



Management of Formative Research at the University: A systematic review



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Manuscript submitted: 25 March 2022, Manuscript revised: 16 May 2022, Accepted for publication: 10 August 2022

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Keywords

*education;
evaluation;
management;
planning;
research;
training;*

Abstract

The study aims to analyze the management stages developed by universities for formative research and systematize the information captured in various articles that were published between the years 2017 to 2022, about the management of formative research carried out by universities in Latin America. For its development, the PRISMA method and the bibliographic analysis allowed selecting and identifying those articles that are useful for the study a total of 30. The results were found to indicate a low quality of management in planning, execution, evaluation, control, and continuous improvement developed by universities, due to the limited amount of financial, technological, and specialized professional resources. which restricts the disclosure of the results of the research in the main scientific journals in the world, so it is necessary to implement methods and improvements in management that allow these results to be reversed and to be able to reach the level of the number of studies that are published by Asian or European countries.

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1 Introduction

In all scientific research, it is important to carry out management processes that guide training in this field, as well as This is how this article proposes a systematic analysis of various documents that refer to the study of training research management in universities, defining the most relevant aspects and characteristics of the various research training programs developed by universities, generally in education (Klingberg et al., 2005). higher education, especially for third-level programs, and post-graduate programs covering master's and doctorate degrees, so it is currently very important to value practical research, through which it can contribute to decision-making at the time of defining or reviewing the curricular plan of the academic programs, as well as analyze the impacts of the current investigation with the data referring to this background (Fernández et al., 2020).

Formative research is important for the approach of the various curricular structures that universities develop and execute, this being an effective strategy to achieve the training of students with knowledge in research, for which it is vital to make correct management so that they can be achieved. the objectives pursued by the executing institutions (Asis et al., 2022).

To promote the improvement of investigative skills in students, it is necessary to take into accounts very important factors such as motivation and the willingness to develop any ability or skill and much more is required in this area, for these teachers must execute strategies that allow students become interested in the importance of research in all contexts where it develops. Teachers who run these courses at universities have the responsibility to generate positive and willing attitudes in students so that a genuine interest in this field is achieved (Palacios, 2021).

This study is justified by its interest in the approach to the management of formative research that occurs in universities, focusing on Latin America, which is a motivation for later presenting more analyzes and proposals in favour of increasing research processes (Richardson, 2011; Etzkowitz, 2003). In this way, it can be said that the countries that promote research, innovation and development are those that have the best technologies that make them more competitive than those that do not generate large amounts of scientific publications. Likewise, it can be asserted that there is a direct connection between research training and professional qualification because most professionals develop investigative processes to obtain their respective degrees. In addition, it must be considered that these two aspects must not only serve to obtain the degree but must also have an impact on the community and generate a greater number of research topics, with management being a task that universities must develop. to increase the amount of research (López et al., 2017).

The study is relevant since it seeks to analyze the current situation of research training management, this is necessary for teachers, students and universities to become aware of the importance of developing adequate systems for the promotion and development of training research programs and that these contribute to the increase of knowledge (Korthagen et al., 2006; Chick et al., 2020).

The training programs must be focused on the students being able to generate new knowledge, and they can complete the entire process that implies the identification of the problems, the identification of the beneficiaries and interested actors, the investigative methodologies, and the technology to be used. in the study, results and conclusions, and that these be published in scientific journals so that they can be disseminated throughout the world's scientific community (Spertus et al., 1995; Bates, 2004).

Regarding the scientific situation, the Latin American countries that have relevant scientific production are Colombia, Mexico, Cuba, Chile, Peru and Venezuela, the methodologies that predominate are experimental, non-experimental, qualitative and quantitative, which is important in the formulation of projects that are notable for the scientific contribution, in this way the universities develop programs that are aimed at achieving this end, however, it is necessary to increase the results (López et al., 2017).

The publication that is developed in specialized journals such as Scopus and Scielo developed by Latin American authors with very few compared to European or American authors, being unavoidable that

universities promote the publication of scientific articles by students in their training research programs (Fernández et al., 2022).

It is known that many universities propose intensive research training programs that only last half a year on average, but due to time pressure and mercantilist desires, the topics raised are repetitive, without a greater impact and they are only published in the repositories of the universities. own universities. Based on the above, the main motivation of this study is to demonstrate that universities only partially fulfil the task of developing the correct management of formative research (Faigenbaum, 2000). The investigations are linked to information technologies and the use of different types of software that allow the development of many important aspects of the investigative work, from the similarity of the works, the ease of generating texts, the verification of syntax, the tabulation of data, the schematization of the works and their presentation, in general, all scientific works currently have technological support (Parra et al., 2018).

Likewise, the information from various studies raises the question of the management of formative research that seeks to provide a referential perspective of the importance of developing adequate management of the investigative processes. Universities play a very important role since they are the ones that develop most of the research training programs whose results seek the completion of research reports such as the publication of results on various specialized platforms, contributing to the increase of knowledge with the dissemination of their respective findings on the topics they are investigating (Guerrero et al., 2013; Atkinson, 1999).

The formation of programs aimed at achieving research skills in students proposes the development of curricular structures that seek to provide adequate conditions for research, production of knowledge, dissemination of knowledge and direct this knowledge towards teaching and the benefit of students. social and productive sectors (Tuesta, 2021).

The production of various types of scientific knowledge is considered significant for a certain population and is recognized and validated by the academic community, this is very important for the generation of skills in analysis and creativity, identifying various problems in a population, and proposing viable strategies. for your attention or understanding (Ancco, 2021).

The management of formative research is transversal and complementary programs to the careers that will be developed and each one of the specialities, especially those linked to science, develops a study and a report on a topic linked to their respective career, the success of these programs it depends on several factors, including the capacities of the teachers, the motivation of the students and the resource limitations that the students may have to carry out the research (Sosa et al., 2017).

Studies of Latin American countries that have been published in the main databases such as science and Scopus, indicate that 75% are from Chile, Brazil and Mexico, about the author's sex 59% are women, addition, 53% of the articles have more than three authors, the topics that have been most studied are those related to educational issues, concerning educational levels this is surpassed by higher levels with 43% of the publications, the most applied methodology are quantitative, qualitative and also mixed, it is necessary to improve research training programs in the region by promoting greater dynamics for the development of scientific studies (Murillo & Martínez, 2019).

The need to improve the management of training research in universities is increasingly urgent due to the importance generated in society by the development of various investigations that meet their needs, on the other hand, the implementation of certain important aspects for the improvement of management, changing the paradigm of research that should be focused only on teachers, the mercantilist concepts of universities to develop research training programs and propose relevant scientific studies and that truly contribute to the Scientific knowledge of the region is very necessary, finally, it is necessary to develop a comprehensive understanding of university research and its management at the level of not only monetary results, but also in scientific investigative quality (Ramos et al., 2018).

A model has been proposed in which teachers promote research within the execution of study plans, based on organization, planning and systematization, these stages being essential for the correct formulation of their projects, for which it is The correct execution of each of these stages is necessary (Espejo & Torres, 2018).

The medical specialities propose formative research from a learning approach because they focus their actions on the delineation, formulation, practice and evaluation of the studies carried out, adding the dissemination of research results, but the current demand for innovation in sciences of health implies the integration of knowledge about the management of scientific and research work (Gutiérrez et al., 2020).

The measurement ranking on the research levels of Peruvian universities is in a low position since they are in position 64 of 182 compared to university entities around the world, this problem is intensified by various deficiencies in research management such as they are the inadequate preparation of personnel, limited infrastructure and equipment, limited financing of research and the small intellectual climate that promotes research, with very few entrepreneurs and professionals that generate research or companies that finance the development of innovative prototypes (Aguilo, 2018).

The research papers that the universities keep in their repositories and that do not publish them, do not make their results known in various specialized forums or events do not contribute to the image and qualification of the university, as an entity that generates research and knowledge, all The results achieved within the framework of the research must be published so that they are useful among those who can benefit from this knowledge (Vargas, 2019).

To ensure that research generates a positive change and a real impact on the comparative rankings of universities worldwide, an adequate management system must be implemented that proposes methods that plan, execute, evaluate and improve its processes, generating a positive impact on the management of formative research (Valles & Rengifo, 2018).

The administration of research in higher education is marked by procedures that are issued, regulated and regulated by state institutions such as CONCYTEC in Peru, in Chile the national council of science and technology, in Argentina the national council of research in science and technology, in the case of Uruguay there are no institutions in charge of managing state policy regarding research, so in summary, the strategic guidelines regarding research processes are shaped by state institutions that in most cases they are inefficient and cause an accumulation of studies that do not have a convincing contribution, in addition to the resources allocated to these institutions, most of the time, with very little (Royero, 2003, cited by Mendoza, 2018).

To develop a management model that seeks to generate a real change in the processes, several important aspects must be taken into account, such as management linked to ethics, training, the promotion of researchers, the launch of funds that finance research projects, the management of the investigative processes, the evaluation, the closure of projects, the publication of the results and throughout this process the administrative management must be in charge of taking care that the goals and the performance of the funds that have been allocated to the project are met. project (Arévalo, 2018).

2 Materials and Methods

For the search of the articles, the PRISMA scheme has been used, which allows finding a certain number of bibliographic sources and with the use of this scheme to select and finally analyze the sources that contribute to achieving the objectives set by research (Pardal & Pardal, 2020). The method that has been chosen for the identification of the methodology is the bibliographic one, the same one that is used to identify relevant information for a certain study (Casasempere & Vercher, 2020).

A systematic review of various articles that have been published from 2017 to 2022 was carried out, where the development of formative research management has been studied, and the analysis of the systematization of information has been carried out using the schematic methodology of the PRISMA model, where it proposes the development of the systematic selection of documents fulfilling various established requirements, seeking to answer the questions raised in this study.

3 Results and Discussions

This study carried out a systematic review of various articles that have been published from 2017 to 2022 under the schematic methodology of the PRISMA model, where an analysis is made of various articles regarding the management of formative research developed by the universities in the field of Latin America where the following questions arise: What are the management stages that universities develop for the management of formative research? To achieve the purpose of this research, articles five years old have been sought since the pandemic that was experienced in 2019 throughout the world changed in many aspects the execution of the investigative processes that have been developed up to that time. Now, those that do not talk

about academic environments, especially university ones in Latin America, were also taken into consideration, in addition, to articles whose reference points are linked to didactic, methodological, and administrative management as well as to teaching. investigative. In this way, the platforms in which they were consulted for the search of the articles were Scielo, Redalyc, Google academic and Alicia Concytec and the reference, the keywords that have been used. Table 1 shows the results of the descriptors.

Table 1
Results of descriptors

Sources	Descriptor	Number
Scielo https://scielo.org/es/	Management of university research systems	12
Redalyc https://www.redalyc.org/	Management of university research systems	18
Alicia Concytec https://alicia.concytec.gob.pe/vufind/	Management of university research systems	544
Google Academic https://scholar.google.com/schhp?hl=es	"Training Research in universities"	177
Dialnet https://dialnet.unirioja.es/	Management of Formative Research	42
Access proposal provided by the Cesar Vallejo University https://www.proquest.com/	"Management of Formative Research"	5
Total		798

The search carried out was proposed using the characters (Management) AND (Research) AND (Formative) AND (Universities) always with quotation marks to focus on the information requested in the search engines The following inclusion and exclusion criteria have been chosen.

Inclusion criteria:

- Writings that show information about the notion of formative research
- Articles published between 2017 and 2022
- Articles in Spanish and English
- Articles show information on formative research in Latin America

Exclusion criteria:

- Articles that do not talk about Latin America
- Articles that do not show relevant information on the variable

Figure 1 shows the Prisma flowchart, showing the results of the systematic analysis of the articles found.

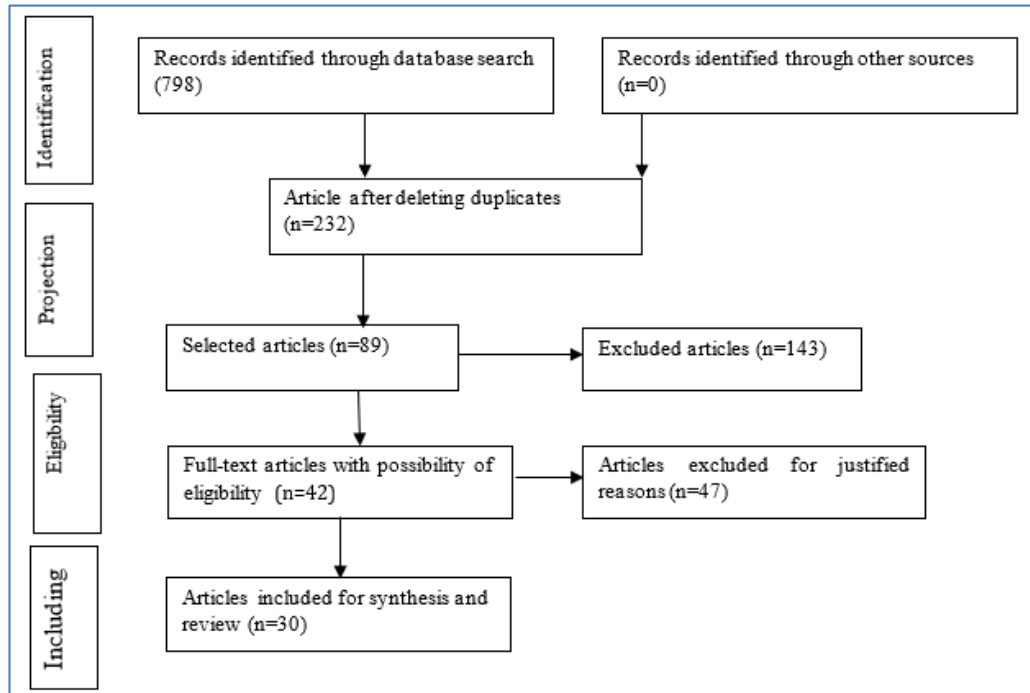


Figure 1. PRISMA flow chart

The PRISMA chart was prepared to obtain the thirty articles proposed in the study, these being selected from a total of 798 articles, which were discarded based on the criteria established for this investigation, such as the repeated articles, those that were not referenced to the research management, and those that are not within the time frame that is being exposed in this study. On the other hand, in figure 2 you can see the stages of the processes presented as dimensions of the variable of the management of the formative research as results of the analysis.

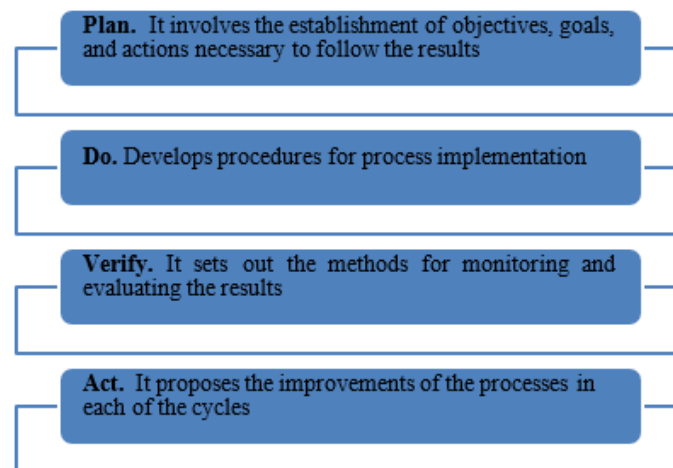


Figure 2. Variable dimensions of training research management in Latin American Universities

To develop adequate process management, four essential stages must be taken into account that corresponds to the PHVD cycle proposed by Deming, the first is planning which seeks to anticipate the actions that are going to be developed by analyzing the scope of each stage of the process and the resources that they need to be able to be executed, a second stage in the doing that implies executing the actions that were proposed, the

next stage is the verification or the evaluation of the results and finally, the action related to how the processes can be optimized in each of the cycles between them, ensure the scope of the goals and yields of the funds destined for this management, if these stages are carried out correctly optimal processes and quality will be achieved (Arévalo, 2018). The Dimensions of the variable Management of Formative Research in the Universities of Latin America that have been determined based on the information found have been planning, doing, verifying or evaluating and acting related to continuous improvement (Suryasa et al., 2022).

The results that have been found in the study are based on the particularities of management that develop formative research, many of them have elementary principles such as planning and control, but others go further, looking at aspects such as ethics and preparation. of teachers as part of the process, they also include aspects such as continuous improvement (Arévalo, 2018). The authors make various proposals so that management can be improved, including planning, selection of a team of researchers, administrative management, coordination with the actors involved in the project, execution of planned activities, managing the effects and making the results known, each of which begins with training for both teachers and students. When developing the systemic analysis of all the articles, the main characteristics were identified, which the authors propose for the adequate management of research, showing the results in figure 3.

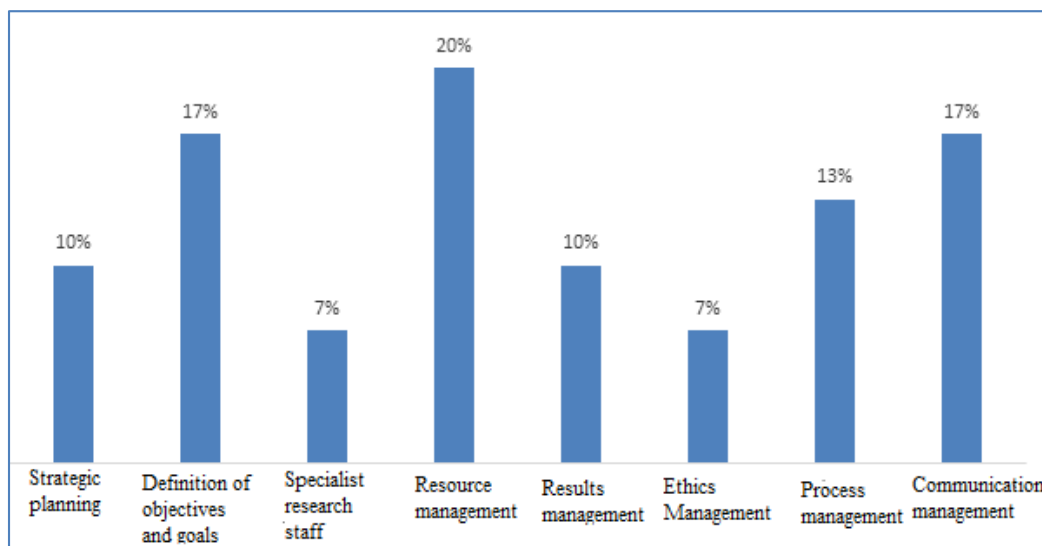


Figure 3. Characteristics of adequate management of formative research

Universities propose the management strategies of formative research based on the framework regulations and guidelines that are issued by the government institutions corresponding to each country, with this they prepare the strategic plans that correspond to a period of each management (Mendoza, 2018). The various documents analyzed propose various techniques that are used to develop research management, 10% indicate that they work under the guidelines of a strategic plan, 17% mention that they have defined objectives and goals, for 7% that the staff must be trained in investigative skills, 20% consider that the resources are vital to developing good management, 10% mention that they control the results, ethics is only presented by 7%, the control of the processes is important for 13%, and communication management is important to consider for 17%. These results clearly show an informal and realistic image that universities develop research management, finding their main interest in the objectives, resources and communication, however, not all the studies that are developed manage to be published due to various management deficiencies, especially linked to promotion and facilities for researchers to manage in specialized journals.

The importance of the development of process management under the Deming cycle allows it to be evaluated and improved continuously, however, the analysis shows that they assign greater importance to resources and not to planning. nor do they provide relevant importance to the management of results and much less to ethics, this being a transcendental aspect when it comes to formative research (Arévalo, 2018).

In the case of Peru, there are public policies to encourage research and there are institutions such as CONCYTEC that promote research and launch funds for the generation of various research projects, but the reception of researchers to these funds is still limited to the little information regarding the projects, the limited diffusion and to the little interest of research institutions such as universities to participate in these funds, having to improve the forms of promotion and also propose different strategies to direct these funds to more specific audiences (Carbonel, 2018).

The publications that were analyzed come from different sources or magazines, where they have been published, among the best known are the academic Google or the Alicia Concytec. Figure 4 shows the distribution of the search engines where each of the articles that have been analyzed in this study has been obtained.

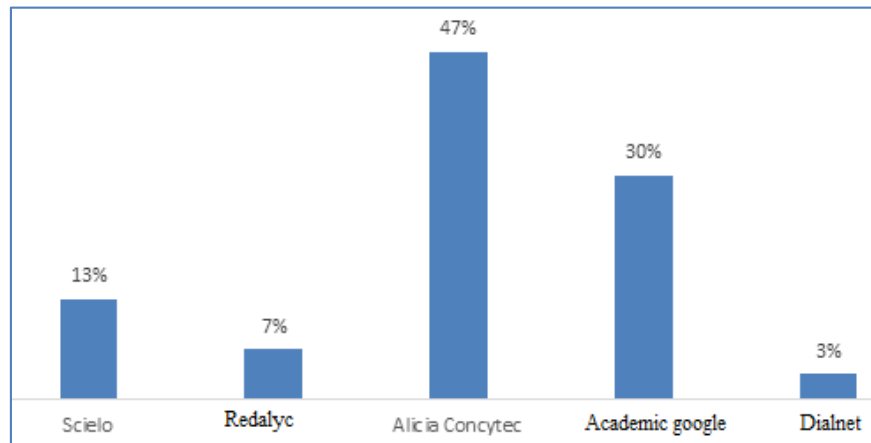


Figure 4. Number of articles selected by search engine

The selected articles were taken from different platforms, of which 13% correspond to Scielo, 7% to Redalyc, 47% to Alicia Concytec, 30% to Google Scholar, and only 3% to Dialnet, almost all the search engines have issued diverse information, but they presented documents that did not correspond to the interest of the study for which they were discarded, information was also found that could have been considered but did not meet the acceptance criteria, such as the publications less than the year 2017, basic criterion, to be selected, it was finally possible to identify the 30 articles of interest in this study and which were used for the systematization of the information.

In Latin America, universities and public institutions that should lead formative research do not have adequate performance, their results being limited if compared to countries such as Asia, Europe and the United States, at the regional level there are also many differences in publications since the country that leads is Brazil, followed by Chile, Colombia, Ecuador and Peru, the other countries have very few published articles, this being the end of the research process, whose purpose is to publicize the results of the investigations to the scientific and academic community of the world (Murillo & Martínez, 2019). The articles included in this research are framed within the years 2017 to 2022, the results are shown in Table 2.

Table 2
Number of articles found per year

Year	No.	Authors
2017	3	(Escobar, 2017) (López et al, 2017) (Sosa et al, 2017)
2018	12	(Aguilo, 2018) (Arévalo, 2018) (Carbonel, 2018) (Espejo & Torres, 2018) (Haro, 2018) (Mendoza, 2018) (Miday et al, 2018) (Ortiz, 2018) (Parra et al, 2018) (Pisco & Vera, 2018) (Ramos et al, 2018) (Valles & Rengifo, 2018)

2019	4	(Fernández et al, 2019) (Murillo & Martínez, 2019) (Pérez et al, 2019), (Vargas, 2019)
2020	5	(Aguilar ,2020) (Fernández et al., 2020) (Gutiérrez et al, 2020) (Madriz et al, 2020) (Uve et al., 2020)
2021	4	(Ancco, 2021) (Koo, 2021) (Palacios, 2021) (Tuesta, 2021)
2022	2	(Asis et al, 2022) (Fernández et al, 2022)

The information obtained from the articles was through the reading and review of each one of them, selecting the information that is relevant for this study, in addition, similar criteria were identified in each of the articles, to make a comparison, qualitatively, seeking to answer the questions formulated in this investigation. According to these results, it has been possible to compare each of the articles, regarding the main problems and limitations that the authors perceive, regarding the management of investigative competencies, as shown in the results in figure 5.

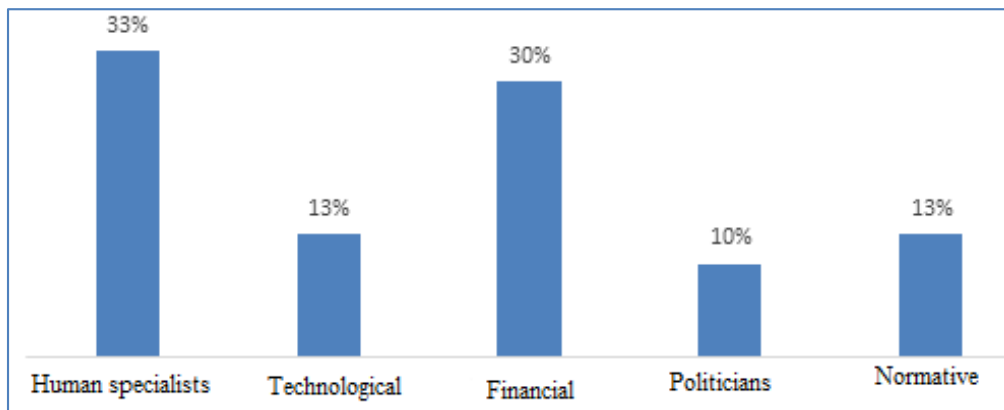


Figure 5. Main problems found in the management of formative research

As can be seen in the figure, the main drawbacks of the institutions that develop the management of formative research are aligned with the needs of specialized human resources at 33%, the technological level is another worrying aspect with 13%, and the resources financial is also an important problem with 30%, public and private policies is an aspect that they consider in 10%, finally, the regulations are raised in 13%, the results clearly show that human and financial resources are the ones that they generate a higher level of competitiveness, this being two limiting factors for the institutions that develop formative research (Herliah et al., 2022).

The results that have been shown in figure 2 clearly show that the management of human resources, financial resources and communications are the management aspects that the authors consider the highest priority, considering that other factors are also important for adequate management. such as planning, objectives, results, and ethics when developing studies. Education is a process that involves various areas that coordinate and interacts with each other, these are the administrative and the pedagogical part, the first assigns the scope, and resources, which means that the pedagogical part needs and this is the one that executes and provides the results, whether academic and financial resources, universities often give priority to obtaining resources and express their main objectives in increasing their income without taking into account the number and quality of the projects that are developed (Haro, 2018).

Research is an activity that is parallel to all the specialities and that is used by a student to obtain his professional degree, it is also developed by teachers who receive a monetary incentive from the university if they generate a greater number of research projects. and that these be published (Vargas, 2019). The state proposes the necessary public policies to develop an adequate promotion of research so that groups of

researchers dedicated to developing projects as a profession are formed. However, in practice they are not complied with since many of the regulations do not have clear procedures and are interpreted at will by the officials on duty, there is also the limited amount of resources that are allocated to this sector and the little interest of private institutions in providing resources and means for research purposes since the return on investment is generally slow or none, leaving many times the allocation of resources to people interested in research such as the students themselves (Carbonel, 2018).

Based on the above, it is clear that research for training in Latin America is still in development, and the inadequate promotion by government institutions, limits the existence of a greater diversity of studies, the management developed by universities and higher study centers still has various deficiencies both in form and substance, there are very wide gaps such as the allocation of monetary resources, human resources, technology among others, which do not allow an adequate execution of the activities linked to the research process, many of them being published in repositories of the university itself, and these results are not known by the scientific community.

4 Conclusion

From the thirty articles selected for the respective inquiry into the various aspects of the management of formative research developed by universities and public and private research centers, it is concluded that research training processes are developed, but these are not executed with the necessary quality to be competitive with other regions such as Europe or the United States, there are priorities for the management of resources, but not for planning, for the management of results, the management of ethics and neither for increasing the competencies of human resources, essential to be able to efficiently develop the Deming cycle that involves planning, the process, evaluation and control, as well as continuous improvement.

Thus, it has been determined that management processes have several limitations that do not allow to ensure that studies get to publish their results in the most prestigious specialized journals, such as the limited number of researchers, limited funding, limited access to technology, and inadequate administrative management. It is important to indicate that there are efforts on the part of the institutions to improve this problem, but these would not have adequate results if there is no integral leadership on the part of the institutions in charge of improving the management of formative research, proposing actions, goals, and resources necessary to generate a significant improvement in this field.

Acknowledgements






We are grateful to two anonymous reviewers for their valuable comments on the earlier version of this paper.

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