

Crowdfunding model as a source of financing for entrepreneurship and innovation projects in higher-education entities

Modelo de crowdfunding como fuente de financiamiento para proyectos de emprendimiento e innovación en entidades de educación superior

Modelo de crowdfunding como fonte de financiamento para projetos de empreendedorismo e inovação em entidades de ensino superior

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Abstract

Introduction: This article is the product of research on reducing the number of intermediaries by making use of Crowdfunding as an alternative source of low-cost financing, developed at the Universidad Distrital Francisco José de Caldas, in 2023.

Problem: Although the term Crowdfunding is not new in the financial field, it is not very well known by the community, which means that it has not been applied as a recurrent financing alternative for projects or businesses in Colombia.

Objective: This article presents a collaborative financing model for higher education institutions in Colombia, mainly for research groups oriented to the generation of new knowledge or spin-offs, with the aim of providing alternatives to classical financing models.

Methodology: A literature review was conducted using the PRISMA methodology to identify, evaluate, and synthesize the existing body of knowledge produced by researchers, academics, or professionals.

Results: The scope of this literature review encompasses the different types of crowdfunding, including its evolution over time and its inclusion in various economic areas. Additionally, it helps to visualize the level of knowledge about this concept among different university groups.

Conclusion: The literature review examines the state of crowdfunding in Latin America, highlighting the lack of research compared to other regions. The impact of crowdfunding in various sectors, including technology, finance, and legislation, is emphasized. Furthermore, the need for theoretical reflection on how crowdfunding affects projects in the Southern Cone region is noted. The objective is to increase understanding and knowledge of crowdfunding among Latin American entrepreneurs and young people.

Keywords: Crowdfunding, Collaborative financing, Model, Higher education.

Resumen

Introducción: El artículo es producto de la investigación en el crowdfunding, alternativa de financiamiento que reduce la cantidad de intermediarios, lo que le permite ser una fuente de préstamos a bajo costo desarrollada en la Universidad Distrital Francisco José de Caldas, en el año 2023.

Problema: Si bien el término Crowdfunding no es nuevo en el ámbito financiero, no es muy conocido por la comunidad, lo que significa que no se ha aplicado como alternativa de financiamiento recurrente para proyectos o negocios en Colombia.

Objetivo: Este artículo presenta un modelo de financiamiento colaborativo para instituciones de educación superior en Colombia, principalmente para grupos de investigación orientados a la generación de nuevos conocimientos o spin-offs, con el objetivo de brindar alternativas a los modelos clásicos de financiamiento.

Metodología: Se realizó una revisión de la literatura utilizando la metodología PRISMA para identificar, evaluar y sintetizar el cuerpo de conocimiento existente producido por investigadores, académicos o profesionales.

Resultados: El alcance de esta revisión bibliográfica abarca los diferentes tipos de crowdfunding, incluyendo su evolución en el tiempo y su inclusión en diversos ámbitos económicos. Además, ayuda a visualizar el nivel de conocimiento sobre este concepto entre diferentes grupos universitarios.

Conclusión: La revisión de la literatura examina el estado del crowdfunding en América Latina, destacando la falta de investigación en comparación con otras regiones. Se enfatiza el impacto del crowdfunding en varios sectores, incluida la tecnología, las finanzas y la legislación. Además, se advierte la necesidad de una reflexión teórica sobre cómo afecta el crowdfunding a los proyectos en la región del Cono Sur. El objetivo es aumentar la comprensión y el conocimiento del crowdfunding entre los emprendedores y jóvenes latinoamericanos.

Palabras clave: Crowdfunding, Financiamiento colaborativo, Modelo, Educación superior.

Resumo

Introdução: O artigo é produto de pesquisa sobre crowdfunding, alternativa de financiamento que reduz o número de intermediários, permitindo ser fonte de empréstimos de baixo custo desenvolvida na Universidade Distrital Francisco José de Caldas, no ano de 2023.

Problema: Embora o termo Crowdfunding não seja novo no campo financeiro, não é muito conhecido pela comunidade, o que significa que não tem sido aplicado como alternativa recorrente de financiamento para projetos ou negócios na Colômbia.

Objetivo: Este artigo apresenta um modelo de financiamento colaborativo para instituições de ensino superior na Colômbia, principalmente para grupos de pesquisa orientados à geração de novos conhecimentos ou spin-offs, com o objetivo de oferecer alternativas aos modelos clássicos de financiamento.

Metodologia: Foi realizada uma revisão da literatura utilizando a metodologia PRISMA para identificar, avaliar e sintetizar o corpo de conhecimento existente produzido por pesquisadores, acadêmicos ou profissionais.

Resultados: O âmbito desta revisão bibliográfica abrange os diferentes tipos de crowdfunding, incluindo a sua evolução ao longo do tempo e a sua inserção em diversos domínios económicos. Além disso, ajuda a visualizar o nível de conhecimento sobre esse conceito entre os diferentes grupos universitários.

Conclusão: A revisão da literatura examina a situação do crowdfunding na América Latina, destacando a falta de pesquisas em comparação com outras regiões. É enfatizado o impacto do crowdfunding em vários setores, incluindo tecnologia, finanças e legislação. Além disso, nota-se a necessidade de uma reflexão teórica sobre como o crowdfunding afeta os projetos na região do Cone Sul. O objetivo é aumentar a compreensão e o conhecimento sobre crowdfunding entre empreendedores e jovens latino-americanos.

Palavras-chave: Crowdfunding, Financiamento colaborativo, Modelo, Ensino superior.

1. INTRODUCTION

Financing is one of the tools that allows organizations to leverage themselves to achieve their objectives. Companies need financial resources at every stage of their lifecycle [1]. First, it is necessary to make an initial investment with which the business idea materializes, and market penetration begins. Then, there is a stage in which the company needs to consolidate and expand into new markets, where it needs money to offer its products and services to new customers. Finally, it must have the resources to compete in its segment and innovate to maintain its position in the market. For this reason, access to different sources of financing allows companies to choose the one that best suits them and allows them to obtain greater economic benefit.

The concept of crowdfunding has gained relevance in recent years, as it is one of the financing alternatives that has led to the materialization of business ideas with lower capital costs compared to traditional financing entities [2], [3]. However, it has been shown that, when talking about crowdfunding, certain doubts are raised, mostly due to a lack of knowledge about its meaning. For this reason, this article aims to present a systematic review of the literature in order to identify the evolution of the

crowdfunding concept and how it relates to the financing of conventional and unconventional business ideas, in addition to identifying the variables, actors or stakeholders that influence the implementation of a collective financing model in a higher-education organization in Colombia.

The development of the article is based on a logical order that allows the reader to understand the crowdfunding concept, the methodology used to collect information and the relationship and importance that this definition acquires with the entrepreneurship programs that are currently being developed in higher-education institutions. First of all, the evolution of the concept of collective financing must be considered, where the origin of the term is presented by analyzing different currents of thought. This is followed by a description of the PRISMA methodology, which is used as a tool for collecting, organizing and filtering information. Finally, the contribution of this perspective to the adoption of Crowdfunding as an accelerator of business ideas and the strengthening of the contribution of educational institutions to the industry (spin-off) is presented.

Finally, a proposal is made for the implementation of the collaborative funding system for higher-education institutions based on the relationship with industry. In some first-world countries, there is a close relationship between organizations and academia, which results in a synergy that facilitates development and continuous improvement, thus improving the experience of students through the possibility of applying knowledge. For this reason, Colombia needs to strengthen the relationship with the organizations and see that by revitalizing this alliance it can obtain economic benefits for the region and allow for sustainable economic development.

2. CONCEPTUALIZATION OF CROWDFUNDING:

The term crowdfunding, also called “collaborative financing”, is known as a financing mechanism that can be used in order to materialize ideas or projects [4], [5]. However, in practical research there is no widely recognized consensus on its meaning. In addition, it is a term that is not very well known, as evidenced by the large SME survey conducted by the ANIF [6], a survey of 1843 organizations; the sample was composed of small and medium-sized companies from different sectors such as services, industry and commerce. The survey conducted by ANIF showed that the vast majority of organizations prefer to use their own resources or leverage with suppliers, because they consider that excessive paperwork, high interest rates and lack of knowledge

about other alternative sources of financing make it difficult for these organizations to access credit. Therefore, the term crowdfunding is not clear enough for it to become more relevant to organizations and individuals seeking to finance a project. Due to the aforementioned, it is necessary to review the literature in order to clarify and provide an analysis of the different definitions given by different authors and schools of thought.

It is necessary to clarify that, although there were approaches to previous official definitions, one of the first official definitions of the word crowdfunding dates back to 2006 in a publication by Sullivan M. [7], who commented that it is a method of financing only charitable actions. However, it is enough to look at the structure of the word to realize that it can have an even broader definition. According to E. Jimenez, M. Diaz and C. Short, the word crowdfunding can be divided into two parts, the first being "Crowd" which refers to a multitude, and the second being "Funding", which refers to financing. In other words, financing carried out by the crowd; in Spanish it is termed as "micromecenazgo" and is understood as a mechanism of collective financing of projects [8], [9], [10].

As shown above, crowdfunding is defined from its conception as a financing method, but it is not only linked to the sponsorship of charitable works [11], [12]. As the concept has evolved over the years, one of the small changes that has become evident in the meaning of the word crowdfunding is that it is no longer just about donations made to projects or charitable works, but on the contrary are contributions encouraged by some kind of reward, which can be financial or emotional [13], [14], [15]. According to the above, crowdfunding encouraged by rewards is born. In other words, it is the collective financing of social or entrepreneurial projects where the sponsors receive a monetary reward or sense of satisfaction.

It should be noted, however, that not all projects seeking crowdfunding are guaranteed success. According to some authors such as V. Kuppuswamy and G. Fisher, in order for backers to be interested in the realization of a project and decide to support it financially, they must feel identified with the values and objectives of the project [16], [15]. For this reason, this is another characteristic that has been added to the definition of crowdfunding. However, there are some positions in which traditional financing (banks, venture capitalists, investors) is related to crowdfunding, because in both cases the financing comes from the contribution of many individuals, since traditional financing entities lend money largely with savings or prepaid contributions [17], [18].

Similarly, the definition has continued to evolve in such a way that FINTECHs were included in its definition. According to recent publications by V. Rodriguez and the Inter-American Development Bank (IDB), we can see the role that web platforms

have taken in the definition of crowdfunding, since they are currently the means by which most of the crowdfunding campaigns are being carried out. Because of the above, some of the definitions that are currently found in relation to crowdfunding include web platforms that allow interaction between backers and fundraisers with the aim of working together for the development and fulfillment of a social or business project [19], [20]. The above means that the resources accessed by a project are not necessarily circulating in its local economy, according to the definition proposed by the media [21], [22], where projects are published and financing is obtained, allowing for the geographic distribution of resources.

In order to better illustrate the definition of the word crowdfunding, the definitions with the highest number of citations are presented below (Table 1) and they are also organized by year of publication, which may give a slight indication of the evolution of the concept and how it has become more robust.

Table 1. Number of citations from 2014 to April 2023

Title and author	Definition	Year of publication	Quartile and number of Citations
The dynamics of crowdfunding: An exploratory study Mollick [21]	It allows project owners to finance their ideas through contributions from a number of individuals without the need for intermediaries, by using the Internet as a means of communication between the sponsor and the project owner.	2014	Q1 – (2097 citations)
Crowdfunding: Tapping the right crowd, Paul Belleflamme, Thomas Lambert, Armin Schwienbacher [23]	Crowdfunding is a method of obtaining financial solutions for the development of business activities, by means of an open call via the Internet, where people make contributions voluntarily or for much less than the contribution is worth to the organization.	2014	Q1 – (1315 citations)
The economics of crowdfunding platforms, Paul Belleflamme, Nessrine Omrani, Martin Peitz [24]	Crowdfunding is an open call for financial resources. It is also carried out through internet-based platforms that connect fundraisers with funders in order to finance a particular campaign.	2015	Q1 – (293 citations)
Equity Retention and Social Network Theory in Equity Crowdfunding, Vismara, Silvio [25]	Crowdfunding is the alternative used by first-time entrepreneurs who, unlike other investors, do not have access to traditional financing platforms. They therefore choose to raise funds through existing social networks.	2016	Q1 – (415 citations)

Source: Own work.

In other words, crowdfunding is positioned as an alternative to traditional financing models. This is due to the fact that this model makes it possible to raise funds for the startup and execution of projects that, in most cases, would not be financed by a traditional means of financing [26], [27]. This is because traditional financing entities have to ensure a sufficient economic return in order to pay dividends to their shareholders, unlike crowdfunding, where backers are not necessarily seeking a financial return, as their participation may be motivated by other factors [28]. In addition, another of the existing differences relates to the fact that, in the vast majority of cases, the funding does not come from a single source, since, as the name suggests, the funding is collective and results from the sum of all donations or loans from each of the stakeholders in the project [29].

Here we can also see new trends that aim to add the means by which the sponsors of the project are communicated to this concept; the vast majority of collective financing campaigns are carried out digitally, because it is easier to make contributions and at the same time to keep track of the status of the funded project [30], [31]. In the vast majority of projects, those in charge of project execution communicate the status of the project, giving feedback to the backers so that they can see their investment reflected in the form of obtaining emotional or financial rewards [13].

Once the concept of crowdfunding and how it has evolved over the years has been defined, a series of currents can be identified around which authors and schools of thought have oriented their efforts. The items in which the concept and implications of crowdfunding have developed are: the academy, regulatory or governmental processes and finally at the business level, Rodríguez V. [32]. For this reason, it is necessary to verify, within the systematic review of the literature, the articles that contribute to each of the aforementioned currents. For this reason, Tables 4 and 5 detail the contribution and classification of the articles found in the systematic literature review.

It is clear that technology has allowed for the emergence of new players or forms of financing; this, due to the ease in which peer-to-peer loans or donations to projects through digital platforms can be made today [33]. These technological tools have led to the collection of virtual currencies such as bitcoin and the like, because many of these platforms have the necessary security to allow commercial exchanges of this type [34]. These characteristics make it easier for investors to participate, but there are also greater risks and it is necessary for these platforms to be regulated by local governments.

In the case of Colombia, the current regulation governing crowdfunding in Colombia is Decree 1357 of 2018 [35]. This regulation explains the requirements with which an organization must comply and lists the demands that investors must meet.

In accordance with the provisions of this article, the intervention of the financial superintendence of Colombia is necessary for the issuance of bonds or shares, which may only be issued by entities that are registered as public limited companies and registered in the national registry of stock market agents, Ministry of Finance and Public Credit. Although these types of policies are designed with the firm intention of protecting the citizens' investment, it is possible that these types of policies make it difficult for organizations to access this type of financing in Colombia [36], [37], [38].

Efforts to legalize and regulate crowdfunding date back to 2007, when countries such as Australia established financial watchdog organizations to make crowdfunding available to sophisticated investors [39]. Subsequently, countries such as the United Kingdom created control platforms in which unsophisticated investors could invest, with the only condition being that the amount allocated for investment did not exceed ten per cent of their assets in a year, Vismara S. [25]. For their part, investors in Colombia must also meet certain requirements if they wish to participate in the sponsorship of a project, for example, they must have assets equal to or greater than ten thousand minimum monthly salaries in force, in addition to being the holder of an investment portfolio with assets equal to or greater than five thousand minimum monthly salaries in force.

As shown above, if a person wants to contribute to a project that interests them and receive a return on their investment, they need to have a lot of capital. However, if they want to be a sponsor of a project and want their return to be emotional and not financial, they could make a donation or a payment. These types of transactions are operations outside the stock market that are controlled and supervised by the financial superintendence of Colombia [40], [41].

3. METHODOLOGY

This article aims to be a document that allows for the synthesis of publications related to crowdfunding, with the intention of gathering all the relevant documentation related to the eligibility criteria in order to guide the work and answer research questions. To this end, it was decided to consult several databases, from which a total of 52 scientific articles were selected and classified, 36 of which were within a quartile, guaranteeing the relevance of the information cited within the academy, according to the position of the scientific journal in which each of them was published. The guiding questions on which the analysis was based were the following:

1. What is the meaning of the word crowdfunding?
2. Which region or area is most interested in crowdfunding?
3. In what areas has crowdfunding been implemented?
4. What are the processes or variables defined in the scientific literature for crowdfunding?
5. How can crowdfunding be implemented in a university environment?

The results of the systematic review of the literature were obtained using the protocol “Preferred Reporting Items for Systematic Reviews and Meta-Analyses”, also known as the PRISMA methodology [42]. This protocol firstly informs the reader of the results of the searches carried out in different databases and search engines according to the keywords used; secondly, it presents a synthesis of the main concepts found in the articles used for the analysis; thirdly, it proposes a definition that can serve as a consensus for the word crowdfunding; and finally, it presents the conclusions and references used.

The implementation of a research methodology is essential to ensure the validity of a study, which is why the systematic literature review is used, as it is based on a rigorous protocol that helps to collect and evaluate all existing evidence on a specific topic, identifying trends, patterns, weaknesses and strengths in the ongoing research, in this case, on Crowdfunding.

This section describes the process of searching for relevant bibliographic material on crowdfunding, following the PRISMA methodology protocol, which consists of 4 steps for the identification of articles (“Figure 1”), in order to facilitate the collection and analysis of information and literature review, homogenizing the information within the available data sources [42], and synthesizing it in a way that allows for easy interpretation.

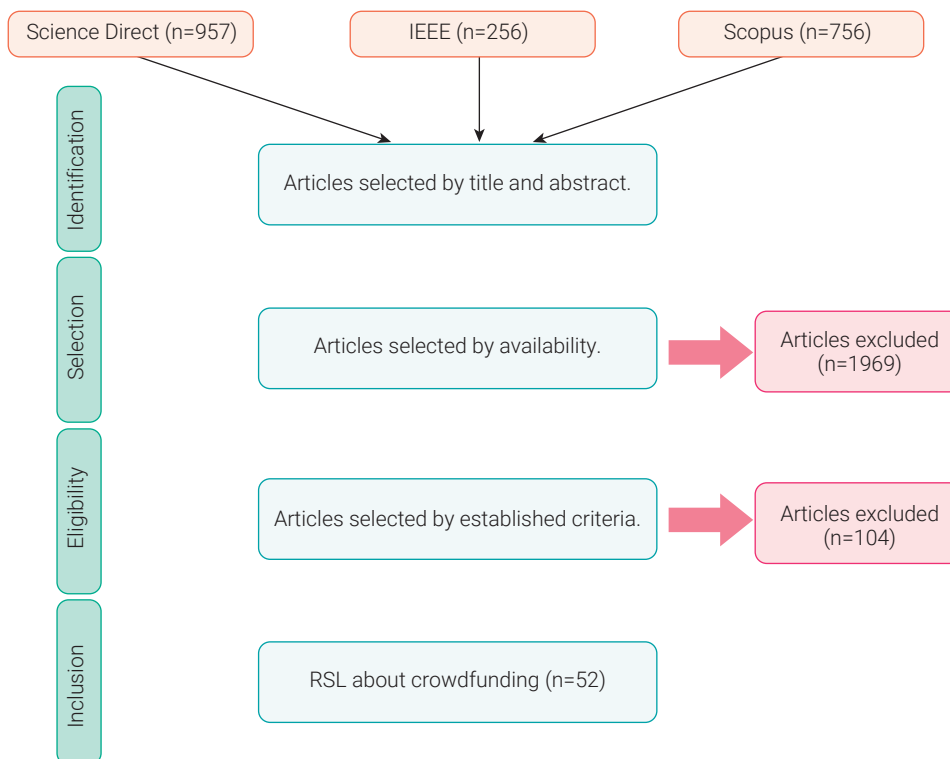


Figure 1. Flow diagram of the PRISMA methodology
 Source: own work.

Stage 1: Identification

At this stage, the search and identification of the articles in the aforementioned databases, Scopus, Science Direct, IEEE, was carried out in order to collect the articles that met the search criteria, which were: the period of publication, with priority within the selection given to articles published from 2015 onwards; since the term crowdfunding is something relatively new, it is more likely to find relevant documentation in recent periods, as shown by the statistics presented in each database.

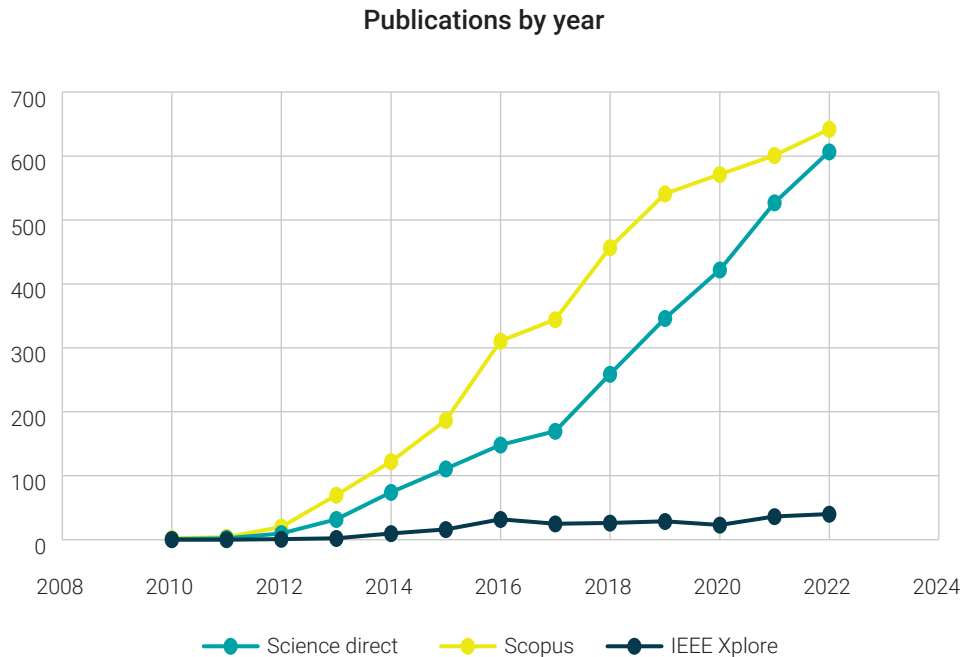


Figure 2. Papers by year 2016 a 2022, Science Direct, Scopus IEEE Xplore web page.

A search equation was implemented in the aforementioned databases to extract useful information to speed up the exploration process, obtaining:

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TITLE-ABS-KEY (crowdfunding) AND ( LIMIT-TO ( OA , "all" )) AND ( LIMIT-TO ( DOCTYPE , "ar" )) AND ( LIMIT-TO ( PUBYEAR , 2023 ) OR LIMIT-TO ( PUBYEAR , 2015 ) AND ( LIMIT-TO ( EXACTKEYWORD , "Crowdfunding" ) OR LIMIT-TO ( EXACTKEYWORD , "Crowdsourcing" ) OR LIMIT-TO ( EXACTKEYWORD , "Entrepreneurship" ))
```

Having as keywords "Crowdsourcing", "Entrepreneurship", "Crowdfunding", and whose title contains the key word "Crowdfunding", in addition to considering the inclusion of articles that are not in any quartile, if it is supported by a recognized institution or meets the above criteria.

Stage 2: Selection

The exclusion criteria are:

- Articles or documents for which full text access is not available, despite being in the FOA category.
- Articles or documents that are in progress.
- Articles or documents that are duplicated when selected from different databases.
- Articles that do not have an area, sector of interest.
- Articles that do not present a methodological design
- Articles that do not present a research hypothesis.

And those of inclusion respectively are:

- Articles or documents published in English or Spanish.
- Articles or documents preferably not older than 5 years

In the second stage, only 156 articles out of 1969 were selected, since 1813 articles were identified as articles that did not meet the necessary criteria to be considered, taking into account the relevance of the article to the research topic, the reliability of the cited articles, and the fact that the article, if applicable, should stand out for the methodology used in its preparation, as well as the impact or implications it could have in governmental or legislative areas.

Stage 3: *Eligibility*

The eligibility criteria are as follows:

- Articles or documents published with a development of the research objectives.
- Articles or documents published with an adequate description of the context in which the research was being carried out.
- Articles or documents published with a clear description of the results.
- Articles or documents published that characterize crowdfunding models in areas of interest.

Of the 156 articles that advanced to the third stage, 104 papers were excluded because they were not related to the proposed central theme, or did not provide a clear answer to the research objectives; leaving the systematic review with 52 articles for their respective analysis.

Stage 4: *Inclusion*

Of the articles presented in the fourth stage, 52 remain because they respond to the research questions posed, or clearly provide the scope or objective proposed in the document, whether it is the presentation of a model, a historical review, or a description of the concept in a setting or case study.

Note that of the 52 articles selected, 16 do not belong to any quartile, but it was decided to use these articles for several reasons: the article to be used was conducted and published by an accredited university, or was published by an entity whose focus is related to the research topic; they are included because the results presented provide a unique and valuable perspective on the collection of information related to crowdfunding.

The normalization and standardization of articles in a scientific community represents a great challenge for the inclusion of scientific productions, due to several factors. One of them is the existence of homonymous authors, which makes it difficult to identify and correctly attribute papers to their respective authors. In addition, the speed with which an article becomes obsolete has increased in recent years, which also complicates the task of measuring and comparing the impact of articles over time.

On the other hand, statistical measures such as placing an article in a quartile by its impact may not be sufficient to adequately assess the quality of the article in question. While the purpose of this measure is to assess an article by its number of citations in the journal, the absence of other important factors such as originality, relevance and accuracy of the results may mean that an article with a high number of citations is not necessarily of high quality. Although the normalization and standardization of scientific articles is a necessary effort to ensure the quality and accuracy of research, it is important to keep in mind that it is not an easy task and that there are limitations and challenges in the process [43].

For this reason, these articles are selected for their quality, both in terms of information and in the presentation of results that are clear and easy to understand and interpret, whether it is the presentation of a model or a literature review that allows for the extraction of information.

QUANTITATIVE ANALYSIS

Among the selected articles that contribute to the literature related to crowdfunding, it is possible to identify the country with the largest number of articles, taking into

account the selection criteria; the 5 countries with the largest number of published articles are: Colombia with 15 articles, USA with 13 articles, Germany with 4 articles, China with 4 articles, France with 3 articles respectively, as shown in Table 3.

Table 2. Articles published by country.

Country	Colombia	United States	Germany and China	France and Mexico	Spain and United Kingdom	Chile, Ecuador, Peru, Argentina, Italy, Denmark, Japan.
Number of articles by country	15	13	4	3	2	1

Source: own work.



Figure 3. Heat map of the number of articles published by country.

Source: Own work.

According to the following methodology, [44] if there is a document produced by two or more authors, each author would have a participation in the production of the article, that is, if there is an article with two authors, each one would have a participation of 0.5 in the article, being 1 the total, or the complete article adding their respective fraction to their country.

Of the 52 articles selected, 36 are classified in a quartile, either Q1 or Q4, and the remaining articles were selected because they were published in journals of higher

education institutions with sufficient relevance to be included, in addition to meeting the selection criteria mentioned above.

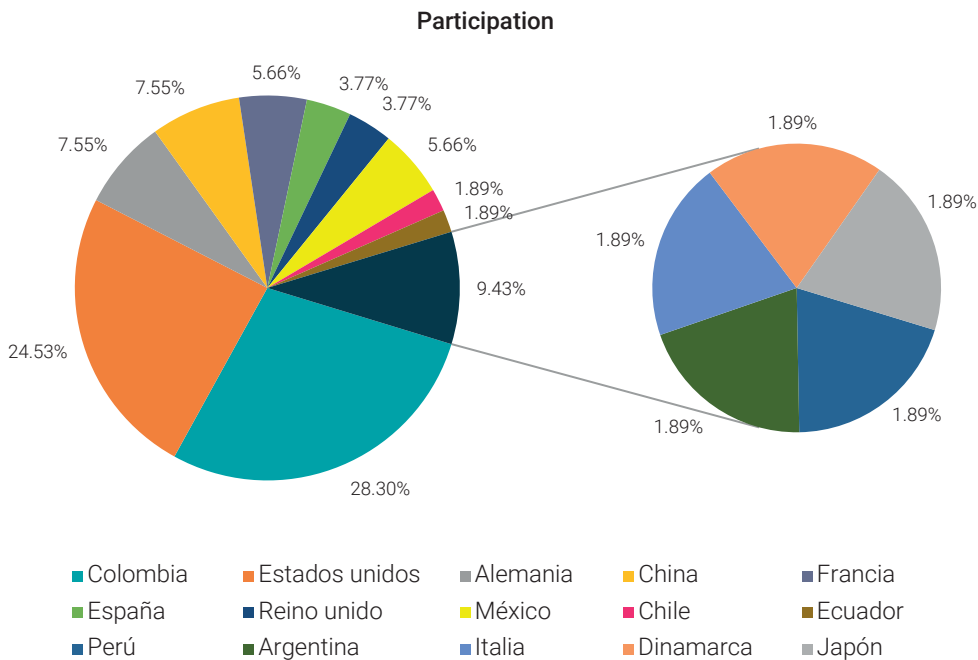


Figure 4. Participation in the publication of articles by authors.
Source: own work.

Another element to consider is the type of document selected. As shown in Table 4, the majority of the documents used are research articles with 73.08%, followed by reports (15.38%), theses (7.69%), standard or law (1.92%) and finally essay (1.92%). The fact that most of the documents used are research articles is a positive aspect to consider, as this type of document requires a greater review by editors and reviewers.

Table 3. Document type.

Document Type	Participation	N
Research article	73.08%	38
Report	15.38%	8
Thesis	7.69%	4
Standard/law	1.92%	1
Essay	1.92%	1

Source: own work.

It was found that the type of research article used was 72% for theoretical reflection, and 27% for literature review; that is, of the 38 research articles, 27 of them were based on a reflection on a case study, and the rest on the existing documentary review of the literature on crowdfunding.

In addition, the identification of the economic sector addressed in the articles represents the ability to understand the scope and focus of the studies, as shown in Table 5.

Table 4. Technology sector.

Economic sector	# Object of study	% Participation
Multiple	15	15.79%
State	9	9.47%
Financial sector	41	43.16%
Technology sector	11	11.58%
Industrial sector	7	7.37%
Banking sector	9	9.47%
Technology	4	4.21%
Agriculture and livestock	3	3.16%

Source: own work.

As can be seen in Table 5, the financial and technology sectors are the ones in which the largest number of documents have been developed, followed by the commercial sector and the education sector, with several of these documents dealing with different sectors simultaneously.

It is also possible to identify the keyword present in the metadata with the highest frequency in the selected articles, with "Crowdfunding" as the main keyword with 15 repetitions as a keyword, followed by "Entrepreneurship" with 8 repetitions, followed by "Financing" with 5 repetitions, and "Capital" and "Innovation" with 3 repetitions each.

Table 5. Number of keyword repetitions.

Words	Count
Crowdfunding	15
Entrepreneurship	8
Financing	5
Capital	3
Innovation	3

Source: own work.

This does not change when analyzing the content of the articles, since the distribution of the words with the highest frequency is:

Table 6. Frequency of words in cited articles.

Rank	Words	Count
1	Crowdfunding	491
2	Knowledge	354
3	Founders	233
4	Based	207
5	Processes	200
6	Funding	166
7	Capital	160
8	Cfps	156
9	Information	150
10	Financing	148

Source: own work

Thanks to the Voyant-Tools tool, a meta-analysis has been carried out which allows us to see that the ranking of the most cited articles varies in relation to the keywords deposited in the databases where these documents are stored. This allows us to outline the behavior of the categories related to Crowdfunding represented in the level of coincidence, characteristic and similarities, so that it can be seen in a better way in Figure 5.

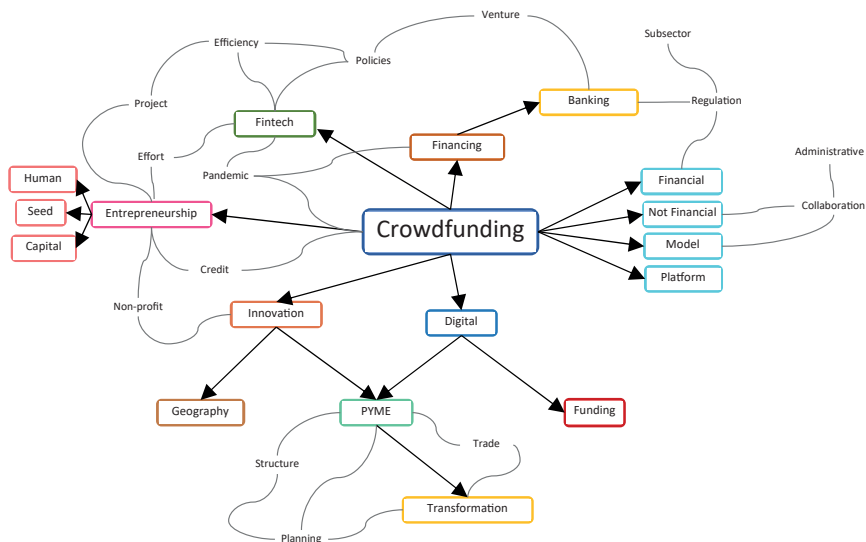


Figure 6. Keyword map.

Source: own work.

whether for an entity, collaborative system or an organization involved, and terms such as revision, acquisition, management, school, activity, seem to be terms that, despite their low frequency, are present in most of the keyword relationship frequency diagram.

This allows us to obtain a clear picture of the areas that tend to deal with crowd-funding; these are areas that are close to the academy. In order to identify the possible proximity and applicability of the concept of microfinancing in higher education entities, we know that the target-selected population is any subject that is part of a higher-education entity whose activity has an economic component that can benefit from the implementation of crowdfunding.

4. DATA COLLECTION AND RESULTS:

Therefore, the following survey is applied, whose main objective is to determine whether the population that could make use of the concept has sufficient economic support to carry out its activities. In order to collect the information as accurately as possible, a survey of fifteen guiding questions was prepared, which was reviewed by a panel of experts to check the quality of the questions and whether they met the main objective of determining the current status of the groups in terms of funding.

Similarly, the survey is composed of questions with multiple answers and Likert scales, in order to enable the use of a statistical analysis that allows for a correct evaluation of the answers that express the feelings of the research groups.

In order to collect information that will allow us to know the real financial status of the research groups, an analysis of the population of the different universities is carried out in order to identify the groups that belong to this environment. The databases of the Center for Research and Scientific Development were searched for existing and public research groups. In addition, the survey helps identify the state of the relationship of the groups or seedbeds with the industrial problems that are found today in our economy. This is achieved with the inclusion of guiding questions related to determining if there is any type of initiative type "SPIN OFF" that would solve the economic problems of our environment, in addition to allowing for the strengthening of relations between the national industry and the development of new knowledge. In order to clarify the data collection process, the above-mentioned survey is presented below, as well as the answers obtained for each of the questions, where 24 research groups from different universities participated in completing the survey.

For questions with a yes or no answer, the following was obtained.

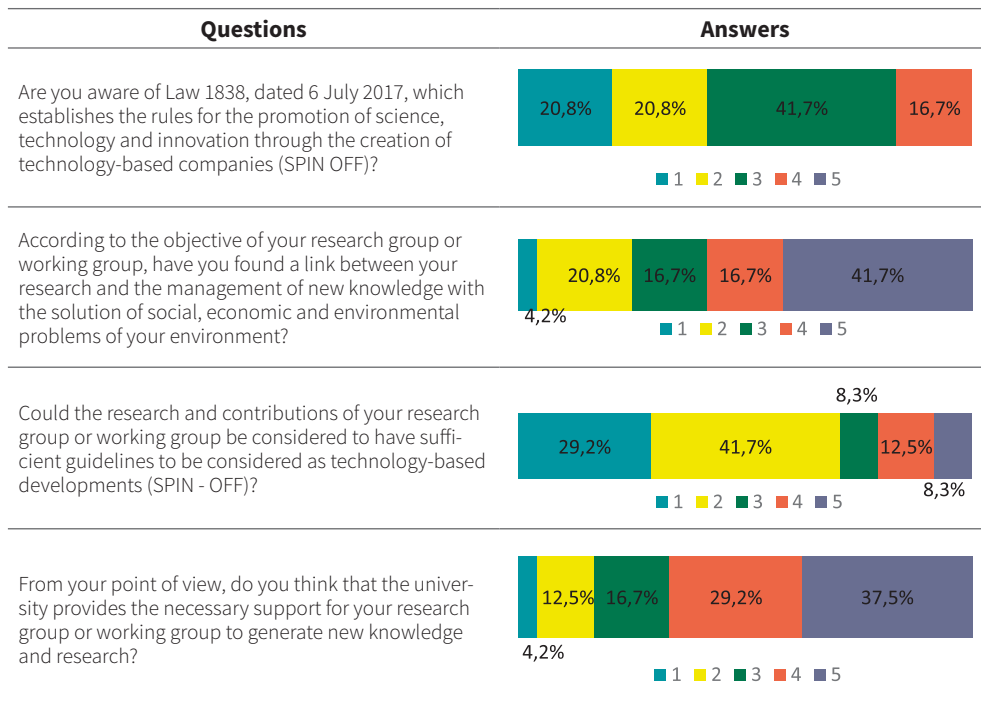
Table 7. Questions and answers (part 1) evaluation of crowdfunding in university research groups in Colombia.

Questions	Answers
Are you aware of Law 1838, dated 6 July 2017, which establishes the rules for the promotion of science, technology and innovation through the creation of technology-based companies (SPIN OFF)?	<p>79,2% 20,8%</p> <p>■ Yes ■ No</p>
According to the objective of your research group or working group, have you found a link between your research and the management of new knowledge with the solution of social, economic and environmental problems of your environment?	<p>70,80% 29,20%</p> <p>■ Yes ■ No</p>
Could the research and contributions of your research group or working group be considered as having sufficient guidelines to be considered as technology-based developments (SPIN - OFF)?	<p>50% 50%</p> <p>■ Yes ■ No</p>
From your point of view, do you think that the university provides the necessary support for your research group or working group to generate new knowledge and research?	<p>37,50% 62,50%</p> <p>■ Yes ■ No</p>
According to your experience in your research group or working group, have you had any barriers or inconveniences in carrying out your research due to institutional barriers?	<p>12,50% 87,50%</p> <p>■ No ■ Yes</p>
Does the university contribute financially to your research activities and the production of new knowledge?	<p>12,50% 87,50%</p> <p>■ Yes ■ No</p>
Does your research group or working group have any inter-institutional agreement or agreement with any company or organization outside the university?	<p>83,30% 16,70%</p> <p>■ Yes ■ No</p>
Are you familiar with the collective financing alternative called "Crowdfunding"?	<p>41,70% 58,30%</p> <p>■ Yes ■ No</p>
If you answered yes to previous question, do you think it feasible for research and entrepreneurship projects within the university or working group to be financed through this alternative?	<p>77,80% 22,20%</p> <p>■ Yes ■ No</p>
According to the research groups or working groups in which you have participated, have you witnessed or are you aware of any of them being financed through crowdfunding?	<p>12,5% 87,50%</p> <p>■ Yes ■ No</p>

Source: Own work.

For questions with a rating range of 1 to 5, where 5 represents the highest score and 1 the lowest, the following was obtained.

Table 8. Questions and answers (part 2) evaluation of crowdfunding in university research groups in Colombia

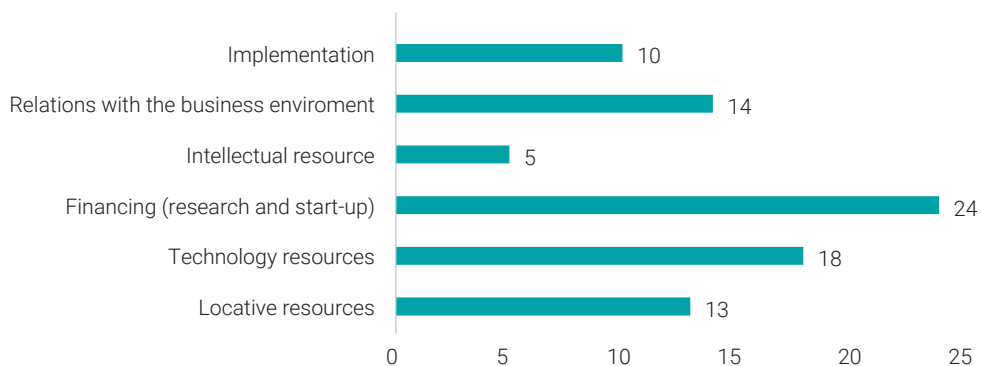


Source: own work.

And, for the multiple-choice question, we obtained.

Table 9. Questions and answers (part 3) evaluation of crowdfunding in university research groups in Colombia.

From your point of view, which of the following is the greatest limitation in fulfilling the mission of your research or working group?



Source: own work.

The information gathering process was carried out by consulting the databases of several higher-education entities, where more than 230 research group contacts were obtained. The survey shown in Table 7 was then sent by e-mail to each of the contacts. Twenty members or research groups collaborated in the survey by providing their answers, which allowed us to know the current status of some of the research groups on the issue of collective financing.

According to the answers received, it is clear that more than 58% of the respondents are not familiar with the term crowdfunding, which opens up the possibility for universities to implement this financing tool in order to counteract what was observed in the survey, where the financing and resources provided by the educational institution are one of the limiting factors for some of the research groups. Similarly, it can be seen that at least 70% of the research groups are developing solutions to problems in their environment, which increases the possibility of sponsorship by the community, as they see a solution to their social or economic problems in these causes.

5. MODEL PROPOSAL

Based on the information collected, the non-implementation of crowdfunding would be based on the fact that there is a lack of knowledge about it. For this reason, the implementation of alternatives that disseminate knowledge and access to this financing tool becomes relevant, which is why higher-education institutions should start working on the creation of communication channels between spin-off research groups and industry. The approach between these two actors would allow for the implementation of new knowledge to solve problems in the economic field, thus providing a more competitive environment and an increase in the social and economic development of the region [47], [48]. Once the need for financing has been identified, it is possible to talk about the possible ways of obtaining resources to carry out a project, the main characteristic of which is the university population. The proposed model for the implementation model of crowdfunding is based on the different variables that affect and influence the development of a project, as expressed by Rodríguez and Henao [49], [50], who talk about the complications in social terms that an organization has to endure over time in the market, where the great complexity of going through what is known as the valley of death of companies, which corresponds to the first two years of activity, is evident. It is clear how important it is to be competitive in an increasingly aggressive and changing market, where it is necessary to be more agile and to optimize resources as they become scarcer [51], [52].

Likewise, the materialization of a project, in addition to generating solutions to problems proposed by the system to which it belongs, must have stakeholders interested in its materialization, which is why two resources necessary for the achievement of the objective come into consideration. The first, refers to the financial resource that allows for the implementation and realization of business ideas, usually the sponsors or stakeholders of the projects who seek a return; in the case of crowdfunding it is the reason why the sponsors invest their capital [53], [54]. The second resource is intangible and refers to knowledge. It seeks to find or innovate the necessary tools to articulate a solution and provide added value to the problems that arise [55].

Taking into account these aforementioned variables, the problem of financing and implementing crowdfunding in higher-education institutions is addressed by proposing a model with three main nodes: The first "Capital Node", the second "Knowledge Node" and the third "Market Node", which are approached through a relational systematic model, as shown in Figure 8 below.

- Capital Node: Defining this system, developed in a university environment, is forced by the scope of the possible interactions of the level of interest that can cause an investment proposal that is striking, as long as they act under legal regulations; The evaluation of "which profile of investors should be targeted to be more successful in the financing campaign", as these agents are not linked to the traditional financing system. The financing selection criteria is aligned with the values, affinity and impact on the environment of the funder [56].
- Knowledge Node: Universities play a very important role in the dynamization of this node, since they are responsible for providing updated and current information that leads to the creation of a competitive business plan according to the needs proposed by the group in charge of the entrepreneurship [23], thus facilitating the interpretation of which technologies to apply and which sponsors to approach.
- Market Node: This is focused on allowing the environment to identify new trends present in the market, focused on the application of entrepreneurship; this being the main characteristic to define an attractive project and how it can present an efficient solution to the existing need for financing, be sustainable, how it is presented in the market, and how new and traditional entities address this new market with the needs that they imply for the financed agent [22] [11].

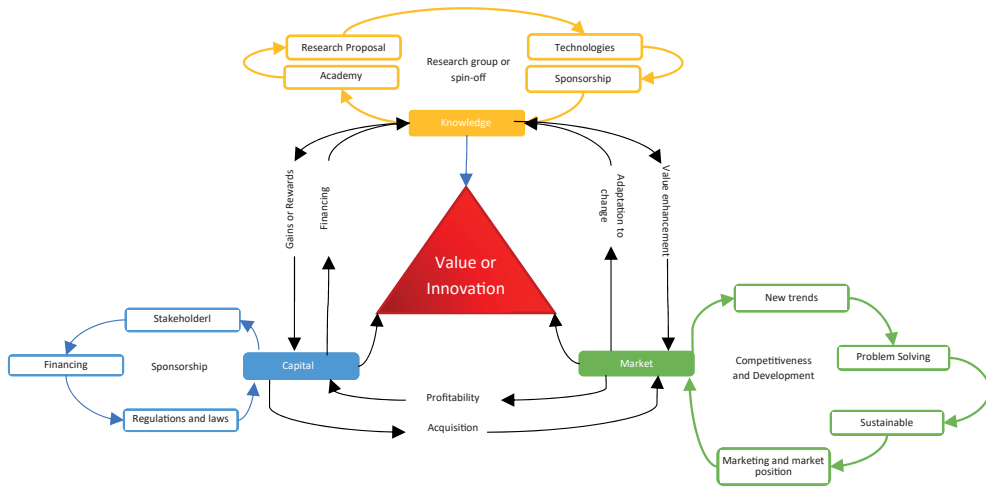


Figure 8. Crowdfunding model in higher-education institutions.

Source: own work.

These relationships are dictated by a closed feedback relationship, where each node continuously receives from the other nodes present, generating a circularity of information. Since the central node is the value or innovation generating node [12], the environment itself causes the generation of information managed in the relationships presented above, which are governed by functions focused on feedback. This friction between the different nodes generates the value or innovation [37]. The correct management of this resource and how it communicates with other nodes dictates the possible degree of success of crowdfunding in a higher-education university environment [12].

Therefore, the implementation of a crowdfunding model could prove to be viable for higher-education organizations seeking to develop new knowledge and innovation through spin-off research groups. Therefore, after a systematic review of the literature on crowdfunding, the knowledge of the main actors and their influence within the educational system, a model is proposed that seeks to solve the economic and market penetration limitations for innovative ideas and entrepreneurship of university research groups.

6. CONCLUSIONS:

The purpose of this review is to summarize the status of crowdfunding as a financing method, noting that it has a greater impact for certain populations, where family and friends play an important role in the early stages of those projects that choose

crowdfunding as a method of raising funds for their project. This is because traditional forms of financing are more difficult to obtain, as traditional banks assess the potential to generate profits (investment risk) in order to grant loans. Artistic projects, small businesses, or social impact projects are usually better received when they are part of the community affected by the project.

Crowdfunding has grown in importance and its evolution has been well documented over the years, establishing itself as a funding alternative for research groups or university spin-offs. Similarly, tools have been developed to increase the scope of the campaigns, with the aim of reaching a wider audience. For this reason, universities should adopt this model in order to have the resources that allow for the materialization of projects and contributions characterized by their innovation, which would provide an increase in value to the economic and social problems of the environment to which they belong.

Most of the theoretical reflection type research carried out studies the behavior and impact of crowdfunding in the United States or Europe, which speaks a lot of the poor traceability of this type of financing in Latin America. This literature review helps to better visualize the state of crowdfunding in the region, and how it has affected different sectors, both in the technological and financial sectors, including the legislative field. Since the arrival and creation of crowdfunding platforms in the country, Decree 1357 has been created, regulating them both in the amounts and means in which they can operate, and the existing need to make a theoretical reflection of the impact on projects in a population belonging to the southern cone. With this in mind, the aim was to obtain the traceability of the concept and provide clarity on the subject, since it is not very well known among Latin American entrepreneurs and young people. For this reason, the review was approached from three basic points of view: governmental, academic and economic. The governmental aspect focused on the state of crowdfunding and the current Colombian regulations. The academic aspect highlighted how the concept has evolved over the years and, finally, the economic aspect showed how this alternative differs from traditional financing methods and how it can be a viable means of financing business ideas and promoting entrepreneurship.

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