Financial Indicators In Project Management Processes: A Bibliometric Review

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Abstract

Financial management is a complex activity due to the many variables and indicators that interfere from globalization and the installment of new technologies in all industries. In this sense, it is relevant to approach project financial management considering the fundamental input of managerial activity such as financial analysis, integrated from the evaluation of its indicators. From this context raised the study is directed to describing the trends of scientifical production within financial indicators in project management processes. A continuous review of the scientific production on the topic was developed in Scopus database using the terms "Financial Management" and "Financial analysis", then the resultant output was extracted from Scopus for data analysis. Next the information was characterized in many indicators allowing to analyze the quantity of published documents, type of document, authors who had published the most, and the countries and journals

with more published documents on the topic. Among the most important findings, the countries where the most investigations had been published were the United States, China, Czech Republic, Slovakia, United Kingdom, and Russia which represent 62% of the publications. Meanwhile, the journals that published the most on this area are Healthcare financial management, Topics in health care financing, Journal of medical practice management and Healthcare financial management, with 5.9% of publications. Finally, the most productive authors are Cleverley WO, Pink GH and Zhang L, each with 5 articles; this considering that 96% of researchers in this field are transient.

Keywords: Financial Management, Economics, Cost Benefit Analysis, Decision Making.

Introduction

Financial management is one of the most important administrative branches for any organization, as it allows to guarantee the sustainability of projects in the long term through the generation of value and the identification of a clear panorama in financial terms that may directly or indirectly affect the investments made (Otero et al., 2019; Polzer, Nolte & Seiwald, 2023).

Currently, financial management is an increasingly complex activity due to the large number of variables and indicators that come into play from the phenomenon of globalization and the expansion of new technologies in all industries (Parales & Ramírez, 2021; Zayed et al., 2021). In first place, globalization is recognized from the interactions between companies and economies anywhere in the world, whose decisions could directly or indirectly affect the internal decisions of any organization (Bojacá & Celis, 2019; Niebles-Nunez, Ramirez & Garcia-Tirado, 2022); while the other aspect take value from the use of technologies as a competitive potential from which effective dividends can result (Chernov, 2020; Mosteanu & Faccia, 2020).

This becomes even more complex as new trends in the financial recognition of intangible assets such as brands or intellectual capital enter (Widnyana et al., 2021; Ramírez-Duran, Niebles-Núñez & García-Tirado, 2023), which require their own methods and strategies for measurement and analysis within financial

management processes (Khan, Yang & Waheed, 2019). In this sense, the application and use of financial indicators allows for an effective decision-making process that, through the information thrown by these elements resulting from arithmetic, it allows natural or legal persons to consider the largest number of variables in an agile and effective way (Vavrek et al., 2021).

These aforementioned financial indicators allow to homogenize everything related to investments and transactions that are made at the corporate level, since they reveal the real situation of a company, sector, country or even a currency (Párraga-Franco et al., 2021). This certainly facilitates and promotes negotiations and transactions in a transparent manner. It is important to explain and understand that these indicators are constantly evolving, where various experts and authors promote new models and measurement systems to effectively analyze the financial situation of a possible investment or transaction (Calderón, Castillo & Calderón, 2021).

These indicators certainly have a very significant impact on project management because they provide the necessary tools to make decisions in a strategic way (Reyes-Molina, 2019). The financial management of projects then takes its great relevance because it allows to guarantee the economic stability of the development of the project from the many variables that could affect it.

In this sense, it is undeniable to approach project financial management without considering the fundamental input of managerial activity such as financial analysis, integrated from the evaluation of its indicators. From this context raised the study is directed to describing the trends of scientifical production within financial indicators in project management processes. This type of study becomes very relevant when understanding the dynamics of use and validation of various indicators and innovative methods for financial projects, which provides new tools to the academic and business sector. In this way, describing the trends of this production would allow identifying the main exponents, methods and indicators that are validated through scientific methodologies in high-impact databases, such as Scopus in the case of this study.

Methodology

A continuous review of the scientific production on the topic was developed in Scopus database using the terms "Financial

Management" and "Financial analysis"; Table 1 expose the keyword standardization.

Table 1. Keyword standardization

Keyword	Descriptor
Financial Management	* Financial Management
Financial analysis	* Financial evaluation * Financial assessment * Financial indicators

Source: Authors (2022)

The equation used for the search in Scopus was: (TITLE-ABS-KEY ("Financial Management") AND TITLE-ABS-KEY ("financial analysis") OR TITLE-ABS-KEY ("financial evaluation") OR TITLE-ABS-KEY ("financial assessment") OR TITLE-ABS-KEY ("financial indicators")); produced 474 results around the research area and comprised within a period between 1969 and 2023.

The resultant output was extracted from Scopus for data analysis. Next the information was characterized in many indicators allowing to analyze the quantity of published documents, type of document, the dynamics of the sources, authors who had published the most, and the countries and journals with more published documents on the topic. The main data from these documents is shown in Table 2.

Table 2. Main information.

MAIN INFORMATION	
Timespan	1969:2023
Sources	369
Documents	474
Annual Growth Rate %	1,29
Document Average Age	13
Average citations per document	8,449
References	12088
DOCUMENT CONTENT	
Keywords Plus (ID)	3060
Author's Keywords (DE)	1149
AUTHORS	
Authors	1348
Authors of single-authored docs	129
AUTHORS COLLABORATION	

Single-authored docs	138
Co-Authors per Doc	3
International co-authorships %	9,916
DOCUMENT TYPE	
Articles	343
Books	10
book chapters	5
conference papers	63
Editorial	2
Erratum	1
Notes	3
Reviews	41
Short surveys	6

Source: authors applying R software based on Scopus data (2022).

Table 2 exposes main data of referred documentation, from 1969 to 2023; In total, the analysis was compound by 474, of which most of them are articles (343), and conference articles (63), to cover 86% of total publications.

Results and discussion

Primarily, a bibliometric productivity analysis was developed, next the analysis of various bibliometric indicators and lastly, the correlations and co-occurrences were analyzed.

Bibliometric productivity's Laws

First, the estimation of the Lotka coefficient, provides the description of the authors' productivity, and evidences a quantitative association between the quantity of authors and their works in a specific area during a period, a minor number of authors contribute with the greatest production, while a greater number make a smaller contribution (Alves, 2019).

Table 3 denotes in accordance with Lotka's law, that most authors (1293) equal to 95.9% present least contribution with only one article, 3.1% have two contributions, 0.6% have three, 0.1% have four and only 0.2% have contributed with five works. In this sense, it is possible to conclude that most documents were by researchers who developed temporal or transitional research on the area.

Table 3. Lotka's Law

Documentos escritos	N. de Autores	Proporción de autores
1	1293	0,959
2	42	0,031
3	8	0,006
4	2	0,001
5	3	0,002

Source: authors applying R software based on Scopus data (2022).

As a contrast, Bradford's law was applied to a group of journals for determining the largest production in the studied topic and it's represented by zones. Table 4 shows that 33.33% of publications are focused in the first 54 journals, which fit into zone 1 of Bradford's law, where few journals are focused as the most productive, allowing the identification of the most searched journals by investigators (Alvarado, 2016; Sembay et al., 2020).

Consequently, it can be seen in figure 1 that the first 4 journals, match the 52% of the total in zone 1 of the law: Healthcare financial management, Topics in health care financing, Journal of medical practice management and Healthcare financial management.

Table 4. Bradford's Law.

Zone	# Journals	# Titles	Percentages
Zone 1	54	158	33,33%
Zone 2	159	160	33,76%
Zone 3	156	156	32,91%

Source: author based on Scopus data (2022).

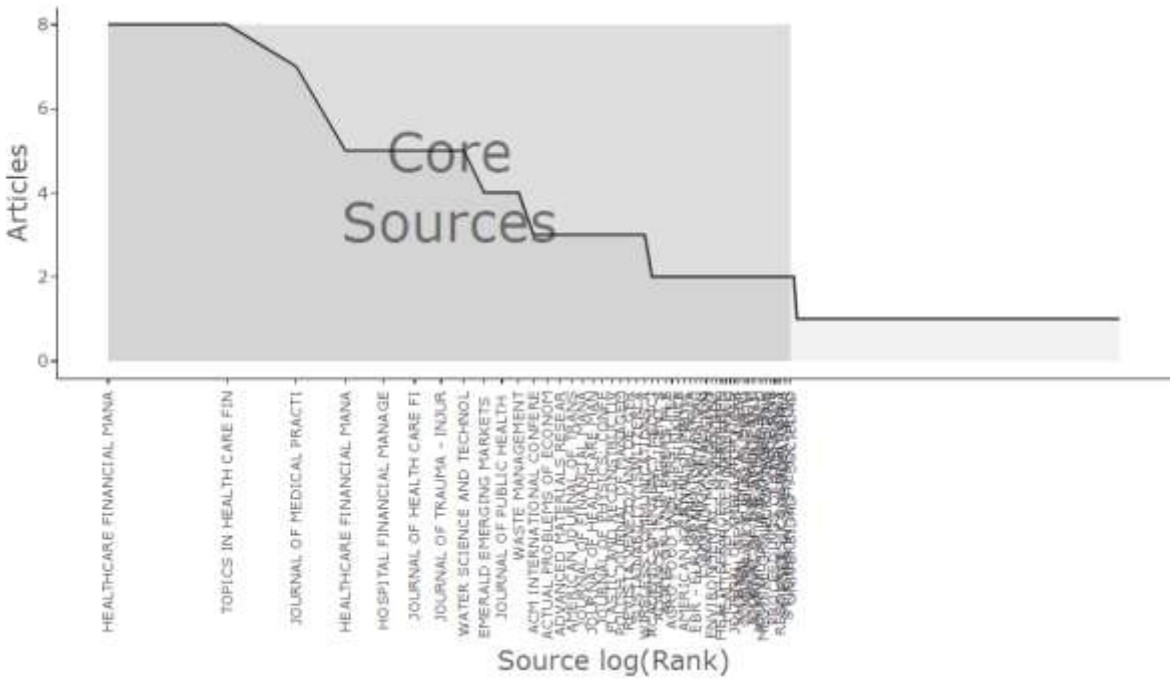

Figure 1. Bradford's Law. **Source**: author based on Scopus data (2022).

Bibliometric indicators

Figure 2 exposes annually a scientific production increase associated to the investigative area, specifically after 2009, denoting that, the last three years, 2020 (24), 2021 (38) and 2022 (26), have had a significant growth on publishing related to the research area in which 19% of total research is focused; representing a growth in the interest for this research area.

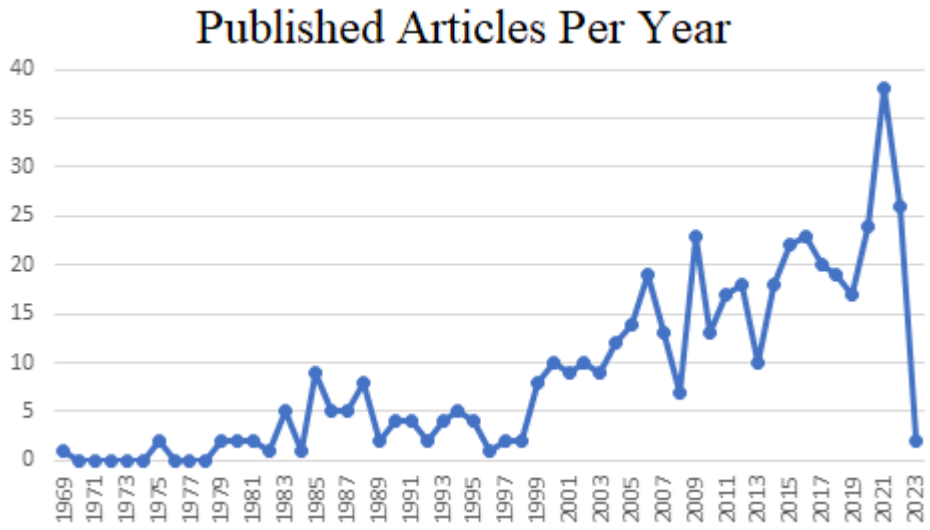

Figure 2. Scientific production per year. **Source**: author based on Scopus data (2022).

Additionally, data was analyzed geographically to identify which countries with the most investigation on the subject. Figure 3 exhibits the map with the nations that developed more studies in the studied area, the dark blue represent the most contributive countries, where it's possible to highlight the United States (169), China (54), Czech Republic (23), Slovakia (17), United Kingdom (17) and Russia (15); the aforementioned countries produce 62% of total investigations in the studied area.

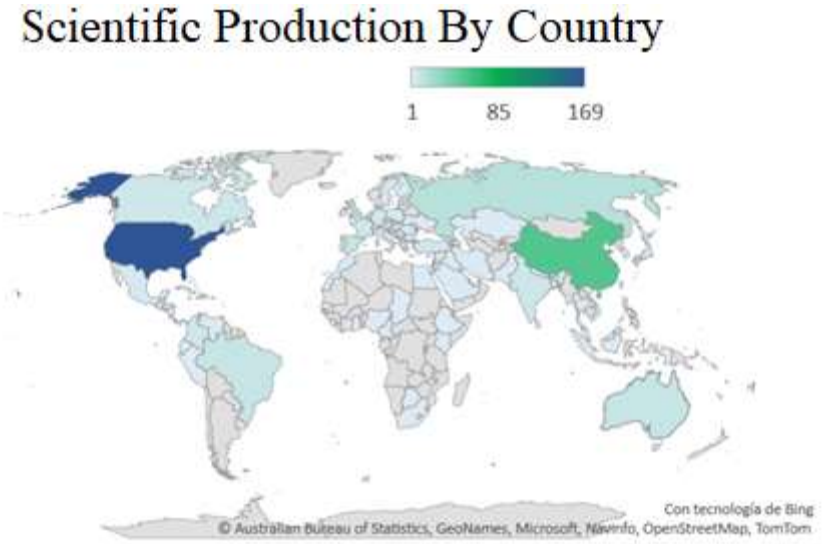

Figure 3. Countries' scientific production. **Source**: author based on Scopus data (2022).

The U.S accounts for 36% of total publications; Several of their studies are aimed at using financial analysis to determine economic viability and make relevant decisions in the medical sector (Endriukaitis et al., 2021; Malvolti et al., 2022; Scott et al., 2022).

In the opposite, China has investigations related to the use of accounting information in financial management projects. (Zhang, 2022; Zhuo et al., 2022; Li, 2022).

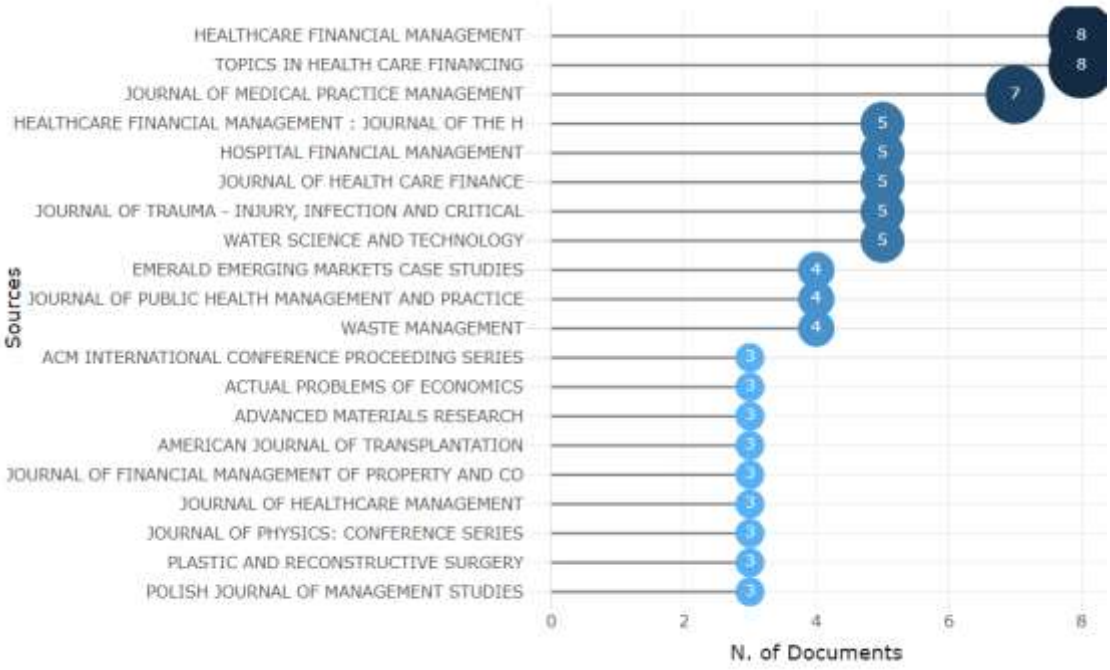

Figure 4. Most important sources. **Source**: author applying R software based on Scopus data (2022).

Likewise, data was analyzed to identify the more important sources in the investigative area; Figure 4 denotes that the 4 journals with more publications on the subject are Healthcare financial management (8), Topics in health care financing (8), Journal of medical practice management (7) and Healthcare financial management (5).

The most cited article in the journal Healthcare financial management addresses the integration of reengineering and financial modeling in the standardization of patient care in healthcare organizations (Meyer & Feingold, 1995). The following journal with more publications, the most cited article deals with the ratios of financial analysis service (Cleverley & Rohleder, 1985).

In the context of studies per author, the index is low in comparison to the amount of publishing from 1969 to 2023. It is to observe in Figure 5, the three authors who have the more publications are Cleverley WO, Pink GH and Zhang L with five publications each.

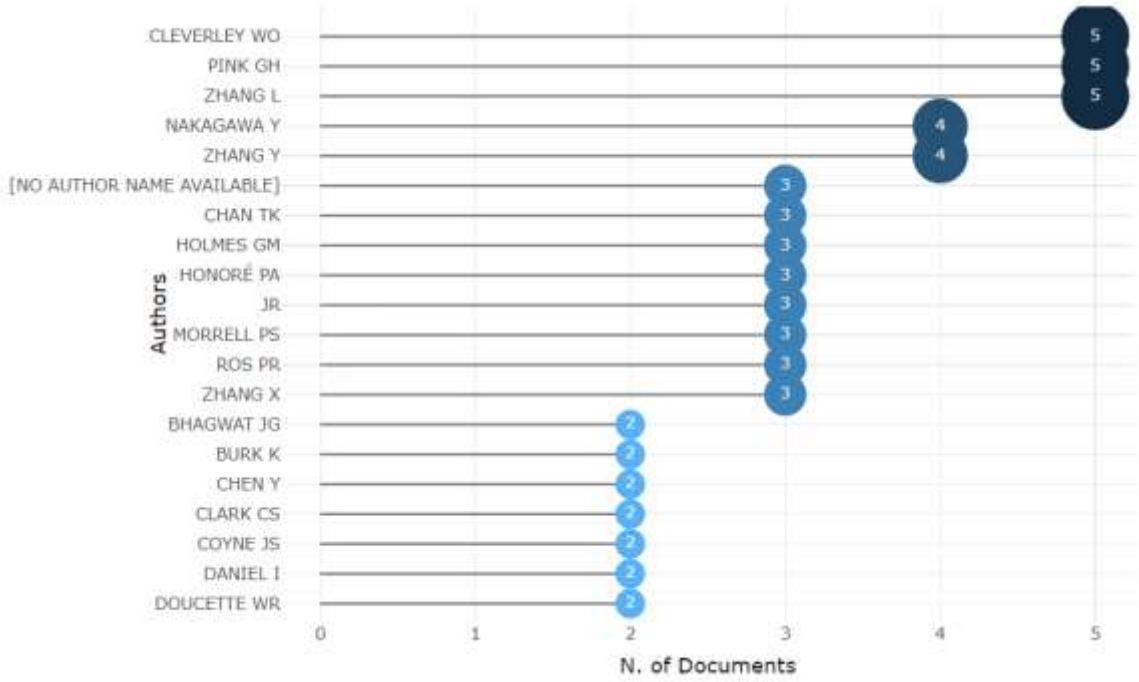

Figure 5. Most important authors. **Source**: author applying R software based on Scopus data (2022).

It is to highlight that Pink is part of authors with more published investigations, Pink has articles that address the use of financial indicators to measure hospital performance (Pink et al., 2006; Pink et al., 2007).

Table 5. Articles with more citations

Articles	DOI	Total Citations
ELLOUMI F, 2001, CORP GOV	10.1108/14720700110389548	140
ZHANG X, 2005, J CONSTR ENG MANAGE	10.1061/(ASCE)0733-9364(2005)131:6(656)	119
DAHABREH Z, 2009, INT ORTHOP	10.1007/s00264-008-0709-6	98
YU Q, 2014, NEUROCOMPUTING	10.1016/j.neucom.2013.01.063	96
ROEBUCK RM, 2011, WATER ENVIRON J	10.1111/j.1747-6593.2010.00230.x	94
OZMINKOWSKI RJ, 1999, AM J HEALTH PROMOT	10.4278/0890-1171-14.1.31	82
MOORE JS, 1983, J BUS FINANC ACCOUNT	10.1111/j.1468-5957.1983.tb00456.x	82
HADIDI LA, 2017, WASTE MANAGE	10.1016/j.wasman.2016.09.030	80
WITTER S, 2010, HEALTH POLICY PLANN	10.1093/heapol/czq013	78
TRUSSEL J, 2003, NONPROFIT VOLUNT SECT Q	10.1177/0899764003257459	66
O'NEILL L, 2007, ANESTH ANALG	10.1213/01.ane.0000253092.04322.23	61
GARG A, 2009, WASTE MANAGE	10.1016/j.wasman.2009.03.031	59
YU L, 2010, NEUROCOMPUTING	10.1016/j.neucom.2008.11.035	57

VAN HERCK P, 2004, INTERNATIONAL JOURNAL OF CARE PATHWAYS	10.1177/147322970400800302	57
ORLEWSKA E, 2004, VALUE HEALTH	10.1111/j.1524-4733.2004.71257.x	54
LANDWEHR MS, 2016, CANCER MED	10.1002/cam4.657	52
KALAME FB, 2011, ENVIRON SCI POLICY	10.1016/j.envsci.2011.03.011	52
LIANG X, 2011, RESOUR CONSERV RECYCL	10.1016/j.resconrec.2011.06.009	48
BEAVIS P, 2003, WATER SCI TECHNOL	10.2166/wst.2003.0678	47
ONDATEGUI-PARRA S, 2004, RADIOLOGY	10.1148/radiol.2333031147	44

Source: author applying R software based on Scopus data (2022).

Table 5 exposes the twenty publications with more citations, where the most important are ELLOUMI F, 2001, CORP GOV (140), ZHANG X, 2005, J CONSTR ENG MANAGE (119), DAHABREH Z, 2009, INT ORTHOP (98), YU Q, 2014, NEUROCOMPUTING 896) and ROEBUCK RM, 2011, WATER ENVIRON J (94); Likewise, Table 6 shows the descriptive disclose for the ten articles with more citations in relation to the investigative area.

Table 6. Articles with more citations

Highlights	Year	Source	Cite
Analysis of the relationship between corporate governance and financial difficulties.	2001	CORP GOV	(Elloumi & Gueyié, 2001)
Analysis of financial viability in privatized public infrastructure projects.	2005	J CONSTR ENG MANAGE	(Zhang, 2005)
Analysis of the costs of medical treatment of fractures.	2009	INT ORTHOP	(Dahabreh et al., 2009)
Predicting business failures using machine learning.	2014	NEUROCOMPUTING	(Yu et al., 2014)
Application of financial analysis to domestic rainwater harvesting systems.	2011	WATER ENVIRON J	(Roebuck et al., 2011)
Evaluation of the profitability and financial impact of a bank's health management program on medical expenses.	1999	AM J HEALTH PROMOT	(Ozminkowski et al., 1999)
Analysis of the financial techniques used by large companies included in the FORTUNE 500 list in the United States.	1983	J BUS FINANC ACCOUNT	(Moore & Reichert, 1983)
Proposal for a financial model to assess the viability of investments in waste-to-energy plants in Saudi Arabia.	2017	WASTE MANAGE	(Hadidi & Omer, 2017)

Evaluation of the policy of free childbirth and caesarean section in Senegal based on the financial analysis of expenditure on health policy and financing.	2010	HEALTH POLICY PLANN	(Witter et al., 2010)
Analysis of the financial characteristics of potential accounting manipulators, in organizations where their program spending ratios are significantly higher than expected.	2003	NONPROFIT VOLUNT SECT Q	(Trussel, 2003)

Source: author applying R software based on Scopus data (2022).

Analysis of relationships and co-occurrences

The analysis of relationships and co-occurrences was developed using the VOSviewer software, using as a restriction that the author has at least one publication and at two citations. The co-authorship analysis exposes 1346 authors, from which 859 satisfy the restriction, and just 21 are connected with another author, representing the 2.4%; figure 6 shows 3 clusters that were identified.

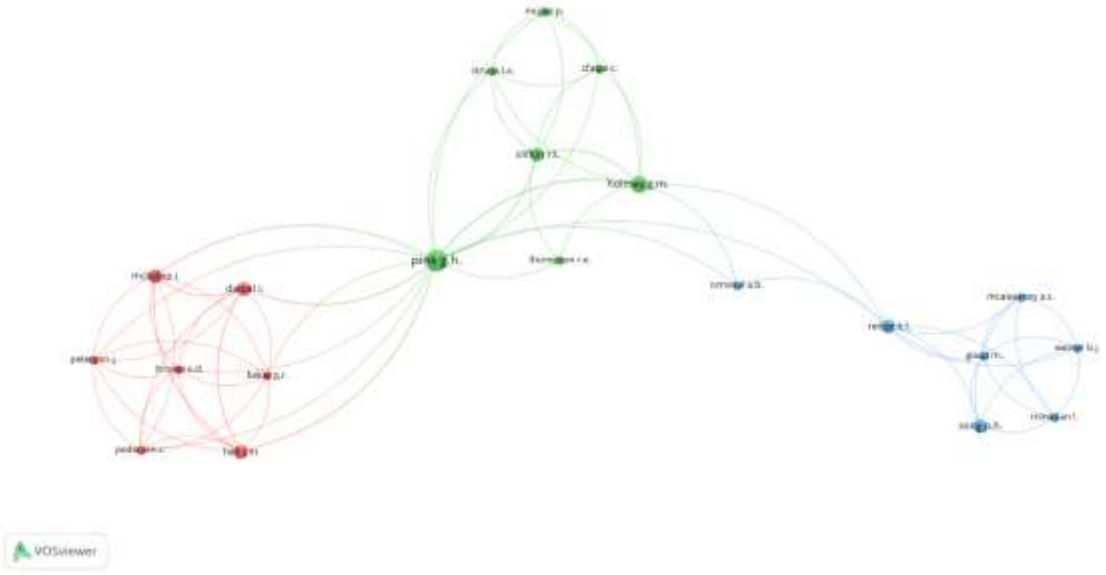

Figure 6. Co-authorship relationship. **Source**: author applying VOSviewer software based on Scopus data (2022).

Lastly, a co-occurrence analysis of keywords was performed, where the restriction was to have at least 5 (of 3833 words) occurrences

of a keyword, which was satisfied by 264 the parameter, this is exhibit in figure 7 and figure 8, where 5 clusters are identified; The words Financial Management, Economics, Finance, Cost Benefit Analysis and Decision Making can be highlighted.

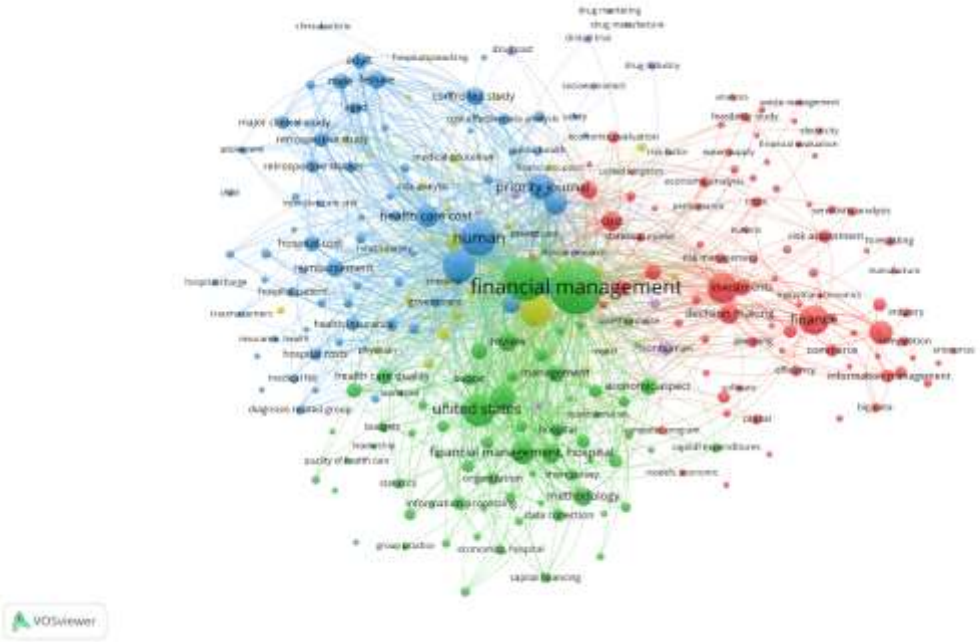

Figure 7. Co-occurrence of keywords. **Source**: author applying VOSviewer software based on Scopus data (2022).

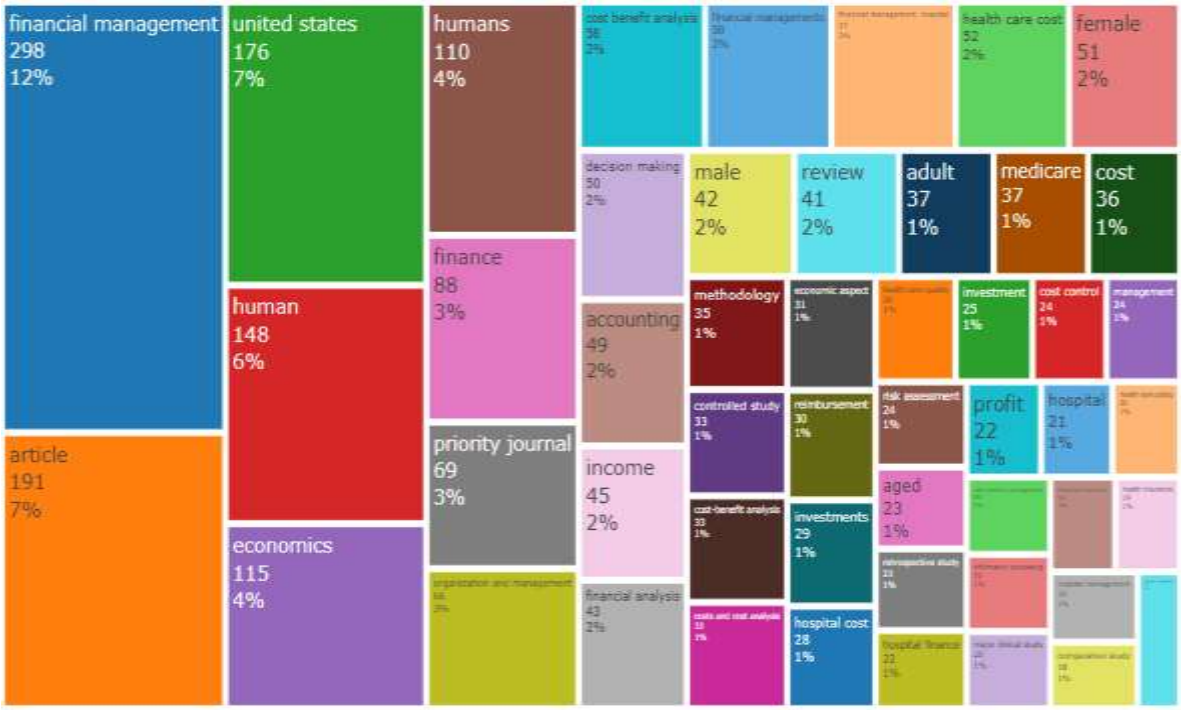

Figure 8. Keywords. **Source**: author applying R software based on Scopus data (2022).

Conclusions

Of the 474 documents analyzed in this bibliometric study carried out based on the information of the Scopus database on the subject of study, it can be concluded that:

72% of the documents consulted are articles, 13% are conference articles and the remaining 15% are made up of other formats. The scientific production analyzed in the period from 1969 to 2023 shows a growing interest in the research topic, the highest peaks of publications were presented in the last three years where 19% of the total published articles are concentrated.

The United States, China, Czech Republic, Slovakia, United Kingdom, and Russia represent 62% of the publications that were generated in the research topic. On the other hand, the journals that publish the most on the subject are Healthcare financial management, Topics in health care financing, Journal of medical practice management and Healthcare financial management, concentrate 5.9% of publications, the rest of the publications are dispersed among different journals. In turn, the most productive authors are Cleverley WO, Pink GH and Zhang L, each with 5 articles; this considering that 96% of researchers in this field are transient.

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