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Research Management In University Education: Bibliometric And Systematic Review

Mgt. Gilda Rosalynn Escalante[1] , Dra. Raquel Mónica Loaiza-Carrasco[2] , Mgt. Frineé Barriga Cárdenas[2] , Dr. Rafael Jiménez García.[2] , Mgt. Herly Barriga Cárdenas[3]

[1]https://orcid.org/0009-0000-7148-8996
gescalantez@ucvvirtual.edu.pe
[2]orcid.org/0000-0003-4097-9076
raquel.loaiza@unsaac.edu.pe
[2]Orcid: https://orcid.org/0000-0002-5926-5498
frinee.barriga@unsaac.edu.pe
[2]Orcid: https://orcid.org/0000-0003-0964-4454
rafael.jimenez@unsaac.edu.pe
[3]Orcid: https://orcid.org/0009-0004-0159-934X
herbaca@gmail.com
(1) Universidad Cesar Vallejo (UCV)
(2) Universidad Nacional de San Antonio Abad del Cusco (UNSAAC)
(3) Universidad Andina del Cusco (UAC)

The objective was to identify the management of research in higher education through bibliometric and systematic review based on four parameters. The information was segmented by periodicity range and keywords such as “research management” and “higher education”. Four databases were used for the diagnosis: Scopus, WoS, Scielo and Google scholar. For the bibliometric analysis, documents from Scopus and WoS were analyzed while for the systematic analysis the four databases were used. The studies included for the review were 23 after going through the selection criteria. As results, the articles that considered the basis of the research institutions were identified, followed by those referring to the quality of the research. Articles on the lack of human resources were also identified and, finally, those that refer to research data management as part of the development of the research.

Keywords: research management, higher education, research institutions, human resources, RDM

Resumen

El objetivo fue identificar el manejo de la gestión investigativa en la educación superior mediante revisión bibliométrica y sistemática basada en cuatro parámetros. La información fue segmentada por rango de periodicidad y palabras clave “research management” y “higher

education". Para el diagnóstico fueron utilizadas cuatro bases de datos: Scopus, WoS, Scielo y Google scholar. Para el análisis bibliométrico se analizaron documentos de Scopus y WoS, mientras que, para el análisis sistemático se utilizaron las cuatro bases de datos. Los estudios incluidos para la revisión fueron 23 después de pasar por los criterios de selección. Como resultados se identificaron los artículos que consideraron base a las instituciones investigativas, seguidos de los referentes a la calidad de la investigación. También se identificaron artículos sobre la falta de recursos humanos y, por último, aquellos que refieren a la gestión de datos de la investigación como parte del desarrollo de la investigación.

Palabras clave: gestión de la investigación, educación superior, instituciones investigativas, recursos humanos, RDM

Introduction

Since ancient times, man has been in quest for answers to all phenomena that happened around him without imagining that what he did was to investigate, that is why this ability was empowering every time in human life looking for the reason why these facts occur then becoming a scientific knowledge which seeks to lead a logical sequence from a specific management (Mercado, 2022). Research comprises studies based on scientific evidence, more so in the higher education environment mentioned by UNESCO Forum on Higher Education and Research (Kearney, 2009) in which it compares, recommends and guides according to management carried out by each institution. Therefore, to manage is to do something in the right way; and to research is to realize a pure and novel knowledge focused on the concept of "research management" (Facundo, 2009). For Ruiz-Ruiz et al. (2022), management in research corresponds to a set of decisions and actions to achieve an objective under an adequate planning with effectiveness and efficiency through the use of certain indicators.

Research management at the university higher education level aims to strengthen and articulate research, development and innovation activities in various contexts by stimulating cooperation among researchers themselves, between groups and research networks (Serpa et al., 2018) is so it should include the improvement and training of the research teacher supported from institution for the achievement of its research objective.

Currently in Latin America, university research systems have the particularity of gathering information, both in production and application of knowledge, experimentally and from technological environments. Each country has its own vision of research management, which makes its results little known worldwide (Royero, 2003). However, this management is beginning to take on greater force with agencies in charge of promoting scientific research in each country (UNESCO, 1999), taking into consideration countries such as Argentina (whose agency in charge of research management is the Secretariat of State for Science and Technology, the National Council for Research in Science and Technology (CONICET), in Brazil, supervised by the National Council for Science and Technology and the Ministry of Science and Technology), in Chile (CONICYT whose CONICYT is in charge of research management), and in Brazil (CONICYT whose CONICYT is in charge of research management). In Chile (CONICYT whose support is represented by FONDECYD and FONDEF. In Colombia represented by the National Council for Economic and Social Policy

(COMPES) and COLCIENCIAS. In Mexico by Secretariat of Public Education (SEP) and the National Council of Science and Technology (CONACYT), in Uruguay it is regulated by National Directorate of Innovation, Science and Technology (CONICYT) and in Peru whose research is managed by the National Council of Science and Technology (CONCYTEC).

The disarticulation of research and academic training from the classroom, academic schools and even faculties correspond to the greatest weakness of universities (Ayerdis, 2023), which is why the author refers that higher education institutions should articulate processes so that the student, who is the key factor in conducting good research and, hand in hand with their research teacher, should break the chains of these weaknesses and promote formative research from an integral perspective.

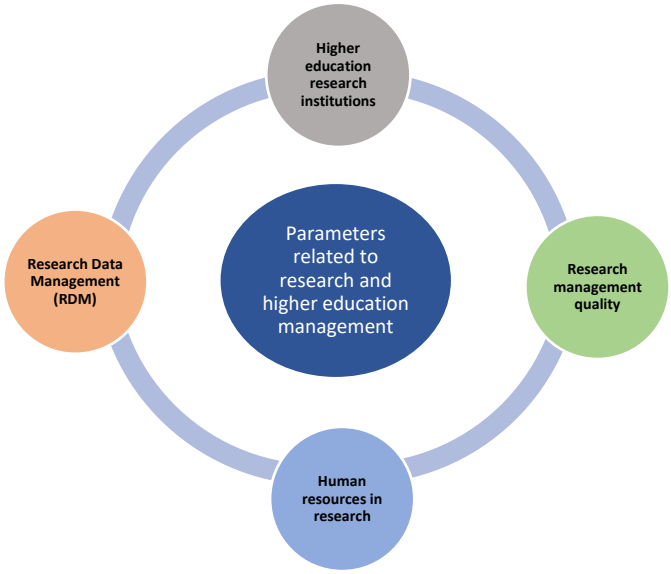
In Peru, the research reality makes that the physical capacity is limited in higher education institutions, therefore, graduate units, especially in research should stick to the technological reality and manage distance education, thus raising awareness in a modern culture of research at all levels of education (Quiroz, 2019). For Villalba and Gonzáles (2017), the research seedbeds are the fundamental constructivist and methodological pillar that allow an integral formation as a basis for research among students and teachers where they inculcate to get involved, innovate and develop much more potential learning than traditional education. Linking teaching and research is the best way to manage strengthening and inquiry of scientific knowledge. In this sense, and as Pernalete and Odor (2022) refer, Peruvian universities have taken a turn in the increase of scientific productions thanks to the enactment of Law No. 30948, which allows the management of research in terms of qualification, evaluation and even financing in scientific research centers.

The objective of this study was to identify the management of research management as a research system through a bibliometric and systematic review based on four parameters related to research in higher education.

Methodology

A bibliometric review was carried out followed by a systematic review referring to research management in higher education teaching. Since the collection of information is relatively recent, there was no greater accessibility to desired information, so it was determined to perform a bibliometric review of the keywords “research management” and “higher education” only for the Scopus and Web of Science databases to identify the relationship between the keywords and other directly related ones. Thus, the information was obtained in a more extended way by means of systematic review. For the systematization, the principles of the “PRISMA P” statement (Quispe et al, 2021) were taken into account and the parameters taken into account were four segmented as follows (Figure 1).

Figure 1. Parameters related to research and higher education management.



Note: The graph represents the parameters used for the research analysis.

Search strategy

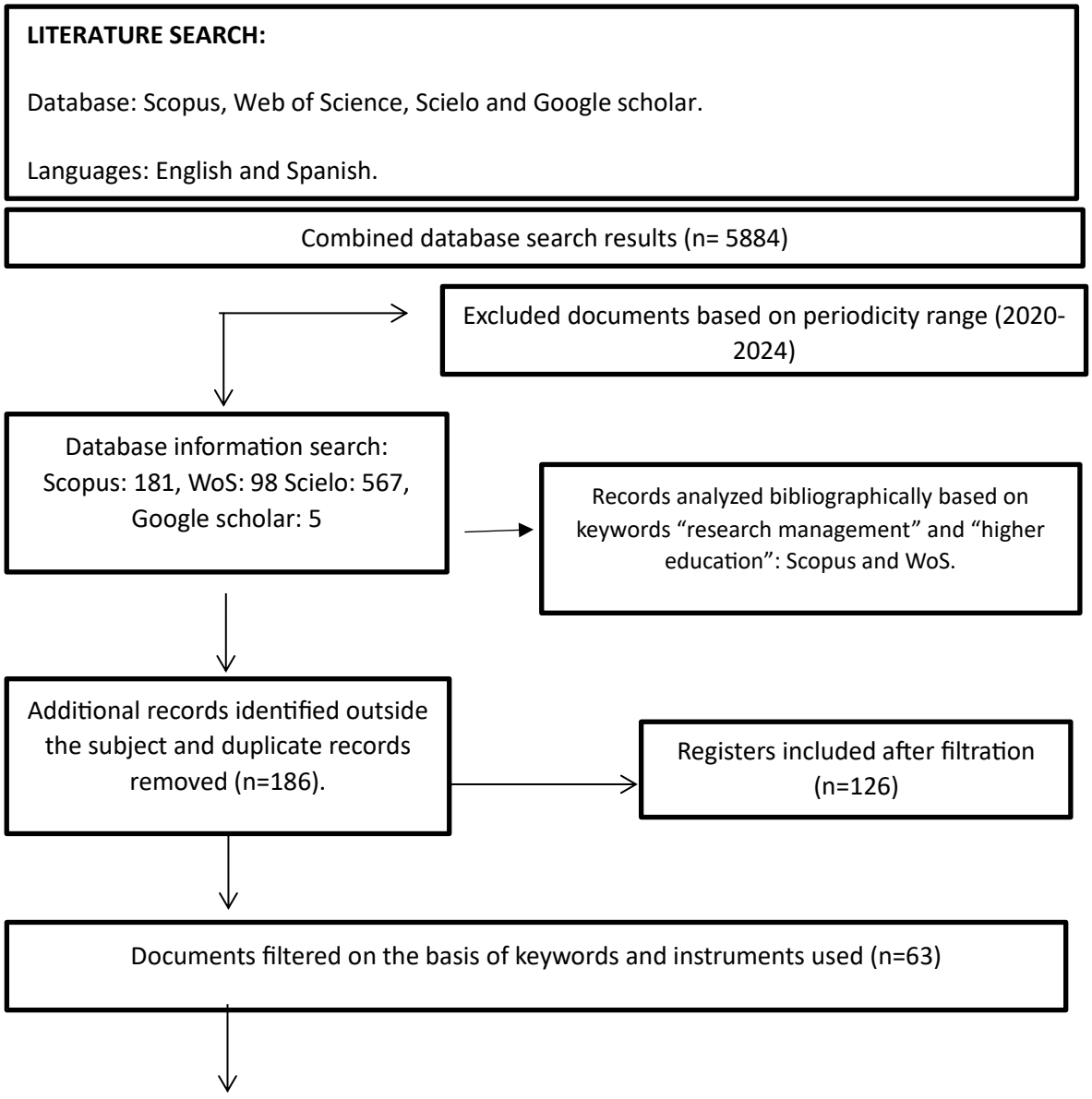
Four databases were used to search for information: Scopus, Web of Science, Scielo and Google scholar. Initially, the results were not encouraging, especially because research management yielded concepts of interest other than research, so it was more specific using two key words “research management” and “higher education” (Table 1). The exclusion and inclusion criteria were taken into account for the final results.

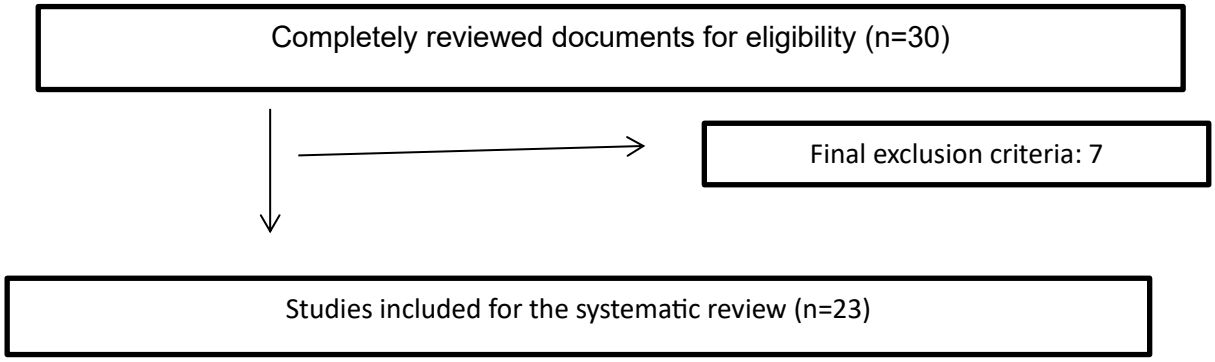
Table 1. Search for information.

DATABASE	KEYWORDS
Scopus	research management AND higher education
Web of Science	research management AND higher education
Scielo	research management AND higher education
Google scholar	research management AND higher education

The periodicity range was between 2020 and 2024. To obtain the sample (n=23), a series of filtrations were carried out, starting with the descriptors "Research Management" and "Higher Education", which were reviewed in the ERIC thesaurus and used for the search log. Likewise, the Boolean operators "AND" were used for filtering and the quality of systematization and specification, and after filtering, it was resolved with the Boolean operator "OR".

Figure 2: Flow chart for the descriptive review.





In the Scopus database, 2018 articles were found overall and after the segmentation of time (2020-2024) and the keywords in English: "research management" and 'higher education' 181 records were included. The same was done with Web of Science database, with the same keywords, resulting in the elimination of 758 articles, leaving 98 documents included after the first filtration.

For the collection of data from Web of Science (WoS), the first filter was performed with the same words and the AND Boolean operator, filtering only by the title of articles, finding a total of 758 articles. For the second filter, it was also determined to include the two words: "management" and "research" in title of articles, establishing the periodicity range between 2020 and 2024, leaving a total of 98 articles. A search was also carried out in the Scielo database where 2054 articles were obtained. After filtering by the period within the last five years of antiquity and where it could be observed that the largest number of publications on research management (ti:((ti:(*)) AND (ti:(higher education)))) corresponded between years 2020 to 2023 with 556 articles and only 11 in year 2024.

For the search in Google scholar, the search was also carried out with the indicators "research management" and "higher education" initially in amount of 1054 but after periodicity range between years 2020 and 2024 and performing the corresponding filters and exclusion and inclusion criteria, only 5 articles clearly related to research management were obtained.

As a first step, each of the articles was reviewed in terms of titles and abstracts through the advanced search in each of the databases; it should also be noted that the authors gave a quick reading to the mentioned articles. Another exclusion criterion was then determined, which was the removal of duplicate and illegible articles, leaving 126 records.

Next, the instruments used in the remaining records were taken into account, leaving 63 articles. With regard to the inclusion criteria, all those studies that met the characteristics of the filtration were taken into account, so that the documents, 30 in number, were completely reviewed for their eligibility, extracting 7 more records and leaving 23 final articles as a study sample.

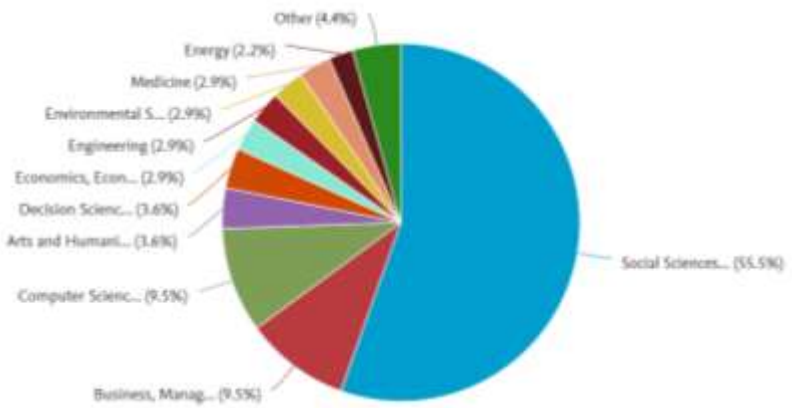
For a more exhaustive analysis, we also included the author or authors, the place and the year of publication of the article, the key words and the instrument used to determine the type of management and any other information necessary according to the subject under study.

Results and discussion

Bibliometric analysis

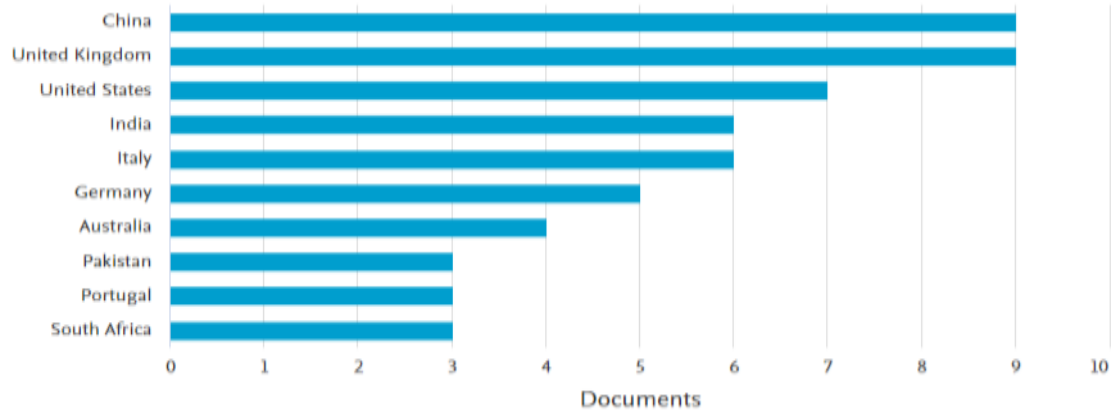
In spite of the scarce information on "research management in higher education", Figure N° 3 shows the percentage of publications in the area of Social Sciences, followed only by the area of Business and Administration, as well as Information Sciences. The other areas only cover between 2 to 4% of publications.

Figura 3. Documentos publicados en porcentaje por áreas académicas.



Similarly, Figure N° 4 illustrates the number of publications by country. The highest number of publications is observed in China, an Asian country, while the lowest number is observed in Australia, Pakistan, Portugal, and South Africa. The United Kingdom also exhibits a relatively high number of publications. In the case of this study, however, the quality of the information provided in the publications from Australia and Pakistan was taken into account.

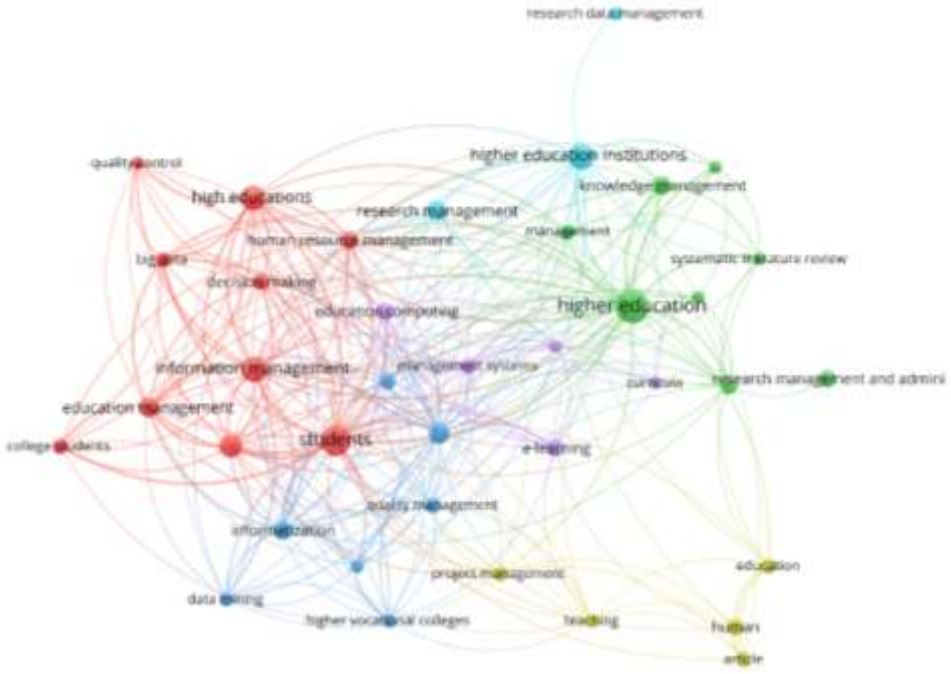
Figure 4. Documents segmented by territorial area.



Network map

The following figure (Figure 5) shows the network map of the articles published in Scopus. According to the keywords, it was found that the largest networks of descriptors are related to the keywords: “higher education” and “research management” respectively. In the figure it can be seen that there are six groups of co-occurrences in different colors: red, blue, lilac, green, light blue and yellow, which compose an interweaving of networks. The size of the networks is directly proportional between the clusters: red, green, blue and light blue and thus with other descriptors.

Figure N°5. Network map of the keywords of the articles published in the Scopus database on research management in higher education teaching.

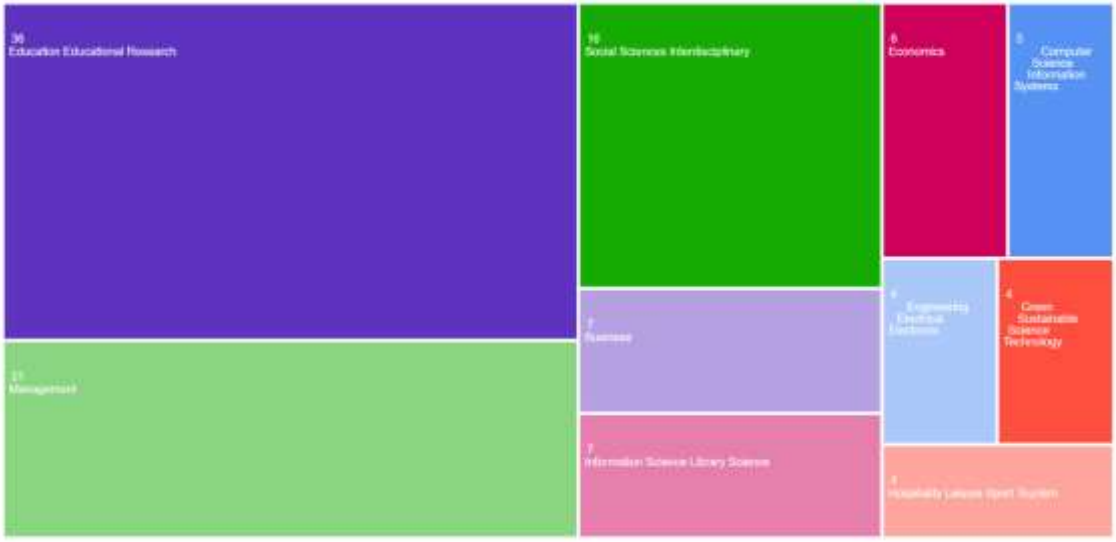


Thus, it can be observed that the cluster that composes the main keyword of the research is found in the green color "higher education" taking greater relevance in relation to the other clusters which are directly proportional to the concepts of research management in higher education.

Likewise, the keyword "research management" is found in the light blue cluster which, although in fewer descriptor networks, is mainly related to the other keyword "higher education" and to other words within the framework of teaching in higher education that were not necessarily determined as keywords within this research, but which are included within general context. "Students" takes an important value in red cluster that encompasses "information management" and "education management" and is directly related to the keyword "higher education". In summary, the two keywords of this study are found in different clusters, with "research management" in the light blue cluster and "higher education" in the green cluster, being more closely related than the other words mentioned above.

Likewise, the bibliometric analysis of the Web of Science database determined by areas of publication was carried out and according to Figure 6, the minimum number of articles related to research management in higher education can be seen. Thus, the largest number of articles was found in area of Education with 36 articles, followed by Administration and Social Sciences with 21 and 16 articles respectively. There were also 7 articles in the areas of Business and Information Sciences, 6 articles in Economics and a smaller number in areas of Information Systems, Engineering and Technological Sciences, and no article was related to the area of Health.

Figure 6. Articles related to research management and higher education in the WoS database.



Systematic analysis

The included studies evaluated the potential and quality of research in higher education institutions using various types of instruments and referring to the four parameters of the study. The 23 papers are briefly summarized below according to author, year of publication, country and instruments used in each of the papers analyzed (Table 2).

Table 2. Specifications of the articles included in the review.

	Author	**Year of publication**	**Location**	**Instruments**
1	Wang, J. **(WoS)**	2023	China	TODIM-VIKOR (IVPF-TODIM-VIKOR) method for solving the MAGDM under IVPFS.
2	Rajashekar P. (**WoS)**	2021	India	Advanced research asset creation model (ARAC).
3	Frei et al. (**WoS)**	2023	Australia	Management Control Systems (MCS).
4	Totska, O. **(WoS)**	2023	Ucrania	Competition for comparative scientific papers.
5	Rafiq et al. **(WoS)**	2022	Pakistán	International research questionnaire.

6	Andrade - Valbuena **(WoS)**	2022	España	Citation and citation bibliometric techniques.
7	Zhou et al. (**WoS)**	2023	Texas	Mixed interviews to evaluate RDM.
8	Chew et al. **(WoS)**	2022	Australia	Introductory online training.
9	Xu et al. **(WoS)**	2022	Texas	Online RDM introduction intervention for baseline and control groups.
10	Al- Jaradat, O. **(WoS)**	2021	Jordania	Online questionnaire.
11	Buciuniene et al. (**WoS)**	2021	Europa	Training proposals for human resources and performance.
12	Mahmut et al. **(WoS)**	2023	Istanbul	Establishment of a Unified National HE System in Australia (ARMS)
13	Ta et al. **(SCOPUS)**	2022	Malasia	Evaluation of Participatory Action Research
14	Yang-Yoshihara et al. **(SCOPUS)**	2023	US y UK	Roles and expectations in the creation of research areas (RMAs)
15	Kienast, R. **(SCOPUS)**	2023	Alemania	Two-dimensional analytical framework organized into four levels of research (meta, macro, meso, micro).
16	Marchant-Cavieres et al. **(SCOPUS)**	2023	Chile	Research management tools (IGI)
17	Thomson et al. (**SCOPUS)**	2023	Australia	Program accredited by the RMO Management Office
18	Finalé et al. (**GOOGLE SCHOLAR)**	2021	Cuba y Mexico	Alternative proposal for the systematization of management theory and university management.
19	Ayala, M. y Valencia, L. (**GOOGLE SCHOLAR)**	2020	Ecuador	Questionnaire to measure the review of statistical data, ranking figures and the main sources of information of international journals.
20	Montenegro, L. y Narváez, M. (**GOOGLE SCHOLAR)**	2021	Colombia	Hermeneutic system of public management, science and technology and innovation.
21	Mendoza et al. (**SCIELO)**	2024	Ecuador	Self-evaluation.
22	Espinoza et al. **(SCIELO)**	2024	Perú	Perceptions of students and teachers on the research management developed, by means of surveys.

2 3	Bidiña et al. **(SCIELO)**	2023	Argentina	Interviews with research secretaries.

Analysis according to the parameters proposed:

Research institutions in higher education

One of the pillars in research management and according to the results of this research are universities and institutions created specifically for research. So, refers Mahmut et al. (2023) whose study was to evaluate Istanbul University under the concept of Research University in Turkey and compares it with international research universities. It places Istanbul University as one of the main allies to manage publications and experimental research works in a coordinated and planned manner. Now, in Malaysia they take research performance assessments (MyRA) as a priority for their universities and research centers of excellence (RCoE), in a new study framework that takes a participatory action approach in addition to describing stepwise approaches for alternative assessment systems which are discussed at the end of the study including their applicability and not just leaving in a study conclusion (Ta et al., 2022). The study by Yang-Yoshihara (2023) in which he also refers to the creation of research-related university careers by an increasing diversity and complexity in the roles and responsibilities of research management as an increasing number of professionals are beginning to study these careers as a distinct field of research. According to the Thomson et al. study, (2023) there is the modern Research Management Office (RMO) for higher education and the establishment of the Australian Research Management Society to support the development of research management professionals. The article presented by Bidiña et al., (2023) further mentions the prospective incorporation of a research project by the office of the Secretary of Science and Technology in charge of R&D management at the National University of La Matanza.

Table 3. Articles related to the parameter: Research Institutions in Higher Education

Parameter	**Author**	**Country**
Research institutions in higher education	Mahmut et al. (2023)	Istanbul
	Ta et al. (2022)	Malasia
	Yang-Yoshihara (2023)	US y UK
	Thomson et al. (2023)	Australia
	Bidiña et al.(2023)	Argentina
	Ayala y Valencia (2020)	Ecuador
	Montenegro y Narváez (2021)	Colombia

Source. Own elaboration

For their part, Ayala and Valencia (2020) mentioned in their article that the student's research management should be improved to improve their research skills from the systematization in the management bodies and to comply with the graduate profile. For Montenegro and Narváez, (2021) the great responsibility falls on higher education institutions who take the lead in research and are responsible for ensuring the advancement of science, technology and innovation, especially in less developed countries.

In analyzing these results, it is clear that in the different continents research management should be determined by a highly professional area of specialization and that specialized research centers or professional schools capable of taking charge of scientific and research production should be created within universities.

Quality of research management

The analysis of research management in higher education, according to the 23 articles examined, takes greater importance those analyzed at the international level in European, Asian and Australian countries; however, there is little information on the management of university information in Latin American countries. For the development of the research, the instruments used were considered and according to these results it has been possible to analyze that research management is mostly applied in management documents. Several articles agree that it depends on the method used for the quality of research management in universities to improve their educational quality. In the case of Wang (2023) they use the Pythagorean method of TODIM based on VIKOR to manage the quality of scientific research with new technological concepts by actively focusing on entrepreneurship in their students. Meanwhile, Rajashekar (2021) addresses research data management in higher education using an advanced research asset creation (ARAC) model in India. Another important data in the present study is the article elaborated by Frei et al. (2023) who take into high consideration the legal elements of their academic freedom and the use of their management control systems (MCS) and consequently emphasize the academic, governmental and business logic, which help to improve research management environments in higher education.

Table 4. Articles related to the parameter: Quality of management in research.

Parameter	**Author**	**Country**
Research management quality	Wang, J. (2023)	China
	Rajashekar (2021)	India
	Frei et al.(2023)	Australia
	Andrade-Valbuena (2022)	España

	Totska (2023)	Ucrania
	Kienast (2023)	Alemania

Source. Own elaboration

Another aspect to consider in research management is publications in journals that consider geographical location, as mentioned by Andrade-Valbuena (2022) in her bibliometric study using similarities on citations, co-citations and self-citations, showing that in her country publications refer more to national and supranational areas than to closer locations. Another evaluation of research management quality is given in Ukraine (Totska, 2023) in students of agricultural universities in which comparative scientific paper competitions are applied analyzing strengths and weaknesses and obtaining new ideas of research management in students.

Kienast (2023) mentions that to raise quality of research, management strategies should be used and presented a two-dimensional analytical framework for management in research literature, which organizes research into four phases: meta, macro, meso and micro). In this section, the quality of research management is more focused on Asian, European and Australian countries, where they develop and propose strategies to raise the quality of research products as they do in China and India, which research and apply it, while in the other countries they propose it.

Human resources in research

The study conducted by Buciuniene et al. (2021) corresponds to the performance of research management, who referred their study to the low research performance by human resources in recent times and defines academic skills, attitudes, behaviors and motivation for researchers associated with research management. Likewise, the work presented by Finalé et al. (2022) affirms the execution problems in the academic research work of students and teachers. The lack of human resources, infrastructure and financial incentives limit student research. Another study refers to the development of digital competencies contribute to development of research management in university teachers to transmit their knowledge to their students and that the use of techniques is not an excuse for the development of their research (Mendoza et al., 2024). Likewise, Espinoza et al. (2024) affirms processes of exploratory research in students and formative processes of research are the fundamental role in research management in classroom.

Table 5. Articles related to parameter: Human resources in research

Parameter	**Author**	**Country**
	Buciuniene et al. (2021)	Europa

Human resources in research	Finalé et al. (2022)	Cuba y México
	Mendoza et al. (2024)	Ecuador
	Espinoza et al. (2024)	Perú

Source. Own elaboration

According to the analysis of the articles studied and the results, the responsibility for research management also falls on teachers and students. This is most evident in the articles from European, Central and South American countries.

Research Data Management (RDM)

Several studies were analyzed in terms of research data management (RDM). Rafiq et al. (2022), who conducted a study in their four main universities, evaluated the awareness, attitudes, behaviors and practices on research data management and used an international questionnaire in which they found that there are no RDM policies at the national and institutional levels, thus placing responsibility on researchers and university administrators, librarians and trainers. In turn, Zhou et al. (2023) refers to another study in reference to RDM in which they were concerned about graduate researchers in social sciences who had no knowledge of RDM, so they used mixed methods to investigate the awareness, confidence, challenges and preparation of RDM in their students. In the study presented by Chew et al. (2022) also mentions the need to train or instruct on RDM in universities and they implemented an initial online training on the topic and whose interviewees were satisfied with such training so they are urged to take immediate actions on it.

Table 6. Articles related to the parameter: Research data management

Parameter	**Author**	**Country**
Research Data Management (RDM)	Rafiq et al. (2022)	Pakistán
	Zhou et al. (2023)	Texas
	Chew et al. (2022)	Australia
	Xu et al. (2022)	Texas
	Al-Jaradat (2021)	Jordania
	Marchant-Cavieres et al. (2023)	Chile

Source. Own elaboration

For Xu et al. (2022) also put emphasis on RDM of research management in their graduate students, very concerned observe the lack of teaching and instruction in this range as the previous case, also in the areas of social sciences and, when applying the instrument in their experimental method they observed that the online group scored higher than those students in the control group. Al-Jaradat (2021) conducted a study on research management and RDM in which he indicated that there is a close relationship between the research process and the data life cycle. For their part, Marchant-Cavieres et al. (2023) mentioned that higher education institutions use policies that prioritize peer competition as the main means for research management. They studied management instruments in various Chilean universities and found that there are hierarchies that also discourage scientific communication in various networks.

For these authors, it is necessary to work on research management data as part of the management processes. The high concern of these authors for research processes and the lack of document management and data collection is evident. In addition, it is interesting how they relate it to the quality of life of the data, since the more time elapsed the data cease to be reliable and valid for future publications.

Conclusions

The identification of parameters related to management of research in higher education has facilitated search for information to identify the various management processes in the documents analyzed, thereby providing a broader perspective on subject across different countries. The paucity of publications on the periodicity under study has precluded a more comprehensive search for information, which would have enabled a detailed analysis of all research management processes in each location, particularly in our region. A limited number of countries have expressed interest in establishing research schools or universities based on their research studies. In contrast, other articles under review merely identify shortcomings without proposing solutions or strategies for implementation. While in developed countries, the establishment of offices, schools, faculties, and research societies has led to an expansion of research processes, publications from underdeveloped countries continue to highlight deficiencies in management of research development. In Texas and Jordan, the primary focus is on the data generated from research activities, including comparisons between resident and foreign students. Notably, residents demonstrate a significantly higher level of confidence in utilization of such data compared to their foreign counterparts. In Texas and Jordan, the values of the people involved in the research process are taken into account, and confidence in them is generated as part of the academic development of research. A further critical aspect of research management is the level of quality of the research itself, which is dependent on the role of researchers and their students. In the absence of effective management, beginning with the leadership of higher education institutions, the impact and outcomes of research will consistently be of poor quality and lack innovation. Moreover, if there is no appropriate infrastructure, experimental laboratories, incentives or resources financed by the educational institutions, the results in publications will be discouraging, discouraging the participation of students and, possibly, this has been one of the reasons why not enough information on research management in higher education has been found in this work.

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