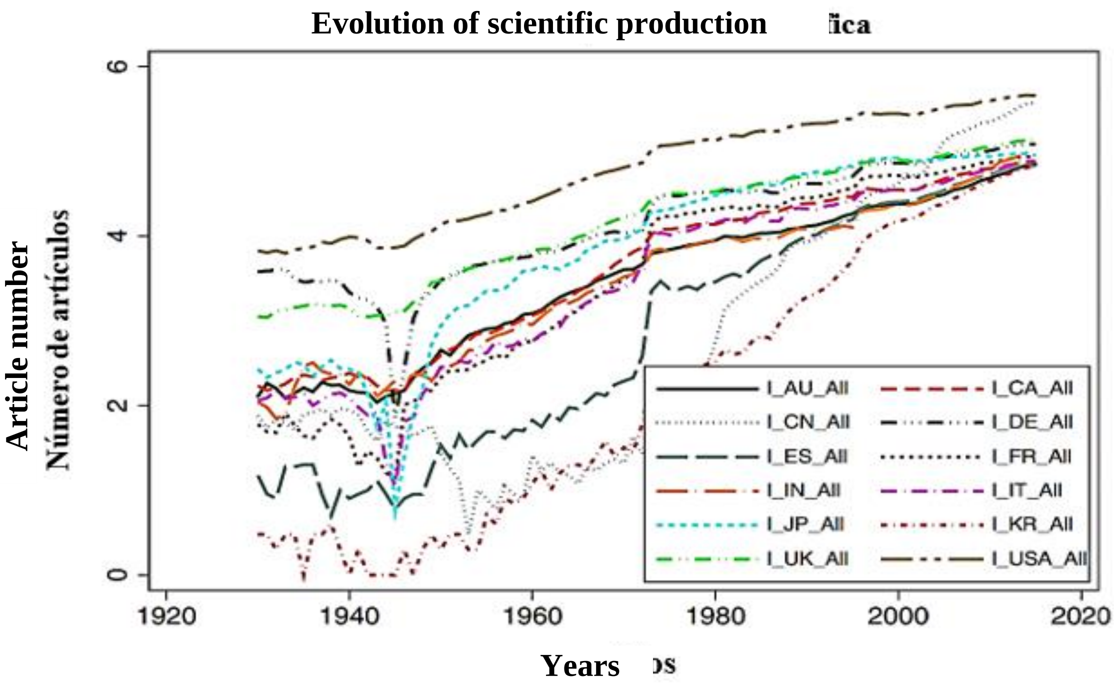
One of the most important Rankings is the SCImago Journal & Country Rank (SJR) (2022), which works through a virtual platform and publication of information available since 1996; this platform has the purpose of measuring the impact and visibility of the scientific publications contained in *Scopus*; its origin is due to the Google PageRank™ algorithm developed by SCImago, it includes scientific indicators of journals and countries that can be compared or analyzed separately, in the case of journals, which can also be grouped into 27 thematic areas, 309 specific thematic categories or by country. For citations, data can be extracted from more than 34,100 titles in more than 5,000 international publishers and metrics or performance indicators from 239 countries worldwide. The SJR indicator was developed by SCImago, the Higher Council for Scientific Research (CSIC), and the universities of Granada, Extremadura, Carlos III of Madrid, and Alcalá de Henares, which are responsible for analyzing, representing, and retrieving *Scopus* information through visualization techniques. Consistent with the above, SCImago has also developed the SCImago Institution Rankings (SIR), which classifies academic and research institutions through an indicator that combines performance in research, innovation in results, and the social impact generated by the measured by their visibility on the web. Finally, there is The Shape of Science applications that allow information to be displayed to reveal the structure of science, and Atlas of Science as an information system focused on graphically representing Ibero-American Scientific Research through interactive maps.

In this way, Journal Citation Reports (JCR), according to Minciencias (2022), is a tool that allows evaluation of the journals that are part of Clarivate Analytics through the Web of Science (WOS) platform through systematic and objective indicators to identify the best scientific journals in the world, for which it compiles the bibliography that has been cited in the articles, it also measures the impact of scientific journals in their thematic area and establishes the relationship between citation and cited journals, as well as assigning the quartiles to the journals that are part of each category.

World Scientific Production

Historically, studies have been carried out on scientific production at an international level, considering different databases and Rankings and applying different methodologies, which have contributed to the analysis of the most scientifically productive countries worldwide, in Latin America and Ibero-America, discovering economic aspects and that have allowed increasing and decreasing scientific advances, some of them are described below. It is in this way that scientific production has presented a significant increase over the years; Monroy & Diaz (2018), state that it is a logarithmic and linear evolution in all areas of knowledge due to the constant annual growth in the number of articles published in the most scientifically productive countries worldwide such as Australia (AU), Canada (CA), China (CN), Germany (DE), Spain (ES), France (FR), India (IN), Italy (IT), Japan (JP), South Korea (KR), United Kingdom (UK) and United States (USA), as is shown in Fig. 1.

Figure 1. Evolution of scientific production worldwide.

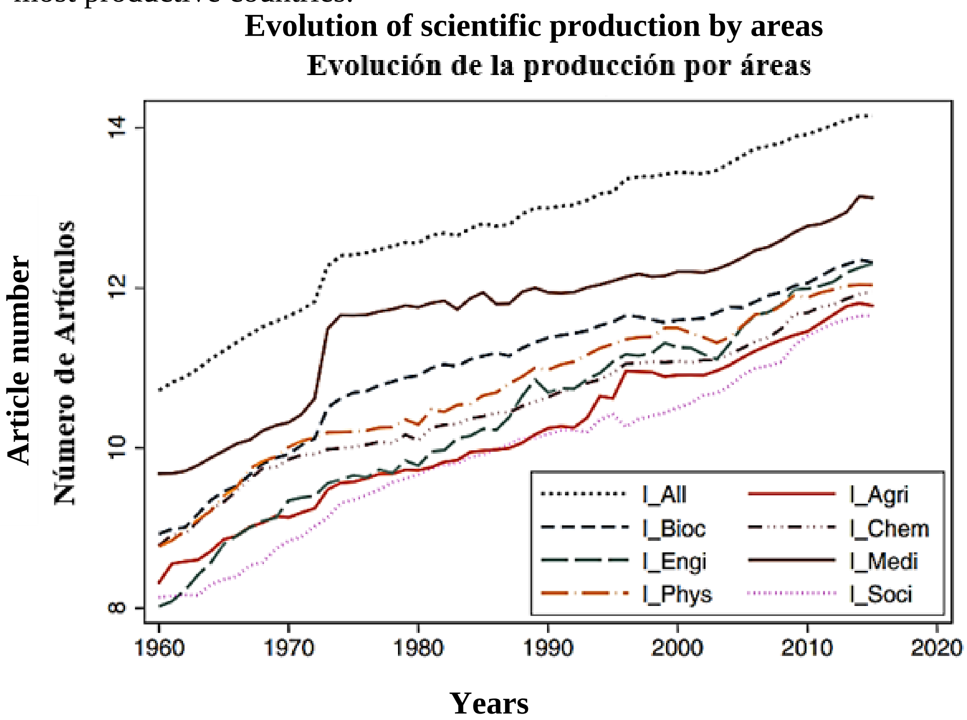


Source: Taken from Monroy & Diaz (2018).

In Fig. 1, is possible to obseve that during the second world war (1939-1945), there was a very significant decrease in scientific production in all the countries analyzed, especially Germany (DE), Japan (JP), and Italy (IT) were the most affected during this period, and to a lesser extent countries such as the United Kingdom (UK), the United States (USA) and Canada (CA). From 1972 to 1974, scientific production significantly increased in all countries except China. Spain increased its total scientific production by 670%, France by 248%, Germany by 148%, and the USA by 58% (Monroy & Diaz 2018). In the years 1995 to 2002, the swing effect occurred that generated a new increase in scientific production thanks to the dizzying rise of dot com (.com), technologies, and information technology, a period in which technological and research organizations were financed and the value of shares in companies in the information technology and technology sector increased. There was also a significant increase in the publication of articles in the fields of medicine, biochemistry, and engineering in these countries. In accordance with Elango (2018), the growth of scientific production in Scopus of the ten most productive countries in the period 1996 to 2015, such as the United States, China, United Kingdom, Germany, Japan, France, Canada, Italy, India, and Spain, which were selected the most productive that surpassed more than a million publications. The results demonstrate that the highest growth rate in publications corresponds to the countries of China with 15.11%, India with 9.86%, and the least productive is Japan with 1.32%. However, this growth has decreased when passing from the first period (1996-2005) to the second (2006-2015) in the ten countries analyzed, except India, whose growth is almost 50%, while in Japan, the growth rate is negative when passing from one period to another, due to a decrease in the number of publications during the years 1996 to 2005, as was studied by Elango (2018).

In this way, Monroy & Diaz (2018) (Monroy & Diaz, 2018) provide a plot where it is possible to observe the evolution of scientific production by areas of knowledge of the twelve most productive countries: All areas (All); Agricultural and biological sciences (Agri); Biochemistry, genetics and molecular biology (Bioc); Chemistry (Chem); Engineering (Engi); Medicine (Medi); Physics and astronomy (Phys); Social Sciences (Soci), as is shown in Fig. 2.

Figure 2. Evolution of scientific production by areas of knowledge of the 12 most productive countries.



Source: Taken from Monroy & Diaz (2018).

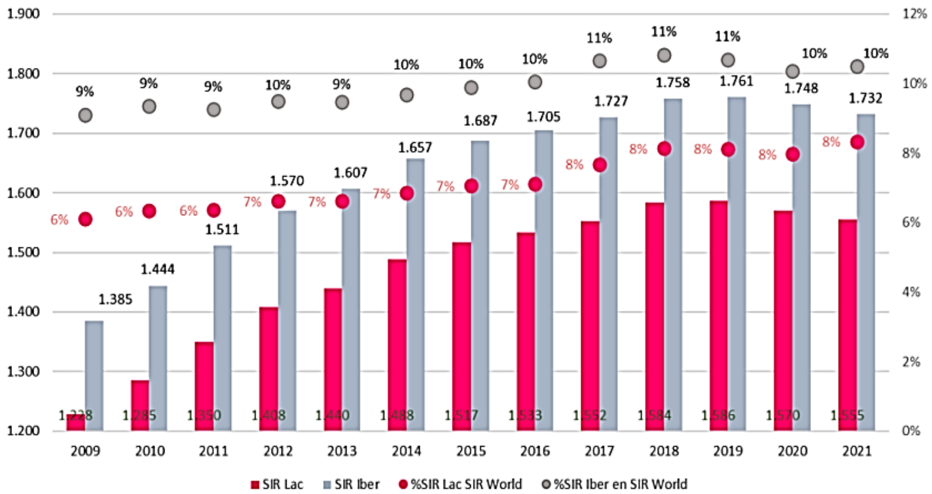
The most representative areas were medicine, biology, physics, and astronomy, with a greater number of publications on heart, coronary, and cancer diseases in the USA, biochemistry, and agriculture in other countries, as was observed in Fig. 2. These investigations were supported by the National Cancer Law and the creation of 15 new research centers. Another justification for this increase is new studies in basic genetics and molecular biology from the discovery of DNA. These scientific advances originated new vaccines against mumps, rubella, chicken pox, pneumonia, and meningitis. Also, in this period performed, the first human heart transplant (Related to the countries). Elango (2018) analyzed the most important disciplines in the period 1996-2015 in the ten most productive countries in the Scopus database, such as the United States, China, the United Kingdom, Germany, Japan, France, Canada, Italy, India, and Spain, which were selected the most productive that exceeded more than one million publications as displayed in Table 1, concluding that there is no common pattern in growth in the top ten countries in the main disciplines. In countries such as the United States and Spain, more remarkable growth was obtained in the discipline of social sciences; on the other hand, in China, the United Kingdom, Germany, and Japan in economics; in France, Canada, and Italy in business; and in India in the discipline of dentistry. It was also observed that the fields that grew the least were engineering in the United States, physics and astronomy in China, and pharmacology in the United Kingdom, Japan, and Italy. On the other hand, the most important disciplines researched in the ten most scientifically productive countries are computer science, decision sciences, economics, energy, environmental sciences, psychology, and social sciences.

Another important aspect of scientific production is the political effects, which positively or negatively affect scientific production because each country has policies to manage research processes and scientific output. There are also political disturbances that affect negatively, mainly authoritarian regimes that have disadvantaged the development of science and technology, as in the case of political unrest in China; the point of Nazi Germany when the National Socialist party came to power in 1933, where scientific production decreased significantly; in Latin America, Chile slowed down publications as a result of the military coup in 1973, whose recovery took place after the dictatorship; in the case of Venezuela, scientific production stopped with the socialist regime of Chavez from 1999; while in Colombia there is growth similar to the development of most Latin American countries (Monroy & Diaz 2018).

Scientific production in Latin America and Ibero-America

In Latin America and Ibero-America, the evolution of scientific production is measured through Rankings, according to Vasquez *et al.* (2019), one of the instruments used is the report Scimago Institutions Rankings Ibero-America (SIR IBER) and Scimago Institutions Rankings Latin America (SIR LAC), which evaluate the quantity and quality of scientific publications of Ibero-American and Latin American universities based on Scopus data, analyzing the publications of academic journals and proceedings of world congresses, evaluating criteria such as production, scientific impact, thematic specialization, and international collaboration networks between institutions. Next, the evolution of scientific production in higher education institutions in the SIR and SIR 2009 and 2021 period is visualized in Fig. 3.

Figure 3. Evolution of the number of HEIs per year in SIRLAC and SIR IBER.

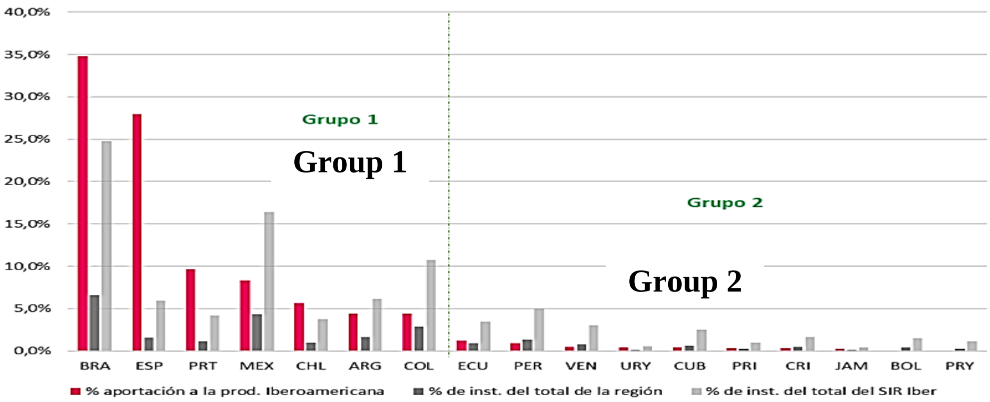


Source: Taken from De-Moya *et al.* (2021) and SCImago institutions rankings (2021).

According to the information contained in the previous plot (Fig. 3), scientific publications according to the *Scopus* database have evolved considerably in recent years, with an increase of 122 institutions in the Latin American region in the period 2009 to 2011, with a participation of 6 % of SIR LAC in the World Ranking (SIR World) in this period, while in the period 2012 to 2016 there was an increase of 315 new institutions that entered SIR LAC, this period has the participation of 7% in the World Ranking (SIR World), and finally in the period 2017 to 2019 they increase until reaching the highest number with 1586 institutions that are part of the SIR LAC, while in the years 2020 and 2021 it decreases by 31 institutions, it is noteworthy that the years 2017 to 2021 it contributes 8% to the World Ranking (SIR World). As for the Ibero-American region, from 2009 to 2011, there was an increase of 126 institutions with a participation of 9% (SIR World). In the same way, in the period between 2012 to 2016, there was an increase of 135, with a participation of 10% in the SIR World, while in the period 2017 to 2019, the institutions increased by 34, with a participation of 11% of the SIR World. Finally, in the years 2020 and 2021, a decrease of 29 institutions was obtained in this Ranking. This behavior indicates that in the 13 years analyzed, there is a slight increase in the number of universities in Latin America and Ibero-America that enter the Scopus database, increasing participation in SIR World, which allows maintaining the level of participation in the world classification in the higher education sector, allowing to visualize the consolidation of scientific production in these institutions. The decrease in institutions in Scopus in recent years is because some HEIs do not have continuous scientific production. Therefore, the research processes are insufficient for continuous publications in quality international journals.

On the other hand, the most scientifically productive countries in *Scopus* are Brazil, Spain, Portugal, Mexico, Chile, Argentina, and Colombia, which correspond to the first group according to the number of publications that exceed 60,000 documents in international scientific journals, in the second group include the countries Ecuador, Peru, Venezuela, Uruguay, Cuba, Puerto Rico, Costa Rica, Jamaica, Bolivia and Paraguay, whose HEIs have made more than 1,000 publications, while in the third group are the countries whose HEIs have made at least one publication in the period 2015 to 2019, as can be seen in Fig. 4

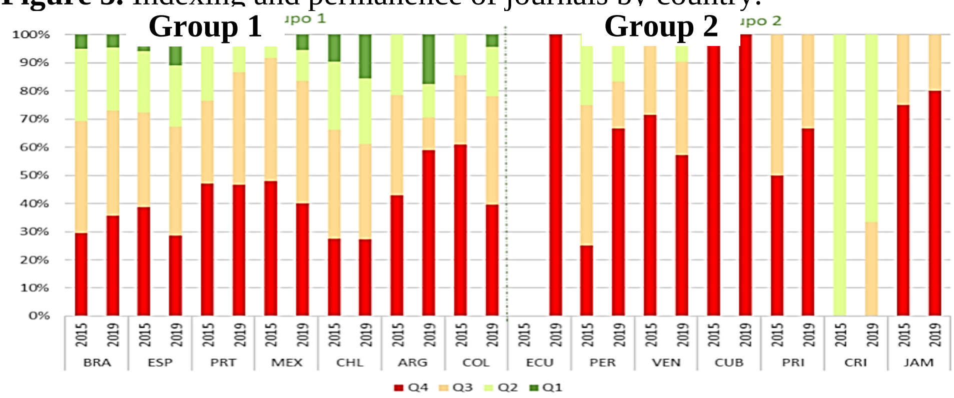
Figure 4. Participation of HEIs by country in the SIR 2021 - Groups 1 and 2.



Source: Taken from De-Moya *et al.* (2021) and SCImago institutions rankings (2021).

Regarding the quality of scientific production, Fig. 5 shows the indexing and permanence of journals by country, with a significant increase in the number of publications in Q1. Consistent with the above, in 2015, HEIs from countries such as Brazil, Spain, and Chile were the only ones with high-impact journals. Subsequently, the participation of all the countries in group one of this analysis increased, as is the case of Spain, which happened from having ten journals in Q1 in 2015 to 28 in 2019; Chile: increased from 6 journals in Q1 in 2015 to 12 in 2019; and in countries such as Portugal, Mexico, Argentina and Colombia, which in 2015 did not have highly cited journals, they had up to 4 publications in Q1 in 2019.

Figure 5. Indexing and permanence of journals by country.



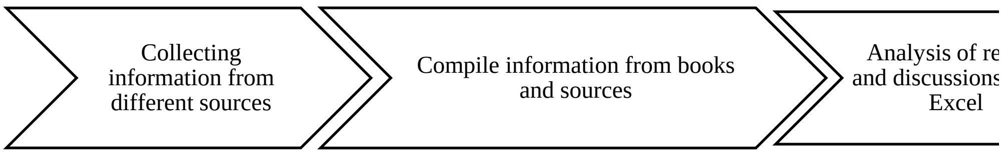
Source: Taken from SCImago institutions rankings (2021) and De-Moya *et al.* (2019).

MATERIALS AND METHODS

Research on scientific production in HEIs is a field widely explored worldwide. In this sense, there has been a significant increase in publications on this subject in recent years, which is the methodology applied. The information was analyzed considering the methodology proposed in Fig. 6, also discussed considering theories of scientific production in higher education institutions and other publications. Notice that the scientific production analysis was developed considering only the information provided directly by the Scopus database about the authors and articles by areas and collaboration networks (Aguillo 2012).

Figure 6. Methodology proposed to the systematic review.

Step I	Step II	Step III



Topic research	Data collection	Production of Universities
Scientific production in higher institutions	All subject areas	Microsoft Excel software

RESULTS AND DISCUSSIONS

Considering the information collected, a general overview of the scientific production was developed as follows:

North America and Canada

In the United States and Canada, Tahmooresnejad *et al.* (2015) compared the scientific production of nanotechnology. The findings showed that public funding of research has a significant linear and positive impact on production in Canada. In contrast, in the United States, this impact is positive but not linear at the article level published and in the index of citations, concluding that participation in scientific networks is positively influenced by the quantity and quality of scientific publications in nanotechnology.

Eastern Europe

In China, Japón, and Corea, Magnone (2012) studied the scientific production of Water-Gas Shift (WGS) reaction technologies in the period 1990-20. It was identified that scientists from China, Japan, and Korea made 788 scientific publications in this field of study. The largest producer was China (50%), corresponding with 394 scientific articles, followed by Japan, with 250 publications representing 32%. Finally, Korea with 18%, corresponding to 18% of the total publications analyzed. According to the above, the growth of the literature on Research and Development (R&D) in Water-Gas Shift (WGS) was exponential in China and not in Japan and Korea. Hyunju & Kim (2014), studied the scientific production of 12 Asian countries in science and engineering in Scopus for five years, in which the increase in scientific publications, the citation index, the impact according to the scientific area, national and international collaboration were compared, and the number of journals in each country analyzed, where it was observed that the largest number of scientific publications in Asian countries are in technologies.

In the middle east, Cavacini (2016) made a comparison of the scientific production in 16 countries of the Middle East from 1996 to 2014 with 27 countries in Western Europe and with the average world production, the results showed in terms of the citation index that Israel was the leading country in the Middle East. On the other hand, Turkey and Iran were the most important in scientific publications, along with the countries of Egypt and Saudi Arabia in the Middle East, while Israel has been decreasing its scientific production, as well as the countries of Western Europe. In the same way, it identified that although emerging countries such as Iran, Turkey, Saudi Arabia, and Egypt have increased their scientific production, they continue to perform below the world average.

European Union

In Spain, the scientific production in virtual and blended education was analyzed in the years 2007 to 2020, Lucas-Barcia & Roa-González (2021), In the Spanish educational journals of the National University of Distance Education (UNED) indexed in WOS and *Scopus*, 72 most cited documents were selected, which were evaluated according to their evolution, methods, and techniques used, the affiliation of authors, and level of impact of the journals in which they were published. Studies of scientific production have also been carried out in Argentina, such as Liberatore *et al.* (2021), which found that 38% of the publications in WOS and Scopus made by the National University of Mar del Plata (UNMDP) during the years 1978 to 2019, were in international collaboration through scientific networks with the United States, and with Latin American countries like Brazil, Chile, and Mexico, and with Europe especially with countries like Spain, Germany, and France.

In France, a study was carried out on the scientific production of open access carried out by Franrenet (2006), concluding that in the area of natural sciences, the vast majority of publications are made in international scientific journals, and open access depends on the policies of the publishers; in the humanities and social sciences, articles are published mainly in many small journals, with electronic publication portals with more open access possibilities, this represents 15% of French scientific production in open access and continues to increase exponentially. Consistent with the above, in France, several open access repositories since 2001, and since 2006 the Center National pour la Recherche Scientifique (CNRS) created the Hyper Articles online (HAL) policy where most of the production is stored open access science.

In Italy, an analysis of scientific production in the period 1972-2015 in the branch of medicine developed by López-Muñoz *et al.* (2017), which evaluated 1,091 scientific journals with 2,949 original publications, and found that the drugs that have been most investigated are clozapine with 257 publications, risperidone with 179 and olanzapine with 172 scientific documents published, mainly in the Journal of Clinical Psychopharmacology and the Rivista di Psichiatria with 58 articles publications each. However, Lorusso *et al.* (2020) conducted a bibliometric study of the scientific production in Dentistry at 37 universities, whose population was 416 researchers with 23,689 published scientific articles. The publications were measured quantitatively and qualitatively, and the citations, the h-index, and the relationship of relative citations of the researchers were also measured. In concluding that there has been a significant increase in production in the last five years, it was also identified that the area of dental clinics is the most scientifically productive. In the same way, De Montis *et al*. (2017) evaluated the scientific production of Italian agricultural engineers from the 2003 to 2016 period, which analyzed 238 articles on the Web of Science published by 87 researchers, and it was discovered that Italian agricultural engineers belong to few global networks with a high percentage tend to cite each other. Also, the study demonstrated that belonging to research groups, usually at a single university, limits the dissemination of more general knowledge.

In Spain, a bibliometric analysis was carried out in the period 1980 to 2019 in the Web of Science of the scientific production by Gómez-Crisóstomo & Luna-Sáez (2022), in which it was shown especially in the last decade that there has been a significant increase in the total scientific production, in the same way, the number of published articles increased, and the documents in Spanish of open access, in addition, the co-authorships, the international collaboration and the citation index of the papers, and finally it was identified in the period studied that the Higher Council for Scientific Research (CSIC) is the most productive scientific institution. Vinader-Segura *et al.* (2020) developed a bibliometric analysis that shows a rigorous and general vision of the scientific production of 734 documents on social networks in Spain the period 2010 to 2019, using the metrics of the Dialnet database in the period 2010 to 2019, the results identified that is a field of interest and scientifically relevant, where social networks predominate in publications of Journalism, Pedagogy, and Sociology, especially in Spanish, in co-authorship especially in Spain with a descriptive and quantitative approach.

Latin America

Chinchilla-Rodríguez *et al.* (2015) evaluated the volume and visibility of scientific production in Public Health through the SCImago Institutions Raking portal. The results revealed that Brazil and Mexico have the highest number of publications, second only to Colombia and Argentina, implying that these countries have research systems that most effectively communicate scientific results. In terms of visibility, Uruguay, Puerto Rico, and Peru are the ones with high rates of scientific collaboration. On the other hand, countries such as Brazil, Uruguay, and Argentina obtained a relative balance, but with differences in the levels of scientific production. Therefore, finding methods to develop and evaluate knowledge transfer through research that compares theory with practice is necessary.

In Colombia, Bucheli *et al.* (2012) analyzed the scientific documents published by public universities of Colombia in WOS in the period 1958 and 2008, evaluating categories such as early exponential growth (EEG), late exponential growth (LEG), and linear and irregular growth (LIG) in said institutions, according to Likewise, they compared the results of these with intellectual capital, concluding that only 9% of the publications have experienced an early exponential growth (EEG), while 47% have obtained a late exponential growth (LEG) and 44% an irregular linear growth (LIG). In the research carried out by Martelo *et al.* (2018), scientific production was evaluated between 2007 and 2016 by 51 professors of the academic programs of Food, Systems, Chemistry, and Civil Engineering of the University of Cartagena, identifying that the best strategies to increase scientific production are the increase of the impact of scientific products and linking teachers to strengthen research. On the other hand, Serrano & Carreno (2016) analyzed the scientific production on Cancer, evaluating the articles published and the formation of human capital in the research groups as of July 2013. The results show that the line of research in Cancer Biology was the one that obtained the largest number of publications, with 390 articles with 86 linked groups. In the same way, the cancer diagnosis and treatment line linked 177 groups with 298 articles published.

In Chile, Suárez-Amaya *et al.* (2022) pointed out that at the University of Tarapacá, economic and hierarchical incentives are given to researchers to increase scientific production and research projects financed through calls within the institution. These strategies are adopted because this institution has limitations of high-impact output. Therefore, incentives are needed to promote the positioning of Chilean universities in the international scientific community.

In Ecuador, Herrera-Franco *et al.* (2021) bibliometrically analyzed the scientific production from 1920 to 2020. The results identified that the scientific production of that country was 30,205 documents that have been co-authored with 84 countries, using 13 languages in 27 areas of knowledge, such as education, technologies, and informatics. Biology, Medicine, sustainability, and Energy mainly. In the same way in Cuba, Galbán-Rodríguez *et al.* (2019) analyzed the scientific production in 200 scientific journals and 13 national and international databases in the period 2000 to 2018, concluding that there is a growth in the publications of Cuban journals, while international publications in Scopus and WOS they only represent 22% per year until 2018. Rodríguez *et al.* (2022) observed that there is little presence of the University of Camagüey of Cuba in the scientific production of ResearchGate and Google Scholar, concluding that the institution has little research in the collaborative scientific platforms of academic-social networks. Rojas-Valladares *et al.* (2021) developed a study at the Metropolitan University of Ecuador in the period 2020-2021; it was shown that 13% of scientific production is found in scientific databases, while 87% belongs to regional databases, where for every 100 articles, only 13 are published in world-renowned scientific databases, while 87 are published in regional databases.

In Peru, important studies have also been carried out on scientific production; Kuong Morales & Kuong Morales (2022) analyzed the scientific production of the universities in Peru and the position they occupy in the Scimago Institutional Ranking, and the results showed that the first Peruvian university appears in the 37th position in Latin America. Therefore, these universities have low production and processes of low-impact research; consequently, they do not occupy the first positions in Latin America. Millones-Gómez *et al.* (2021) determined that research policies did not hurt the international scientific production of 97 public and private Peruvian universities in the years 2019 and 2020, while at the national level, scientific production is affected by research policies. Therefore, it is necessary to strengthen project financing policies, increase the training of researchers, and establish scientific collaboration networks, to increase scientific productivity. The study carried out by Carranza-Esteban *et al.* (2022) identified that only 14.29% of university presidents in Peru had published scientific publications in Scopus and WOS, with an average h index of 3.62 in *Scopus* and 1.14 in WOS. Therefore, said scientific production is very scarce, and policies are required to increase the dissemination of research products. On the other hand, Esteban *et al.* (2022) identified that 17 Nursing directors from 42 state and private Peruvian universities made at least one scientific publication in *Scopus*, WOS, Redalyc, SciELO, and Latindex from 2014 to 2019, which corresponds to an average rate of 2.32 published articles, which represents an average H index of 0.25, this indicates that the scientific production of these managers is deficient.

In Brazil, Mazaro *et al.* (2021) conducted a bibliometric analysis of 249 studies of Occupational Therapy and mental health taken from the VHL, *Scopus*, and Scielo databases from 1990 to 2018. The results showed which area of knowledge has a higher incidence of articles from Brazil, Australia, and the United States, published in English, especially from 2000; these investigations were developed under the qualitative method. Berrío-Zapata, (2021) analyzed the production and dissemination of scientific literature on COVID-19 in Brazil in 2020 according to Web of Science and determined that 2703 scientific articles were published mainly in English, which received 10,190 citations, which corresponds to an average of 3.77 citations per article, and concentrated in ten Brazilian journals, the University of São Paulo was the most productive. Furthermore, these publications were mentioned on 40,062 social networks, the most significant being Twitter, with 94.8%.

In Mexico, Suclupe-Navarro *et al.* (2021) evaluated through a bibliometric and scientometric analysis of 118 articles published in Scopus on library anxiety in the period 1989 and 2018, it was shown that these publications experienced a progressive increase, but the collaboration between authors was low; it was also identified that the journal Library Review was the most important, in the same way, the most important keywords were analyzed. In the same way, Franco-Paredes et al. (2016) carried out a bibliometric analysis of the scientific production of the Mexican Journal of Eating Disorders the period 2010 to 2014, determining that 70 articles were published in the studied period distributed in five volumes, with a percentage of 64.28 original studies, with an average of four authors per article, with a participation of 60% of authors from Mexico who mainly belong to the National Autonomous University of Mexico, scientific collaboration with two or three different countries was also identified. Finally, these articles obtained 46 references on average.

In Colombia, León *et al.* (2022) determined bibliometrically through Scimago Journal & Country Rank that Colombia is the Latin American country with the highest growth in the production of psychology in Scopus in the period 2015-2019. However, it ranks fourth in the region, surpassed by Brazil, Mexico, and Colombia. In the same way, Chile was identified in terms of the number of psychology journals. On the other hand, Colombia ranks second in Latin America with ten journals in *Scopus* but is in the fourth position in publications of this type. In another bibliometric analysis in the period 2007 to 2019, in *Scopus* developed by Gómez-Velasco *et al.* (2021), it was determined that in Colombia, there is a growing trend of scientific production in economics with an annual average of 13%, has also been growing in publications of high impact journals, participation in important networks of scientific collaboration at a national and international level, and co-authored publications.

Taxonomies of scientific production

The classifications of scientific production are specific to each country or region. Therefore, in the literature, there are agreements on the trends and policies that affect the local and global dynamics of this topic of study, which depends on both endogenous and exogenous factors of each country. In most cases, regulatory guidelines are established for the direction of research and innovation. In the same way, the trends are constituted in particular ways of carrying out the research processes that promote and encourage the scientific advance of each country Rhoten (2011); Mabe & Amin (2001); Díaz (2012); and Kempener *et al.* (2010). Table 1 shows the guidelines for directing scientific production in some countries.

Table 1. Regulatory organisms of scientific production according to the characteristics of each country.

Regulatory entity of scientific production	**Ref.**	**Country**	**Description**
White House Office of Science and Technology Policy (OSTP)	OSTP, (1976)	Estados Unidos	The White House Office of Science and Technology Policy (OSTP) is one of the most important agencies in the United States that maximizes science and technology, promoting health, prosperity, security, environment, and justice for all American citizens.
Council for Science and Technology (CST)	(CST, 2022)	Reino Unido	The Council for Science and Technology (CST) advises the Prime Minister on science and technology issues through UK government departments to maximize emerging technologies (autonomous vehicles and robotics).
Federal Ministry for Research and Technology Bundesministerium für Forschung und Technologie (BMFT)	(BMFT, 1972)	Alemania	The Federal Ministry of Education and Research (BMBF) has as its main function the promotion of basic research, applied research, and technological development in Germany.

National Science Council (NSC)	(NSC, 1959)	China	It is a ministry in charge of promoting and developing scientific research processes in China, supporting university research and science parks to develop science, technology, and innovation.
Ministry of Education, Culture, Sports, Science, and Technology (MECSST) 文部科学省	(MECSST, 2001)	Japón	The Ministry of Education, Culture, Sports, Science, and Technology of Japan coordinates education, science, and technology in Japan's academic, cultural, and sports spaces.
Fundación Española para la Ciencia y Tecnología (SICTI)	(SICTI, 2011)	España	It is a dependency of the Ministry of Science and Innovation of Spain, which analyzes and monitors the strategies of Spain's Science, Technology, and Innovation (EECTI). In addition, it contains information on the financing of Spanish research.
Consejo Nacional de Desarrollo Científico y Tecnológico (CNPq)	(CNPq, 1951)	Brasil	It is an institution linked to the Ministry of Science, Technology, and Innovation, in charge of promoting Science, Technology, and Innovation, strengthening the frontiers of knowledge and sustainable development.
Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET)	(CONICET, 1958)	Argentina	It is the main entity dedicated to promoting science and technology in Argentina, aiming to improve relations with society and the national production system.
Consejo Nacional de Ciencia y Tecnología (CONACYT)	(CONACYT, 1970)	México	It promotes the development of scientific research, technology, and innovation to promote the country's technological modernization.
Departamento Administrativo de Ciencia, Tecnología e Innovación (COLCIENCIAS)	(COLCIENCIAS, 1968)	Colombia	Minciencias coordinates the National System of Science, Technology, and Innovation-SNCTI, creating a scientific, technological, and innovative culture in Colombia so that the regions, the productive sector, professionals and non-professionals, students and teachers (basic, secondary, undergraduate, and postgraduate)), participate in research strategies and agendas.
Comisión Nacional de Investigación Científica y Tecnológica (CONICYT)	(CONICYT, 1966)	Chile	It is a corporation in charge of strengthening the scientific and technological base, to promote scientific and technical culture in the population.

Consejo Nacional de Innovación, Ciencia y Tecnología (CONICYT)	(CONICYT, 2006)	Uruguay	An advisory body of the public powers (Executive and Legislative) on science, technology and innovation (CTI) issues.
Consejo Nacional de Ciencia y Tecnología (CONACYT)	(CONACYT, 1997)	Paraguay	An entity in charge of formulating, coordinating, articulating, promoting, evaluating, and executing policies to guide Science, Technology, Innovation, and Quality, contributing to sustainable development.
Secretaría Nacional de Ciencia y Tecnología. (SENACYT)	(SENACYT, 2008)	Ecuador	It is the main body of the Science, Technology, and Innovation (STI) system, in charge of formulating STI policies.
Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica (CONCYTEC)	(CONCYTEC, 2006)	Perú	The body in charge of the direction, promotion, coordination, supervision, and evaluation of science, technology, and technological innovation promotes scientific and technical development.
Consejo Nacional de Investigaciones Científicas y Tecnológicas (CONICIT)	(CONICIT, 1990)	Venezuela	Promotes and consolidates the strengthening of the country's scientific and technological research activity.
Secretaría Nacional de Ciencia, Tecnología e Innovación (SENACYT)	(SENACYT, 1997)	Panamá	Their purpose is to strengthen, support, and promote science, technology, and innovation to raise the productivity, competitiveness, and modernization of the public, private, and academic-research sectors, promoting the dissemination of knowledge to society.
Consejo Nacional para Investigaciones Científicas y Tecnológicas (CONICIT)	(CONICIT, 1972)	Costa Rica	Its purpose is to promote the generation of innovation and knowledge in science and technology, which allows improving the quality of life and the sustainable development of society.
Consejo Nacional de Ciencia y Tecnología (CONACYT)	(CONACYT, 1992)	El Salvador	Its mission is to coordinate national science and technology policies aimed at the economic and social development of the country.
Consejo Nacional de Ciencia y Tecnología (CONCYT)	(CONCYT, 1990)	Guatemala	Promotes scientific and technological development and coordinates the scientific and technical activities carried out by the National Science and Technology System.
Consejo Hondureño de Ciencia y Tecnología (COHCIT)	(COHCIT, 1993)	Honduras	It is the entity that promotes scientific, technological, and innovation development by promoting science, technology, and innovation activities.
National Commission on	(NCST, 1993)	Jamaica	Their function is to maximize the benefits of science and technology strategies for

Science and Technology (NCST)			national, social, and economic development.
Consejo Nicaragüense de Ciencia y Tecnología.	(CONICYT, 1995)	Nicaragua	It deals with matters of science and technology through the coordination of institutional actions and research centers of the National Educational System.
Secretaría de Estado de Educación Superior, Ciencia y Tecnología (SEESCYT)	(SEESCYT, 1996)	República Dominicana	The entity that guides science and technology through the promotion, regulation, and administration of the National System of Higher Education, Science and Technology.
Ministerio de Ciencia, Tecnología y Educación Superior (STTE)	(STTE, 1984)	Trinidad y Tobago	Guides the implementation of the national policy on Science, Technology, and Innovation (CTI) through the development of higher education and scientific and technological progress.

Source: Authors.

On the other hand, in Table 3, It can be seen that each country has an organization to promote and measure scientific production through strategies to strengthen research, technology, and innovation, according to the organization and political structure of each state, taking into account their needs, characteristics and how the investigative, visibility and quality processes of educational institutions are conceived as organizations conducive to the generation of knowledge, which allows the increase of Intellectual Capital through the use of intangible resources in organizations such as knowledge, the experience, skills, and competences of the researchers, the physical, the technological and financial infrastructure of the organization, and the networks of scientific collaboration (Quintero-Quintero *et al.* 2021). Finally, it is concluded that the taxonomies or approaches to scientific production depend on the particularities of each country, for which trends and policies have been established that frame the direction of research processes at a general level and in a particular way of HEIs.

Table 3. Main studies on scientific production at a global level according to the citation index.

Research	**Ref.**	**Objective and findings**	**Cites**
Some bibliometric procedures for analyzing and evaluating research fields.	(Gutiérrez-Salcedo *et al.* 2018)	Analyzed the quality and quantity of scientific production to explore a field of research by analyzing the performance of scientific actors (countries, universities, departments, researchers) as well as the impact of their activity based on bibliographic data and scientific mapping. This study presents some techniques and software that allow analyzing the effect of a field of research and its scientific structures, based on bibliometric indices (h, g, hg, and q2), in addition to the h-classics approach,	94

		which identifies the classic articles of a research field and three free scientific mapping software tools.	
Scopus scientific mapping production in industry 4.0 (2011–2018): A bibliometric analysis.	(Kipper *et al.* 2020	A bibliometric analysis was performed with the number of publications, associated documents, and the h-index, which included 1,882 documents, and 4,231 keywords, identifying the evolution of topics related to Industry 4.0.	77
Ritmo de crecimiento diario de la producción científica sobre covid-19. Análisis en bases de datos y 851epositories en acceso abierto.	(Torres, 2020)	A global view of the daily increase in scientific production on Covid-19 was obtained in open access databases such as Dimensions and Web of Science Core Collection, which indexes a total of 9,435 publications, well above Scopus (1,568) and WoS (718).).	64
¿How to boost scientific production? A statistical analysis of research funding and other influencing factors.	(Ebadi & Schiffauerova 2016)	I identify a positive impact on the age of researchers and funding, the quantity and quality of scientific output of individually funded researchers in Canadian natural sciences and engineering. Academic researchers produce more articles, but those with industry affiliation do so with higher quality.	51
Eficacia del método flipped classroom en la Universidad: metaanálisis de la producción científica de impacto.	(Martínez *et al.* 2019)	The impact of scientific production in Scopus and WOS on the flipped classroom methodology and its effect on the academic performance of university students were analyzed. It evidences a bias in the publications favoring this method over other methods.	38
Geographical imbalances and divides in the scientific production of climate change knowledge.	(Pasgaard *et al.* 2015)	The scientific production on climate change was studied using a worldwide geographical distribution of author affiliations in more than 15,000 scientific publications in the wealthiest and most developed countries with colder climates; the network of author affiliations of the countries with colder climates was also analyzed, vital research interests, but with little knowledge exchange between regions due to geographic proximity, common	32

		environments, and similar political and economic characteristics.	
Global scientific production of robotic surgery in medicine: A 20-year survey of research activities.	Fan *et al.* (2016)	A bibliometric analysis on robotic surgery in medicine was carried out on the Web of Science, with 3,362 articles between 1994 and 2015, showing a significant increase of 572.87% compared to the previous decade, with leadership from the USA that has published 1,402 articles (41.701%), followed by Germany with 342 (10,173%). The journal with the highest number of publications is the Journal of Endourology with 237 (7%), followed by Surgical endoscopy and other interventional techniques with 188 (6%).	31
The role of public funding in nanotechnology scientific production: Where Canada stands in comparison to the United States.	(Tahmooresnejad, *et al.* 2015)	Compare the impact of public grants (government funds) and scientific collaborations in publications related to nanotechnology between Canada and the USA, concluding that research funding has a very positive linear impact in Canada. In contrast, the USA has a non-linear effect on the number of publications; regarding collaboration, a positive result was evidenced in the number of citations only in the USA.	19

Source: Authors.

It is important to mention that the most important empirical studies on scientific production have been carried out on topics such as trends, public financing for research, robotic surgery in medicine, bibliometric analysis in open-access databases, neurosciences, research, international collaboration, geographical imbalances and divisions in the production of knowledge (See Table 4). In affinity with the above, this topic has been widely studied in various countries and areas of knowledge, with few studies on scientific production influenced by intellectual capital from 2015 to 2021 being visualized in *Scopus*.

Table 4. According to the citation index, the main studies on scientific production in Higher Education Institutions (IES).

Research	**Ref.**	**Research results**	**Cites**
Impact of scientific productivity on digital competence of future teachers: Bibliometric approach in	(Rodríguez *et al.* 2019)	Through bibliometric analysis, analyzed the scientific production with the greatest impact of digital skills in the training of teachers in higher education, using the Scopus and Web of Science databases in the years 2014 to 2017, concluding that there is a strong trend of publications in English in minutes and scientific articles from	38

Scopus and Web of Science.		journals, which places Spain as the most influential country in such publications.	
The VQR, Italy's second national research assessment: Methodological failures and ranking distortions.	(Abramo & D'Angelo 2015)	The quality of research (VQR) was evaluated in Italian universities from 2004 to 2010, simulating the selected research products in a set of rankings applying the precise VQR qualification criteria. Later these "VQR rankings" were compared with the application of adequate bibliometrics, and finally, the comparison was extended to university rankings based on scientific production for the period studied.	30
Scientific production of Medical Universities in the West of Iran: A Scientometric analysis.	(Rasolabadi *et al.* 2015)	Bibliometrically carried out the scientific production in five medical universities of western Iran in Scopus from 2010 to 2014, evidencing 3011 publications, which were cited 7158 times with an average rate of 4.2 citations per article. These universities obtained an H-index between 14 and 30. Ilam University of Medical Sciences had the highest international collaboration with an (INI) with an index of 0.33. The highest growth rate belonged to the Kurdistan University of Medical Sciences (69.7).	30
Scientific Production on Open Access: A Worldwide Bibliometric Analysis in the Academic and Scientific Context.	(Miguel *et al.* 2016)	The world scientific production of open access was analyzed, both in the academic and scientific context, showing that the most productive researchers are from the USA, Canada, France, and Spain. Thus, a collaborative network with some subnetworks with diverse co-authors was observed, concluding that Open access is a new emerging and frontier field of library and information science.	23
Scientific production of the medical school of a Peruvian university in *Scopus* and Pubmed.	(Gonzales *et al.* 2018)	A bibliometric analysis of the scientific production of the Faculty of Medicine of the National University of Trujillo (Peru) was carried out through a literature review using the Medline/PubMed and Scopus databases up to June 2016. It was evidenced that there are 54 articles (43 in Scopus, 39 in PubMed, and 28 in both), which were published in 21 journals, including 2 Peruvian journals, and 16.7% (9/43) of them were written in English, with a membership of 39 authors, concluding that scientific production is low, and collaborative networks are required.	13
University-industry scientific production and the Great Recession.	(Azagra *et al.* 2019)	The research exposed that spending on R&D in OECD countries and other economies in the context of the Great Recession (2007-2013), where industry dominated university-industry scientific production, but the crisis changed the impact of that source of expense, the great recession harmed scientific production in universities.	13

Knowledge linked to museum specimen vouchers: measuring scientific production from a major biological collection in Colombia.	(Arbelaez *et al.* 2017)	Analyzed 628 articles from 152 Biological journals at the Alexander Von Humboldt Biological Resources Research Institute, Colombia (IAvH-CB), confirming that these publications are mainly regional or national, with a growing trend in terms of the number of articles published through the time, where IAvH-CB is a massive source of scientific knowledge about Colombian biodiversity.	9
Co-authorship networks as a tool for evaluating the scientific production of research groups.	(Rodríguez & Gómez, 2017)	It was visualized in the scientific publications by eight research groups in Biology from 2001 to 2014 of the Pedagogical and Technological University of Colombia (UPTC), a low density represented in a reduced number of relationships between authors and groups of this institution. Therefore, their relations with external institutions, both national and international, are greater.	9
The scientific production of the Colombian record of psychology: Descriptive analysis of the period 2010-2014.	(Ravelo *et al.* 2016)	It was found that in the Revista Acta Colombiana de Psicología de la Universidad Católica de Colombia from 2010 to 2014, the area with the most significant influx was neuropsychology and bibliometrics, with an average of 3.8 and 3.5 authors, respectively, while the legal area has one author per item; the year 2014 was the most productive in publications with an average of 27 in the areas of psychology and health, whose origin corresponds to 60.5% of international authors.	4
Efficiency in the use of digital databases for scientific production in Colombian universities.	(Cortés, 2016)	Evaluated the efficiency of digital databases in scientific production in accredited universities in Colombia in 2013 using *Scopus* publications. It is concluded that Colombia has had an outstanding performance in Latin America due to an increase in participation of 2.5 % from 1996 to 6% in 2013, a level reflected in the fifth position of the Top ten most productive countries. Therefore, the joint purchase of digital databases, open access resources, and adjusting policies encouraging research is recommended.	4
Scientific production of the departments of the Faculty of Medicine of the National University of Colombia	(Escobar, Eslava, & Gómez, 2016)	The Faculty of Medicine of the National University of Colombia was analyzed in terms of scientific production in the Sara module (database) in the period 2000 - 2012, showing that there are 8777 scientific publications, with a participation of 3873 articles that represent the 44.1%, where internal medicine in the area with the highest production, and finally the publications by academic	4

between 2000 and 2012.		departments is proportional to the number of publications made.	
Characterization of the scientific production on university classifications. A bibliometric study from 1988 to 2018.	(King *et al.* 2020)	This work described the evolution of the investigations through the search for articles on the evolution of the publications in WOS on university rankings after the publication of the first ranking (Shanghai in 2004), it was determined that the highest productivity contained in the University Ranking belongs to Europe and second and third place in Asia and America. Therefore, the authors who contribute the most publications on this subject of study belong to European institutions.	2
Scientific production in the medical schools in Colombia in the period 2001-2015.	(Sánchez *et al*. 2016)	It was evidenced in 62 medical schools registered in the Ministry of National Education that there were 14,167 scientific publications in the period 2001 to 2015, identifying the University of Antioquia, Rosario University, Valle University, National University of Colombia, and the Pontifical Javeriana University as the five most productive institutions, as well as it was established that the first 10 faculties contributed 78.5% of publications.	2
State of the scientific production of Social Responsibility in Colombia.	(Zarate *et al*. 2017)	Analyzed the behavior and work of the research groups formed at the national level with research lines in Corporate and University Social Responsibility, based on the concepts of Intellectual Capital, highlighting that the research areas of the CSR and/or RSU groups correspond to 12 lines in areas such as Business / Productivity / Competitiveness; CSR; and Social Responsibility. It was identified that there are 524 researchers in CSR and/or RSU, of which 59% have a Master's degree and 20% a Doctorate.	2
Implementation of an annual plan of goals for the improvement of scientific production in a Colombian university. Positive and negative aspects.	(Vazquez & Posada, 2020)	Determined that the Technological Universities of Bolívar in the period 2017 - 2019 exceeded the goal of scientific production, depending on some academic departments of Engineering. In addition, there is a preference for the publication of conference proceedings instead of books or journals through the evaluation of variables such as type of product, number of authors, thematic area, and temporal evolution in *Scopus*.	2
The scientific production of the Colombian Act of Psychology: a	(Ravelo *et al*. 2020)	A bibliometric analysis of 127 articles published in the journal Acta Colombiana de Psicologia of the Catholic University of Colombia between 2015 and 2019 was carried out, finding 74% of international authorship of publications. In addition, 42.5%	1

descriptive and bibliometric analysis of the period 2015 - 2019.		belong to clinical psychology and psychology. Health, 21.3% in psychometrics, and 87% have a quantitative approach, concluding that this journal makes essential contributions to psychology in Latin America.	
IJPR in PubMed central: A contribution to Latin America's scientific production and edition.	(Alzate, 2020)	Identified the Latin American journals that are part of the database of the National Library of Medicine of the US National Institutes of Health (PubMed central - PMC) and that publish in biomedical and life sciences journals. In PMC, there are 3,194 indexed journals, where Latin America participates with 40 (1.25%), 39 are indexed in Scopus, and 25 in WOS, of which 36 belong to Brazil. As for Colombia, there are 275 journals that are indexed in Publindex, 63 belong to medical, biological, and psychological sciences, 27 are indexed in Scopus, eight in WOS, and only two in PMC. Finally, it was concluded that there is low indexing in the PMC of Latin American journals.	0

Source: Authors.

Based on the literature review in *Scopus*, a high percentage of bibliometric analyzes of scientific production are carried out using study variables such as specific areas of knowledge or in certain research journals and/or countries, using various databases. Therefore, research of this type that is carried out, in general, is scarce. Concerning the above, in this study, a general bibliometric analysis of scientific production is carried out, in which various countries, areas of knowledge, and research journals are involved, where many authors converge, and the database is also used *Scopus* data.

CONCLUSIONS

Scientific production is considered a product of research developed mainly in Higher Education Institutions and/or universities. Through its research mission, developed by university professors, it has become a fundamental instrument for the improvement of academic quality in HEIs worldwide, where publications are considered the main component in scientific activity and a fundamental pillar in higher education, thus allowing universities to be classified according to their scientific production and indicators academics. Likewise, there is an agreement where it is established that scientific production depends mainly on the impact of research and innovation policies and trends in research in each country, which affects the local and global dynamics of scientific production.

The new lines of research in this topic of study can be related to the study of financing, the necessary technological infrastructure, and the generation of research collaboration networks for scientific production in HEIs, which contributes to decision-making by part of the directors of these institutions to make greater scientific contributions. In addition to obtaining better classifications in the university rankings, greater prestige, and institutional reputation, because few studies can reveal the sources of financing of government entities and the same institutions worldwide, it is also required to know the types of technologies that are used to establish scientific collaboration alliances in local, national and global HEIs.

The limitations of this study are oriented to the use of the Scopus database to carry out the bibliometric analysis; even though it has excellent international scientific prestige due to the quality of its scientific publications and comprehensive coverage, other databases can be used by researchers to carry out this type of study.

REFERENCES

Abramo, G., & D'Angelo, C. A. (n.d.). The VQR, Italy's second national research assessment: Methodological failures and ranking distortions. Journal of the Association for Information Science and Technology, 66(11), 2015. doi:https://doi.org/10.1002/asi.23323

Aguillo, I. (2012). Is Google Scholar useful for bibliometrics? A webometric analysis. Scientometrics, 91, 343–351. doi:10.1007/s11192-011-0582-8

Alzate, F. A. (2020). IJPR in pub med central: A contribution to the Latin America's scientific production and edition. International Journal of Psychological Research. Volume 13, Issue 2., 9-13.

Aranguren, M. J., Franco, S., Horta, R., & Silveira, L. (2016). Retos y Aprendizajes de Institutos de Investigación Transformadora. Journal of technology management & innovation, 11(1)., 69-79.

Arbelaez, E., Acosta, A., DoNascimiento, C., Espitia, D., Gonzalez, A., & Medina, C. (2017). Knowledge linked to museum specimen vouchers: measuring scientific production from a major biological collection in Colombia. Scientometrics. Volume 112, Issue 3., 1323-1341.

Archambault, É., Campbell, D., Gingras, Y., & Larivière, V. (2009). Comparing bibliometric statistics obtained from the Web of Science and Scopus. Journal of the American Society for Information Science and Technology. 60(7), 1320-1326. doi: https://doi.org/10.1002/asi.21062

Arechavala, R. (2011). Las universidades y el desarrollo de la investigación científica y tecnológica en México: Una agenda de investigación. Revista de la Educación Superior 40 (158), 41-57.

Azagra, J. M., Tijssen, R. J., Tur, E. M., & Yegros, A. (2019). University-industry scientific production and the Great Recession. Technological Forecasting and Social Change., 139, 210-220. doi:https://doi.org/10.1016/j.techfore.2018.10.025

Bastidas, M., & Benites, R. (2016). Incidencia de la motivación en la producción científica institucional. Revista Retos, 11(1). DOI: 10.17163/ret.n11.2016.05, 65-87.

BMFT. (1972). Bundesministerium für Bildung und Forschung. Retrieved from https://www.bmbf.de/bmbf/de/home/home_node.html

Bucheli, V., Díaz, A., Calderón, J. P., Lemoine, P., Valdivia, J. A., Villaveces, J. L., & Zarama, R. (2012). Growth of scientific production in Colombian universities: an intellectual capital-based approach. Scientometrics. Volume 91(2), 369–382. doi:10.1007/s11192-012-0627-7

Buela, G., Guillén, A., Ramiro, T., & Quevedo, R. (2017). Ranking de investigación de las universidades públicas españolas. Revista Iberoamericana de Psicologia y Salud., 8(1), 21-35.

Buela, G., Gutiérrez, O., Bermúdez, M., & Vadillo, O. (2007). Comparative study of international academic rankings. Scientometrics, 71(3). DOI: https://doi.org/10.1007/s11192-007-1653-8, 349–365.

Carranza-Esteban, R., Turpo-Chaparro, J., Hernández, R. M., Mamani-Benito, O., & Apaza-Romero, A. (2022). Scientific Production of Rectors of Peruvian Universities. Frontiers in Education. Volume 77. Article number 772887. doi:10.3389/feduc.2022.772887

Cavacini, A. (2016). Recent trends in Middle Eastern scientific production. Scientometrics, 109 (1)., 423-432. doi:https://doi.org/10.1007/s11192-016-1932-3

Chinchilla-Rodríguez, Z., Zaca, G., Vargas-Quesada, B., & De Moya-Anegón, F. (2015). Latin American scientific output in Public Health: combined analysis using bibliometric, socioeconomic and health indicators. Scientometrics 102(1), 609-628. doi:https://doi.org/10.1007/s11192-014-1349-9

CNPq. (1951). Conselho Nacional de Desenvolvimento Científico e Tecnológico. Retrieved from https://www.gov.br/mcti/pt-br/composicao/rede-mcti/conselho-nacional-de-desenvolvimento-cientifico-e-tecnologico

COHCIT. (1993). Consejo Hondureño de Ciencia y Tecnología. Retrieved from http://bd.politicascti.net/report_SI.php/instrument/ver/149/es

COLCIENCIAS. (1968). Departamento Administrativo de Ciencia, Tecnología e Innovación (Colciencias). Retrieved from https://legadoweb.minciencias.gov.co/sobre_colciencias?vdt=info_portal%7Cpage_1

Collins, F. B. (1998). Distributed work arrangements: A research framework. The Information Society, 14(2)., 137–152.

CONACYT. (1970). Consejo Nacional de Ciencia y Tecnología. . Retrieved from https://www.conacyt.gob.mx/Que-es-conacyt.html

CONACYT. (1992). Consejo Nacional de Ciencia y Tecnología. Retrieved from https://www.conacyt.gob.sv/

CONACYT. (1997). Consejo Nacional de Ciencia y Tecnología. Retrieved from https://www.conacyt.gov.py/mision-vision

CONCYT. (1990). El Consejo Nacional de Ciencia y Tecnología. Retrieved from https://vicepresidencia.gob.gt/Consejo-Nacional-de-Ciencia-y-Tecnologia-CONCYT

CONCYTEC. (2006). Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica. Retrieved from https://portal.concytec.gob.pe/index.php/concytec/

CONICET. (1958). Consejo Nacional de Investigaciones Científicas y Técnicas.

CONICIT. (1972, Mayo 10). Consejo Nacional para Investigaciones Científicas y Tecnológicas. Retrieved from http://www.conicit.go.cr/transparencia/acceso/info_inst/marco_filosofico.aspx

CONICIT. (1990). Consejo Nacional de Investigaciones de Científicas y Tecnológicas. Retrieved from https://www.conicyt.cl/sobre-conicyt/convenios/convenios-internacionales/acuerdo-complementario-de-cooperacion-cientifica-y-tecnologica-entre-el-consejo-nacional-de-investigaciones-cientificas-y-tecnologicas-conicit-de-la-republica-de-venezuela-y-la-comis

CONICYT. (1966). Comisión Nacional de Investigación Científica y Tecnológica. Retrieved from https://www.conicyt.cl/sobre-conicyt/que-es-conicyt/

CONICYT. (1995). Consejo Nicaragüense de Ciencia y Tecnología. Retrieved from https://www.sica.int/consulta/entidad.aspx?Idn=13262&IDCat=29&IdEnt=589&Idm=1&IdmStyle=1&noarea=0

CONICYT. (2006). Consejo Nacional de Innovación, Ciencia y Tecnología. Retrieved from http://www.conicyt.gub.uy/que_es

Cortés, J. D. (2016). Eficiencia en el uso de bases de datos digitales para la producción científica en universidades de Colombia. Revista Española de Documentacion Cientifica. Volumen 39, Edición 2., 1-15.

CST. (2022). Council for Science and Technology. Retrieved from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1066859/cst-ways-of-working-2022.pdf

Cummings, J. N., & Kiesler, S. (2008). Who collaborates successfully? Prior experience reduces collaboration barriers in distributed interdisciplinary research. Proceedings of the 2008 ACM conference on computer supported cooperative work ACM., 437 - 446.

De Montis, A., Ganciu, A., Recanatesi, F., Ledda, A., Serra, V., Barra, M., & De Montis, S. (2017). The scientific production of Italian agricultural engineers: A bibliometric network analysis concerning the scientific sector AGR/10 Rural buildings and agro-forestry territory. Journal of Agricultural Engineering. Volume 48, Issue SpecialIssue 12017 Article number 635, 36-47.

De-Moya, F., Herrán, E., Bustos, A., Corera, E., Tibaná, G., & Rivadeneyra, F. (2019). SCImago Institutions Rankings SIR Iber 2019. Retrieved from http://www.elprofesionaldelainformacion.com/documentos/SIR_Iber_2019.pdf

De-Moya, F., Herrán, E., Bustos, A., Corera, E., Tibaná, G., & Rivadeneyra, F. (2021). Ranking Iberoamericano de Instituciones de Educación Superior 2021. Retrieved from http://www.profesionaldelainformacion.com/documentos/SIR_Iber_2021.pdf

Díaz, L. (2012). Missions-oriented R&D institutions in energy between 2000 and 2010: A comparative. Research Policy. Volume 41, Issue 10. https://doi.org/10.1016/j.respol.2012.02.015, 1742-1756.

Ebadi, A., & Schiffauerova, A. (2016). How to boost scientific production? A statistical analysis of research funding and other influencing factors. SCIENTOMETRICS. Volumen: 106 Número: 3., 1093-1116.

Elango, B. (2018). Growth of Scientific Publications: An Analysis of Top Ten Countries. Library Philosophy and Practice (e-journal). Library, IFET College of Engineering, Villupuram, India, elangokb@yahoo.com, 1-11. Retrieved from https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=5313&context=libphilprac

Ellegaard, O., & Wallin, J. A. (2015). The bibliometric analysis of scholarly production: How great is the impact?. Scientometrics 105, 1809–1831. doi:https://doi.org/10.1007/s11192-015-1645-z

Escobar, F., Eslava, J., & Gómez, O. G. (2016). Producción científica de los departamentos de la facultad de medicina de la universidad Nacional de Colombia entre los años 2000 y 2012. Revista Facultad de Medicina. Volumen 64, Número 2., 189-198.

Esteban, R. F., Hernández, R. M., Mamani-Benito, O. J., Chaparro, J. E., & Mamani, P. G. (2022). Scientific Production of the Nursing Major's Managment Personal from Peruvian Universities. Revista Cubana de EnfermeriaVolume 38, Issue 1. Article number e4238.

Fan, G., Zhou, Z., Zhang, H., Gu, X., Gu, G., Guan, X., . . . He, S. (2016). Global scientific production of robotic surgery in medicine: A 20-year survey of research activities. International Journal of Surgery. Volume 30, 1. DOI 10.1016/j.ijsu.2016.04.048, 126-131.

Fernández, F., & Baker, D. (2017). Science Production in the United States: An Unexpected Synergy between Mass Higher Education and the Super Research University. The Century of Science (International Perspectives on Education and Society, Vol. 33), Emerald Publishing Limited, Bingley, 85-111. doi:https://doi.org/10.1108/S1479-367920170000033006

Ferrand, É., Odou, P., Lebel, D., & Bussières, J. (2019). Evaluation of knowledge and perceptions of pharmacists and residents pharmacists about bibliometric indicators applied to the scientific literature in pharmacy. Annales Pharmaceutiques Françaises. 77(3), 250-263. doi:https://doi.org/10.1016/j.pharma.2018.11.005

Franco-Paredes, K., Díaz-Reséndiz, F. d., Pineda-Lozano, J. E., & Hidalgo-Rasmussen, C. A. (2016). Análisis bibliométrico de la producción científica de la Revista Mexicana de Trastornos Alimentarios en el periodo 2010-2014. Revista Mexicana de Trastornos Alimentarios. Volume 7, Issue 1, 9 - 16. doi:https://doi.org/10.1016/j.rmta.2016.03.001

Frangopol, P. T. (2005). Revista internaţională SCIENTOMETRICS. Articol apărut în suplimentul de vineri ALDINE al ziarului România liberă din 25 , 1-8.

Franrenet, S. (2006). France: Open archiving of scientific production. BiofuturIssue 272, Pages 5, 1-15. Retrieved from https://hal.archives-ouvertes.fr/hal-00176428/document

Galbán-Rodríguez, E., Torres-Ponjuán, D., Martí-Lahera, Y., & Arencibia, R. (2019). Medición de la producción científica cubana en revistas académicas mediante un enfoque de cobertura integral. Scientometrics 121., 1019–1043. doi:https://doi.org/10.1007/s11192-019-03233-6

García de Fanelli, A. M. (2014). Rendimiento académico y abandono universitarioModelos, resultados y alcances de la producción académica en la Argentina. . Revista Argentina de Educación Superior, ISSN-e 1852-8171, Nº. 8., 9-38.

García-León, R. A., Gómez-Camperos, J. A., & Jaramillo, H. Y. (2021). Scientometric Review of Trends on the Mechanical Properties of Additive Manufacturing and 3D Printing. J. Mater. Eng. Perform., 30, 4724–4734. doi:10.1007/s11665-021-05524-7

García-León, R., Martínez-Trinidad, J., & Campos-Silva, I. (2021). Historical Review on the Boriding Process using Bibliometric Analysis. Trans. Indian Inst. Met., 74, 541–557. doi:10.1007/s12666-020-02174-6.

Gómez, R. E., & Gerena, A. (2017). Análisis de 5 universidades colombianas con mayor porcentaje de investigaciones publicadas en revistas de primer cuartil según el SIR Iber 2014. Bibliotecas. Vol 35, N° 3. EISSN: 1659-3286. DOI: http://dx.doi.org/10.15359/rb.35-3.1, 1-31.

Gómez-Crisóstomo, R., & Luna-Sáez, R.-M. (2022). Four decades of library and information science in Spain: bibliometric analyis of scientific production. Revista Espanola de Documentacion Cientifica. Volume 45, Issue 3, 1-17. doi:https://doi.org/10.3989/redc.2022.3.1878

Gómez-Velasco, N. Y., Chaviano, O. G., & Ballesteros-Alfonso, A. L. (2021). Dinámicas de la producción científica colombiana en economía. Un estudio bibliométrico en Scopus 2007 - 2019. Lecturas de Economía, (95), 277-309. doi:https://doi.org/10.17533/udea.le.n95a344139

Gonzales, J., Chavez, T., Lemus, K., Silva, I., Galvez, T., & Galvez, J. (2018). Producción científica de la facultad de medicina de una universidad peruana en SCOPUS y Pubmed. Educación Médica, 19(2), 128-134. doi:https://doi.org/10.1016/j.edumed.2017.01.010

Guerrero, J. M., Castellanos, M., & Gomez, J. (2019). Uso de un modelo ontológico para evaluar la relevancia de producción científica. Transacciones IEEE América Latina. Volumen 17, Número 9., 1424-1431. doi:https://doi.org/10.1109 / TLA.2019.8931135

Gutiérrez-Salcedo, M., Ángeles-Martínez, M., Moral-Munoz, J. A., Herrera-Viedma, E., & Cobo, M. (2018). Some bibliometric procedures for analyzing and evaluating research fields. Applied Intelligence., 48(5), 1275–1287. doi:https://doi.org/10.1007/s10489-017-1105-y

Herrera-Franco, G., Montalván-Burbano, N., Mora-Frank, C., & Bravo-Montero, L. (2021). Scientific Research in Ecuador: A Bibliometric Analysis. Publications 2021, 9(4), 55, 1-34. doi:https://doi.org/10.3390/publications9040055

Hyunju, J., & Kim, H. (2014). Research output of science, technology and bioscience publications in Asia. Science Editing, 1 (2), 62-70. doi:http://dx.doi.org/10.6087/kcse.2014.1.62

Jin, B., & Rousseau, R. (2005). Evaluation of Research Performance and Scientometric Indicators in China. In H. F. Moed, W. Glänzel, & U. Schmoch, Handbook of Quantitative Science and Technology Research (pp. 497-514). New York, Boston, Dordrecht, London, Moscow: Springer Science + Business Media, Inc. Retrieved from https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.453.9529&rep=rep1&type=pdf

Jones, B. F., Wuchty, S., & Uzzi, B. (2008). Multi-University Research Teams: Shifting Impact, Geography, and Stratification in Science. Science 322 (5905), 1259-1262. doi:10.1126/science.1158357

Kempener, R., Diaz, L., & Condor, J. (2010). Governmental Energy Innovation Investments, Policies and Institutions in the Major Emerging Economies: Brazil, Russia, India, Mexico, China, and South Africa. Energy technology innovation policy discussion paper. , 16.

King, A., Llinas, X., & Amestica, L. (2020). Caracterización de la producción científica sobre clasificaciones de universidades. un estudio bibliométrico desde 1988 a 2018. Formacion Universitaria. Volumen 13, Número 2, 1., 53-62.

King, A., Llinas, X., & Amestica, L. (2020). Caracterización de la producción científica sobre clasificaciones de universidades. Un estudio bibliométrico desde 1988 a 2018. Formación universitaria., 13(2), 53-62. doi:http://dx.doi.org/10.4067/S0718-50062020000200053

Kipper, L. M., Furstenau, L. B., Hoppe, D., Frozza, R., & Iepsen, S. (2020). Scopus scientific mapping production in industry 4.0 (2011–2018): a bibliometric analysis. International Journal of Production Research. Volume 58, Issue 6., 1605-1627.

Kuong Morales, M., & Kuong Morales, S. (2022). Scimago international bibliometric ranking: a reality for peruvian universities. Revista Venezolana de Gerencia. Volume 27, Issue 7., 426 - 442. doi:10.52080/rvgluz.27.7.28

León, J. F., Llanos, V. D., Ordóñez, E. J., & García, J. F. (2022). Produccion cientifica colombiana en psicologia en Scopus desde el 2015 al 2019. Revista Espanola de Documentacion Cientifica. Volume 45, Issue 2, 1-11. doi:https://doi.org/10.3989/redc.2022.2.1850

Liberatore, G., Sleimen, S., Vuotto, A., Di Césare, V., & Pallotta, N. (2021). Estudio de la internacionalización de la Universidad Nacional de Mar del Plata desde la perspectiva de la producción científica. Análisis de la colaboración y liderazgo científico. Información, cultura y sociedad. 44, 13-32. doi:https://doi.org/10.34096/ics.i44.8665

López-Muñoz, F., De Berardis, D., Fornaro, M., Vellante, F., di Giannantonio, M., Povedano-Montero, F. J., . . . Álamo, C. (2017). A bibliometric analysis of scientific production on atypical antipsychotic drugs from Italy. Rivista di psichiatria psichiatria 52(6), 236-246. doi:https://doi.org/10.1708/2846.28727

Lorusso, F., Inchingolo, F., & Scarano, A. (2020). Scientific Production in Dentistry: The National Panorama through a Bibliometric Study of Italian Academies. Hindawi. BioMed Research International. Volume 2020 |Article ID 3468303, 1-10. doi:https://doi.org/10.1155/2020/3468303

Lucas-Barcia, & Roa-González, J. (2021). Análisis de la producción científica sobre enseñanza universitaria virtual y semipresencial en revistas españolas de alto impacto. Revista Complutense de Educación. 32(4), 605-616. doi:https://doi.org/10.5209/rced.70887

Mabe, M., & Amin, M. (2001). Growth dynamics of scholarly and scientific journals. Scientometrics, 51(1)., 147–162.

Magnone, E. (2012). A general overview of scientific production in China, Japan and Korea of the water-gas shift (WGS) process. Information (Switzerland). Volume 3, Issue 4., 771 - 789. doi:https://doi.org/10.3390/info3040771

Martelo, R., Jaramillo, J., & Ospino, M. (2018). Producción científica de docentes universitarios y estrategias para aumentarla mediante series de tiempo y MULTIPOL. Espacios. Vol. 39 (Nº 16), 11-21.

Martínez, T. S., Díaz, I. A., Romero, J. M., & Rodríguez, A. M. (2019). Eficacia del método flipped classroom en la Universidad: Meta-análisis de la producción científica de impacto. REICE. Revista Iberoamericana

Sobre Calidad, Eficacia y Cambio en Educacion. Volume 17, Issue 1., 25-38. doi:10.15366/reice2019.17.1.002

Mateus, I. M., & Berrío-Zapata, C. (2021). Brazilian scientific production on COVID-19: A bibliometric and altmetric analysis. 18th International Conference on Scientometrics and Informetrics, ISSI. Leuven, 12 July 2021 through 15 July 2021, Code 170532, 783 - 793. doi:https://pesquisa.bvsalud.org/global-literature-on-novel-coronavirus-2019-ncov/resource/pt/covidwho-1498768?lang=es

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. Volume 2021 |Article ID 5510209, 1-8. doi:https://doi.org/10.1155/2021/5510209

Mazaro, L. M., Depole, B. F., Gasparini, D. A., Colato, E. R., Gomes, L. D., Souza, M. B., . . . & Lussi, I. A. (2021). Panorama da produção científica sobre terapia ocupacional e saúde mental (1990-2018): estudo bibliométrico. Cadernos Brasileiros de Terapia Ocupacional, 29, e2855., 1-21. doi:https://doi.org/10.1590/2526-8910.ctoAR2159

MECSST. (2001). Ministry of Education, Culture, Sports, Science and Technology. Retrieved from https://baike.baidu.com/item/%E6%96%87%E9%83%A8%E7%A7%91%E5%AD%A6%E7%9C%81/10350878

Miguel, S., De Oliveira, E. F., & Gracio, M. C. (2016). Scientific Production on Open Access: A Worldwide Bibliometric Analysis in the Academic and Scientific Context. Publications. Volumen: 4 Número: 1, 1-15. doi:10.3390/publications4010001

Miller, T. R., Baird, T. D., Littlefield, C. M., Kofinas, G., Chapin, F. S., & Redman, C. L. (2008). Epistemological Pluralism: Reorganizing Interdisciplinary Research . Ecology and Society, 13(2)., 42-60.

Millones-Gómez, P. A., Yangali-Vicente, J. S., Arispe-Alburqueque, C. M., Rivera-Lozada, O., Calla-Vásquez, K. M., Calla-Poma, R. D., . . . Minchón-Medina, C. A. (2021). Research policies and scientific production: A study of 94 Peruvian universities. PLoS ONE 16(5), 1-15. doi:https://doi.org/10.1371/journal.pone.0252410

Minciencias. (2021). Modelo de medición de grupos de investigación, desarrollo tecnológico o de innovación y de reconocimiento de investigadores del sistema nacional de ciencia, tecnología e innovación. Retrieved from https://minciencias.gov.co/sites/default/files/upload/convocatoria/anexo_1_-_documento_conceptual_2021.pdf

Minciencias. (2022). Journal Citation Report (JCR). Retrieved from https://minciencias.gov.co/glosario/journal-citation-report-jcr

Monroy, S. E., & Diaz, H. (2018). Time series-based bibliometric analysis of the dynamics of scientific production. Scientometrics. 115(3)., 1139-1159.

NCST. (1993). National Commission on Science and Technology. Retrieved from https://www.mset.gov.jm/2019/06/20/national-commission-on-science-and-technology/

NSC. (1959). National Science Council. Retrieved from https://es.frwiki.wiki/wiki/Minist%C3%A8re_de_la_Science_et_des_Technologies_(r%C3%A9publique_de_Chine)

O'Loughlin, D., MacPhail, A., & Msetfi, R. (2015). The rhetoric and reality of research reputation: ‘fur coat and no knickers’. Studies in Higher Education, 40(5). https://doi.org/10.1080/03075079.2013.842224, 806–820.

Ordorika, I., & Rodríguez, R. (2010). El ranking Times en el mercado del prestigio universitario. Perfiles Educativos, vol. XXXII, núm. 129., 8-29.

OSTP. (1976). Office of Science and Technology Policy. Retrieved from https://www.whitehouse.gov/ostp/

Pagani, R., Kovaleski, J. L., & Resende, L. M. (2015). Methodi Ordinatio : a proposed methodology to select and rank relevant scientific. Scientometrics.

Pasgaard, M., Dalsgaard, B., Maruyama, P. K., Sandel, B., & Strange, N. (2015). Geographical imbalances and divides in the scientific production of climate change knowledge. Global Environmental Change-Human nnd Policy Dimensions. Volume 35. 10.1016/j.gloenvcha.2015.09.018, 279-288.

Peralta, M. J., Solís, F. M., & Peralta, L. M. (2011). Visibilidad e impacto de la producción científica de la Universidad Central "Marta Abreu" de Las Villas durante el período 2000-2008. Revista Cubana de ACIME Vol.22 No.1. , 60-78.

Piedra, Y., & Martínez, A. (2007). Producción científica . Ciencias de la Información, vol. 38, núm. 3., 33-38.

Powell, J. J., & Dusdal, J. (2017). The European Center of Science Productivity: Research universities and institutes in France, Germany, and the United Kingdom. International Perspectives on Education and Society., 33, 55-83.

Pritchard, A. (1969). Statiscal bibliography or Bibliometrics. Journal of Documentation. 25(4), 348-369.

Quintero-Quintero, W., Blanco-Ariza, A. B., & Garzón-Castrillón, M. A. (2021). Intellectual Capital: A Review and Bibliometric Analysis. publications., 9(46), 1-23. doi:https://doi.org/10.3390/publications9040046

Ramírez, M. S. (2015). Acceso abierto y su repercusión en la Sociedad del Conocimiento: Reflexiones de casos prácticos en Latinoamérica. Education in the Knowledge Society, 16(1)., 103-118.

Rasolabadi, M., Khaledi, S., Khayati, F., Kalhor, M. M., Penjvini, S., & Gharib, A. (2015). Scientific Production of Medical Universities in the West of Iran: a Scientometric Analysis. Acta Informatica Medica., 23(4), 206-209. doi:https://doi.org/10.5455/aim.2015.23.206-209.

Rauhvargers, A. (2011). Global university rankings and their impact. Leadership for WorldClass Universities Challenges for Developing Countries. España: European University Association.

Ravelo, E. L., Mejía, S., & González, M. E. (2016). La producción científica de acta Colombiana de psicología: Análisis descriptivo del período 2010-2014. Acta Colombiana de Psicologia. Volumen 19, Número 2., 298-314.

Ravelo, E. L., Miguel, B., Mejia, S., Millan, J. D., & Salas, G. (2020). La producción científica de Acta Colombiana de Psicologia: análisis descriptivo y bibliométrico del período 2015 - 2019. Acta Colombiana de Psicologia. Volumen: 23 Número: 2., 188-204.

Rhoten, D. (2011). Interdisciplinary Research: Trend or Transition. Items and Issues, 5(1–2)., 6 -11.

Rhoten, D., & Parker, A. (2005). EDUCATION: Risks and Rewards of an Interdisciplinary Research Path. Science, 306(5704). DOI: 10.1126/science.1103628, 2046–2046.

Rodríguez, A. M., Trujillo, J. M., & Sánchez, J. (2019). Impacto de la productividad científica sobre competencia digital de los futuros docentes: aproximación bibliométrica en Scopus y Web of Science. Revista Complutense de Educacion. , 30(2), 623-646. doi:https://doi.org/10.5209/RCED.58862

Rodríguez, J. K., & Gómez, N. Y. (2017). Redes de coautoría como herramienta de evaluación de la producción científica de los grupos de investigación. Revista General de Informacion y Documentacion. Volume 27, Issue 2., 279-297.

Rodríguez, Y., Hernández, T. R., Carvajal, B. M., Ubeda, J., Herrera, G., & Sierra, E. (2022). Open science and the scientific production of the University of Camagüey in academic social networks. Bibliotecas, Anales de InvestigacionVolume 18, Issue 1, 1-18.

Rojas-Valladares, A. L., López-Fernández, R., Socorro-Castro, A. R., & León-González, J. L. (2021). Estudio de la producción científica en la Universidad Metropolitana del Ecuador, en el período 2020-2021. Universidad y Sociedad. 13(6), 89-98. Retrieved from https://rus.ucf.edu.cu/index.php/rus/article/view/2370

Salmerón, E., & Manzano, F. (2018). The higher education sustainability through virtual laboratories: The Spanish University as case of study. Sustainability (Switzerland). , Volume 10(11,4), 1-22.

Salmi, J., & Saroyan, A. (2007). League Tables as Policy Instruments. Higher Education Management and Policy, 19(2)., 1-38.

Sánchez, N. F., Galván, J. F., & Eslava, J. (2016). Producción científica en las facultades de Medicina en Colombia en el periodo 2001-2015. Revista Facultad de Medicina. Volumen 64, Número 4., 645-650.

SCImago institutions rankings. (2021). SCImago Research Group (2021). SIR — SCImago institutions rankings. Retrieved from https://www.scimagoir.com/

SCImago Journal & Country Rank (SJR). (2022). Scimago Journal & Country Rank (JSR). Retrieved from https://www.scimagojr.com/aboutus.php

SEESCYT. (1996). Secretaría de Estado de Educación Superior, Ciencia y Tecnología. Retrieved from https://mescyt.gob.do/nosotros/quienes-somos/

SENACYT. (1997). Secretaría Nacional de Ciencia, Tecnología e Innovación. Retrieved from https://www.senacyt.gob.pa/sobre-nosotros/

SENACYT. (2008). Secretaría Nacional de Ciencia y Tecnología.

Serrano, M. L., & Carreno, J. A. (2016). Productividad científica de las líneas de investigación y su contribución para el control del cáncer en Colombia. Revista Colombiana de Cancerologia Volumen: 20 Número: 167-174., 4 .

SICTI. (2011). Sistema de Información sobre Ciencia, Tecnología e Innovación. Retrieved from https://www.ciencia.gob.es/Estrategias-y-Planes/Sistema-de-Informacion-sobre-Ciencia--Tecnologia-e-Innovacion--SICTI-/Sistema-de-Informacion-de-Ciencia-Tecnologia-e-Innovacion-SICTI.html

STTE. (1984). Ministerio de Ciencia, Tecnología y Educación Superior. Retrieved from http://docs.politicascti.net/reportes/TT.pdf

Suárez-Amaya, W., Rodríguez-Altamirano, M., & Ganga-Contreras, F. A. (2022). Strategies to promote scientific university production in Chile. Revista de Ciencias Sociales. Volume 28, Issue 2., 350 - 363. doi:10.31876/rcs.v28i2.37943

Suclupe-Navarro, P., Limaymanta, C. H., Ramírez, N. H., & Guillén, H. (2021). Scientific Production on Library Anxiety: A Bibliometric and Scientometric Analysis from Scopus. Revista Espanola de Documentacion Cientifica. Volume 44, Issue 2., 1-13. doi:10.3989/redc.2021.2.1753

Tahmooresnejad, L., Beaudry, C., & Schiffauerova, A. (2015). The role of public funding in nanotechnology scientific production: Where Canada stands in comparison to the United States. Scientometrics. Volume 102, Issue 1., 753 - 787. doi:https://doi.org/10.1007/s11192-014-1432-2

Tahmooresnejad, L., Beaudry, C., & Schiffauerova, A. (2015). The role of public funding in nanotechnology scientific production: Where Canada stands in comparison to the United States. Scientometrics. Volume 102, Issue 1, 17. DOI: 10.1007/s11192-014-1432-2, 753-787.

Torres, D. (2020). Ritmo de crecimiento diario de la producción científica sobre covid-19. Análisis en bases de datos y repositorios en acceso abierto. Profesional de la Informacion. Volumen 29, Edición 2., 1-6. doi:10.3145 / epi.2020.mar.15

Vasquez, C., Luna, M., Bucci, N., Torres, M., & Viloria, A. C. (2019). University Clusters from SIR IBER Indicators of Innovation Factor 2016-2019. The 4th International workshop on Big Data and Networks Technologies (BDNT 2019) November 4-7, Coimbra, Portugal, 570-581.

Vazquez, P., & Posada, M. R. (2020). Implementation of an Annual Goal´s Plan for the improvement of scientific production in a Colombian university. Positives and negatives aspects. Revista General de Informacion y Documentacion. Volume 30, Issue 2., 457-471. doi:10.5209/rgid.72821

Vinader-Segura, R., Puebla-Martínez, B., & Vicente-Fernández, P. (2020). Scientific production about social networks in Spain: Bibliometric analysis (2010-2019). RISTI - Revista Iberica de Sistemas e Tecnologias de Informacao. Volume 2020, Issue E35, 436-451.

Visser, M., van Eck, N., & Waltman, L. (2021). Large-scale comparison of bibliographic data sources: Scopus, Web of Science, Dimensions, Crossref, and Microsoft Academic. Quant. Sci. Stud., 2, 20–41. doi:10.1162/qss_a_00112

Zarate, R., Becerra, L. E., & Fuentes, F. L. (2017). Estado de la producción científica de la Responsabilidad Social en Colombia. Revista Espacios. Vol. 38 (Nº 53), 20-33.