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Financial Performance of Multinational Enterprises: A Historical Review and Future Research Trends

Alberto Antonio Agudelo Aguirre[1]
Universidad Nacional de Colombia, sede Manizales
aagudeloa@unal.edu.co

Carlos Andrés Díaz Restrepo*[2]
Universidad Nacional de Colombia, sede Manizales
cardiazre@unal.edu.co

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Abstract

The purpose of this research is to conduct a literature review on the evolution of research on the financial performance of multinational enterprises through bibliometric and network analysis to map this area of knowledge and identify emerging research trends. A science mapping analysis was carried out from 687 records retrieved from Web of Science and Scopus and dated field's most relevant documents, authors, journals, institutions, and countries. Moreover, the main contribution of this document is delineating the trends and emerging research topics on the financial performance of MNEs.

Keywords: Multinational performance; co-citation analysis; emerging trends; bibliometric analysis; scientific mapping.

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[1] PhD in Finance Universidad del CEMA. Professor of Business Administration Faculty, Universidad Nacional de Colombia. Manizales – Colombia. ORCID: https://orcid.org/0000-0001-6647-3482
[2] PhD (c) in Administration Universidad Nacional de Colombia. PhD in Administration Student Universidad Nacional de Colombia, Manizales - Colombia. Professor of Economy and Administration Sciences Faculty. Universidad Católica de Pereira, Colombia. ORCID: https://orcid.org/0000-0003-0141-3029
*Corresponding author

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Desempeño financiero de empresas multinacionales: Una revisión histórica y tendencias futuras de investigación

Resumen
El propósito de esta investigación es realizar una revisión de la literatura sobre la evolución de la investigación en el desempeño financiero de las empresas multinacionales a través de un análisis bibliométrico y de redes en un intento de mapear esta área de conocimiento e identificar las tendencias emergentes de investigación. Se realizó un análisis de mapeo científico a partir de 687 registros recuperados de Web of Science y Scopus, fechados durante el período comprendido entre 2000 y 2021 con el fin de identificar los documentos, autores, revistas, instituciones y países más relevantes en el campo. Además, la principal contribución de este documento es la delineación de las tendencias y los temas de investigación emergentes sobre el desempeño financiero de las empresas multinacionales.

Keywords: desempeño multinacionales; análisis de co-citation, tendencias emergentes; análisis bibliométrico; mapeo científico.

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1. Introduction

The performance of MNEs has generated significant interest in the literature in the last 20 years. Recent research has focused on performance at the enterprise level (Nguyen, 2017; Nguyen & Kim, 2020; Pisani *et al.*, 2020) after the analysis of MNEs was done through the analysis of the environment in the country of origin and the country of destination in the last 50 years. (Egan, 2018; Hobdari *et al.*, 2017; Rozalia & Aurel, 2019).

This review will help to understand the approaches and limitations of the existing literature in the study of the financial performance of MNEs. Identifying the relationships among authors, current research topics, and future research is important to advance our understanding of these types of organizations.

A detailed bibliometric analysis of the studies related to the financial performance of MNEs contained in WoS and Scopus was made to fill the gap detected and to address the previous research questions, a. This article carried out a science mapping analysis on the financial performance of those MNEs to offer a holistic vision of this issue by exploring the field's evolution. To meet this objective, the Bibliometrix package and the Gephi tool were used to

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analyze and visualize the trends and behavior of the scientific production recorded in Web of Science and Scopus databases.

The document is organized into four sections apart from the introduction. First, the methodology provides a detailed description of the material selection and the tools used. Then, the statistical analysis of the search results is presented together with the bibliometric analyses of the documents, authors, journals, and countries. Next, the networks that resulted from the analysis of co-citations, co-occurrences, and trends are explained; the trends are the result of the cluster analysis. Finally, the conclusions, limitations, and recommendations for future research are presented.

2. Methodology

2.1. Data Source

The data used in this study were obtained from Scopus and WoS, chosen because of their worldwide recognition, scope, and leadership (Zhu & Liu, 2020).

Scopus has greater coverage than WoS; overlap is an obvious issue (Aksnes & Sivertsen, 2019). Approximately 90% of the records kept in one database are also found in the other (Bar-Ilan, 2010). However, using both databases will allow a comparison of the behavior of scientific production in this area of knowledge, which may be an additional contribution to this research.

The criteria used for the search (Table 1) are the result of the analysis of previous reviews and their respective limitations.

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Table 1. Search criteria

Databases	***Web of Science***	***Scopus***
Space of time	2000-2021	
Consultation date	September 09, 2022	
Type of document	Articles, Books, Book Chapters, and Conference papers	
Type of journal	All types	
Search field	Title, abstract, keywords	
Search terms	(multinational OR mne) AND (finance OR financial) AND (performance)	
Records	591	461
Overall outcomes	790	

Source. Own work.

These filters resulted in 591 records in WoS and 461 in Scopus. After contrasting and eliminating duplicate records found in both databases, it was possible to determine that the total production was 790 documents. The overlap was 75%. A quantitative approach was used for bibliometric analysis to increase rigor and objectivity and decrease researcher bias in the review, as suggested by Zupic and Čater (2015). This approach has been used in various works of research in management with valuable results (Diez-Vial & Montoro-Sanchez, 2017; Ferreira *et al.*, 2020; Puck & Filatotchev, 2020).

2.2. Analytical tools

Bibliometrix is the primary analytical tool used in this study. It is an open-source software developed in the R language that performs bibliometric analysis, and it is used especially for scientific mapping. This package was developed by Massimo Aria and Corrado Cuccurullo from the University of Naples Federico II (Aria & Cuccurullo, 2017). The choice of this tool

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was motivated by several reasons: its compatibility with different databases, its multiple analytical functions, its free access, and, especially, its capacity to identify trends.

This code performs analysis of different items, such as authors, countries, journals, institutions, and keywords. The references help the creation of networks for the bibliographic analysis of coupling, co-citation, collaboration, and co-occurrences. Another attribute of this package is its use of the data extracted from the WoS and Scopus databases in multiple formats (.txt, .bib.tex, .csv), which implies that no additional time is required for its preparation and adaptation. The Bibliometrix version used is 3.0. This tool has been used in recent studies (Dabić *et al.*, 2020; Duque & Cervantes-Cervantes, 2019; Fallah & Heidari, 2020; Nguyen, 2017; Puck & Filatotchev, 2020; Sageder & Feldbauer-Durstmüller, 2019).

To complement the results, an analysis of social networks or co-citations map was made. It is an approach used in bibliometrics, which allows visualizing the entire knowledge network of a subject and facilitates the identification of its sub-areas (Gurzki & Woisetschläger, 2017; Kuntner & Teichert, 2016; Zuschke, 2020). This procedure is based on the analysis of co-citation among documents. It allows identifying of the most frequent references of each work, which are considered the most relevant within the specific subject (García-Lillo *et al.*, 2017; Hota *et al.*, 2020).

There are several tools to perform network analyses; some of the most recognized are Pajek, CiteSpace, UCINET, VOSviewer, and Gephi. Because of its multiple features, we used Gephi (Bastian et al., 2009) in this study. For example, it is open-source software, data manipulation is simple, visualization is highly detailed, its architecture is flexible and multitasking, and it can use various data formats (Jacomy *et al.*, 2014). This tool has been used in studies that have obtained beneficial results (Arvidsson & Caliandro, 2016; Cheng, 2016; Fahimnia *et al.*, 2015; Kamble *et al.*, 2018). The R software was used to extract the references of the records obtained from the databases and to prepare the data file in .graphml format to be imported to Gephi.

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There are several advantages to using bibliometric methods of this type. For instance, the results will be the statistical analysis output from reliable data from duly arbitrated sources. The findings are determined by quantitative methods that limit the selection bias of the authors; in addition, the volume of information is not a limitation, which makes this method more suitable than a qualitative one to answer the questions of this study.

3. Research overview

3.1. Number of publications by year

To analyze the trend and evolution in this field, a comparison of the number of publications registered in WoS and Scopus between 2000 and 2021 was made. Likewise, the total production was calculated by adding the records of each database and eliminating the duplicates; the results are summarized and presented in Figure 1. According to the data obtained, the most cited article in this area was published in 2001 (Delios & Beamish, 2001). However, only as of 2015, the number of publications shows a growing trend. The annual growth rate reaches 19.82%, indicating that this issue is receiving the scientific community's attention. This trend also shows that this behavior will continue for the next few years. Additionally, 61% of the total documents (484 of 790) were published between the years 2016 and 2021; this indicates the novelty of the research on the financial performance of MNEs.

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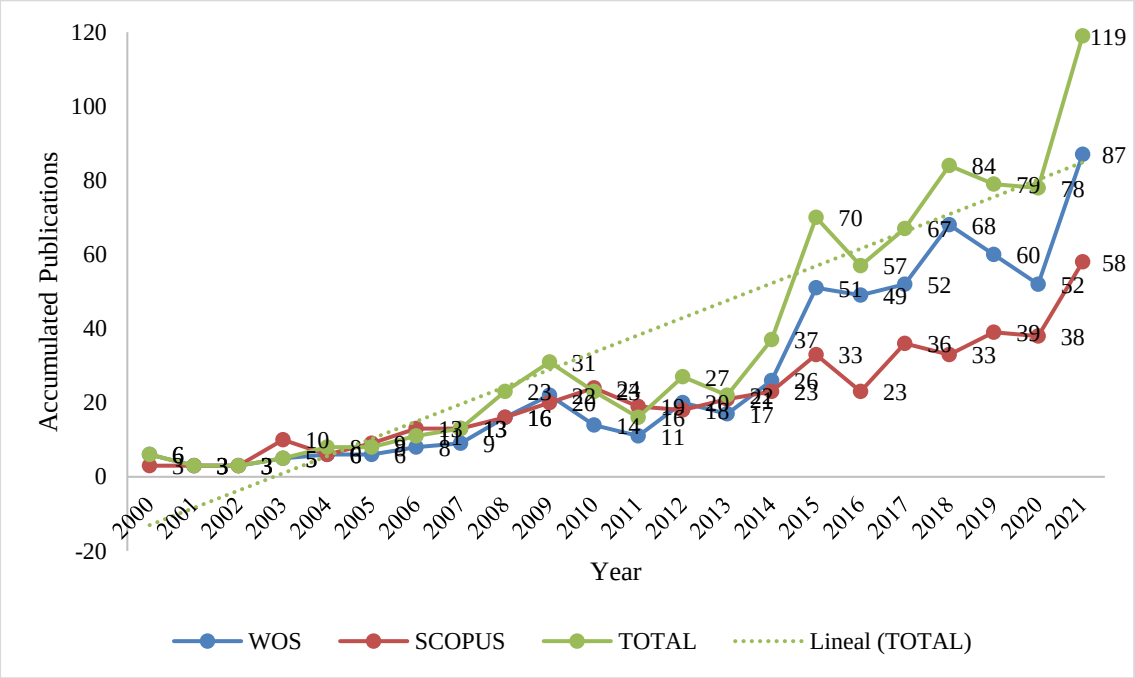
Figure 1. Number of accumulated publications per year



Source. Own work

3.2. Source of publications

This section describes the distribution of the publications in different journals by listing the number of records obtained from each database, the total (to obtain this datum, the duplicated records in Wos and Scopus were filtered), the SJR 2019 indicator (this indicator measures the scientific influence of the average article in a journal (SCImago SJR, 2021), the quartile in which they are classified according to Journal Citations Reports (JCR) and Scimago Journal Country (SJC), and finally, the h-index registered in (SJR).

Table 2 shows the ten journals with the largest publications on the subject. The journal with the highest production is International Business Review, with 3.95% of documents, followed by the Journal of International Business Studies, with 2.64%. It is not possible to state the hegemony of a single journal since none has a considerable number of records compared to the others; the number of works published in the ten most important makes a total of 20.35%.

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An essential element is the origin of the journals; 5 out of 10 are from the United Kingdom, demonstrating this country's role in controlling publishing centers. The remaining journals (Journal of Cleaner Production, Journal of Banking and Finance, Journal of Business Ethics, Management International Review, and Strategic Management Journal) are from the Netherlands, Germany, and the United States.

Table 2. Top 10 journals

Journal	***WoS***	***Scopus***	***Total***	***% of total***	***SJR 2019***	***Quartile***	***H index (SJR)***	***Country***
International Business Review	26	10	27	3.95%	1.45	Q1	87	United Kingdom
Journal of International Business Studies	16	9	18	2.64%	4.99	Q1	184	United Kingdom
Journal of Cleaner Production	0	7	7	1.02%	1.89	Q1	173	Netherlands
Long Range Planning	5	7	10	1.46%	2.01	Q1	96	United Kingdom
International Journal of Emerging Markets	6	5	9	1.32%	0.37	Q2	26	United Kingdom
Journal of Banking And Finance	7	5	8	1.17%	1.34	Q1	148	Netherlands
Journal of Business Ethics	24	5	24	3.51%	1.97	Q1	168	Netherlands
Management International Review	15	5	15	2.20%	1.04	Q1	53	Germany
Multinational Business Review	7	5	9	1.32%	0.76	Q1	26	United Kingdom
Strategic Management Journal	9	5	12	1.76%	8.43	Q1	269	United States

Source. Own work.

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3.3. Author and co-authorship analysis

According to the records obtained from the databases between 2000 and 2021, the author with the largest number of publications is Aguilera-Caracuel, Javier from the University of Granada (Spain). He has 13 publications in both WoS and Scopus; the first one was registered in 2010.

The second author with the largest records is Guerrero-Villegas, Jaime from the Pablo de Olavide University (Spain). He has a total of 7 publications; this researcher published his first research related to the subject in 2015.

Table 3 lists the top 5 contributing authors in this area. This list was compiled by comparing the records found in WoS and Scopus. In addition, indicators such as the number of citations and h-index (an Indicator proposed by Hirsch (2005), which allows measuring the scientific productivity of each researcher) were considered. The total number of publications of each author, obtained by comparing the records in each database and eliminating duplicates, is also listed.

Table 3. Top 5 authors

Author	WoS			Scopus			Total publications
	Number of publications	Number of citations	Index h	Number of publications	Number of citations	Index h	
Aguilera-Caracuel, Javier	10	405	10	6	472	10	13
Guerrero-Villegas, Jaime	6	116	6	4	146	8	7
Nguyen, Quyen TK	6	2.083	21	5	484	10	6
Rugman, Alan M.	5	5.923	34	4	7.816	43	5
Delios, Andrew	4	5.001	33	2	6.266	36	4

Source. Own work.

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To visualize the collaboration network among authors, Bibliometrix used the records obtained from the search of the databases between 2000 and 2021. An author represents each node. The 20 authors with the largest number of publications and at least two connections (co-authors) were selected; this filter yielded a network of 9 researchers. The size of an author's name represents the number of publications, and the collaboration between an author and other authors is represented by the line that connects them. The thickness indicates a greater number of participants as co-authors.

Three collaboration groups that met the aforementioned criteria were identified; the main group led by Aguilera-Caracuel Jaime stands out. This researcher has six co-authorships with Jamid Guerrero-Villegas, one of the five authors with the largest number of publications on the topic. The other collaboration network is led by Nguyen, Quyen T.K., who has two co-authored publications with Rugman, Alan M. Besides, the list of authors co-authorship described in Table 3 shows that collaboration between authors generates a greater impact on their productivity (Lee & Bozeman, 2005).

Figure 2. Author collaboration network analysis

Source. Own work.

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3.4. Affiliations analysis

Table 4 presents the top 10 publishing organizations registered in this bibliometric study (69 out of 683). The University of Granada in Spain is the institution with the most contributions in this field of research, with 14 documents, followed by the University of Reading and Macquarie University, with 12 and 11 documents, respectively.

Table 4. Top organizations

Organization	WoS	Scopus	Number of articles	Country
University of Granada	11	6	14	Spain
University of Reading	10	7	12	United Kingdom
Macquarie University	6	7	11	Australia
Henley Business School	0	7	7	United Kingdom
Aalto University	5	5	5	Finland
Wirtschaftsuniversität Wien	2	4	4	Austria
Universiti Sains Malaysia	2	4	4	Malysia
Korea University	4	4	4	South Korea
Goethe-Universität Frankfurt am Main	3	4	4	Germany
University of Toronto	4	4	4	Canada

Source. Own work.

3.5. Country analysis

Table 5 shows the ten countries/regions with the largest number of publications on the financial performance of MNEs, disaggregated by each database and in total (to obtain this datum, the duplicate records were purged in WoS and Scopus). The United States contributed 28.38% of all the data analyzed; this shows the leadership of this country in terms of the number of papers compared to other countries. The countries co-leading the list are the United Kingdom (16.59%) and Australia (10.19%).

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Table 5. Top 10 countries / regions

Country / Region:	Number of articles			
	WoS	Scopus	Total	% of Total
United States	156	93	195	28/ 38
United Kingdom	84	57	114	16:00
Australia	50	32	70	10:19
China	52	23	65	9.46%
Spain	36	20	50	7:28
Germany	32	16	43	6/26
Netherlands	30	16	37	5.39%
Italy	22	12	27	3.93%
Korea	20	11	27	3.93%
Canada	8	16	16	2.33%

Source. Own work.

To facilitate the identification of collaboration between countries, Bibliometrix used the records obtained and represented each country as a node by selecting the 20 with the largest number of publications and with at least two connections between them. The result suggests strong cooperation in various groups. The main one comprises the United States, China, and France, reflecting greater transnational authorship. The striking feature of this group is its transcontinental composition, which implies a significant integration of schools and various academic currents. A second group of the United Kingdom, Finland, Spain, Italy, and the Netherlands was also identified and showed the connection among the European thought networks.

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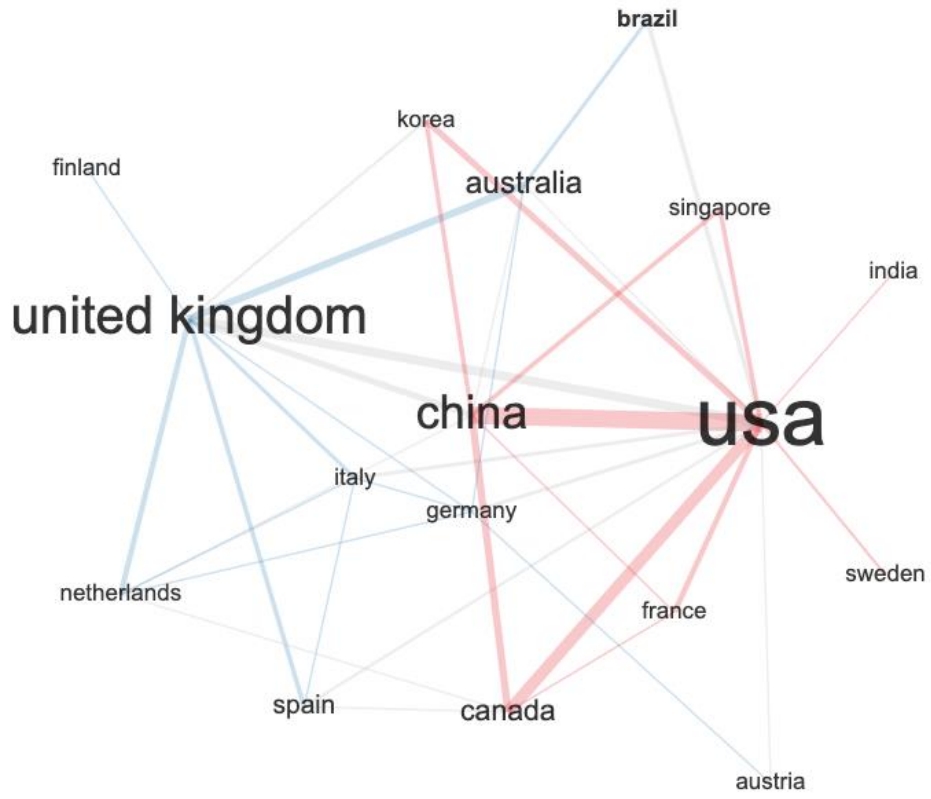
Figure 3. Country collaboration network analysis



Source. Own work.

3.6. Co-citations authors analysis

Figure 4 shows the author's co-citations network, which allowed to identify the most outstanding researchers within the network by determining the number of times they are cited (White, 2003). This criterion determines the most influential authors on a specific topic (Small, 1973). The 20 most cited authors were selected, including the top 5, Alan M. Rugman, Andrew Delios, Mattew A. Hitt, Kogut B., and John Dunning; the first two researchers are also part of the list of authors with the largest number of publications in the area (Table 3).

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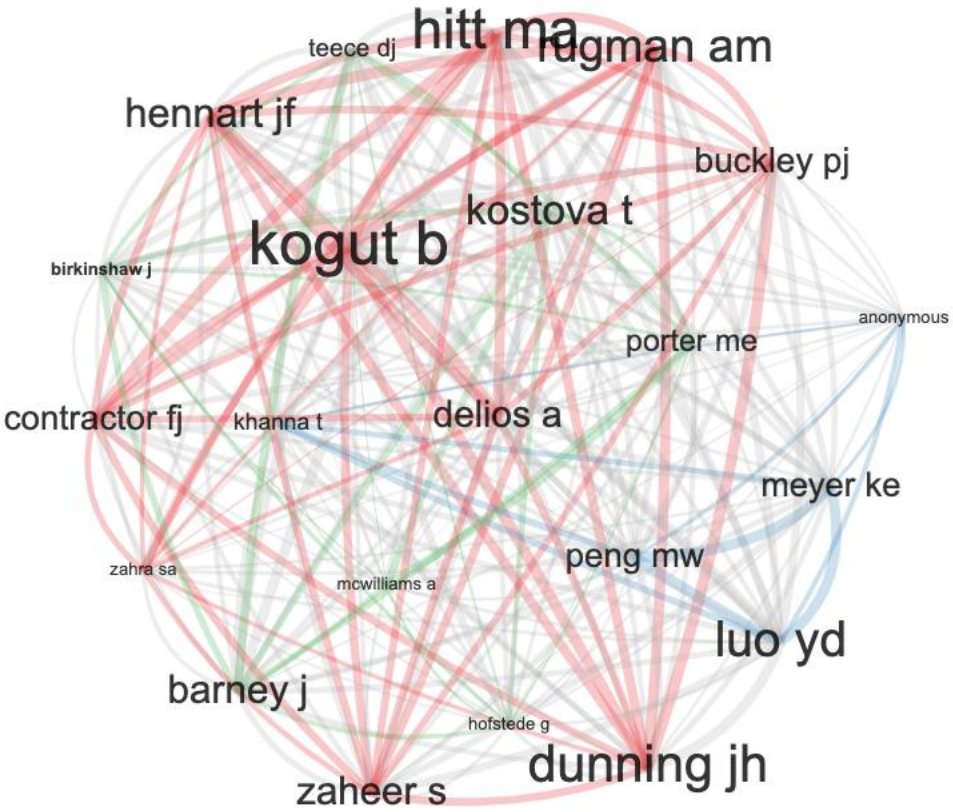
Figure 4. Author cocitation network



Source. Own work.

3.7. Co-occurrence analysis

The word co-occurrence network (interconnection between words), listed in Figure 5, was generated from each document's keywords; the 20 most repeated were chosen. The word cloud generated indicates that terms such as financial performance, performance, firm performance, management, and multinational corporations are the most recurrent in the publications. In addition, the trend in the emergence of these concepts during the last five years indicates that research in the field leans towards these lines.

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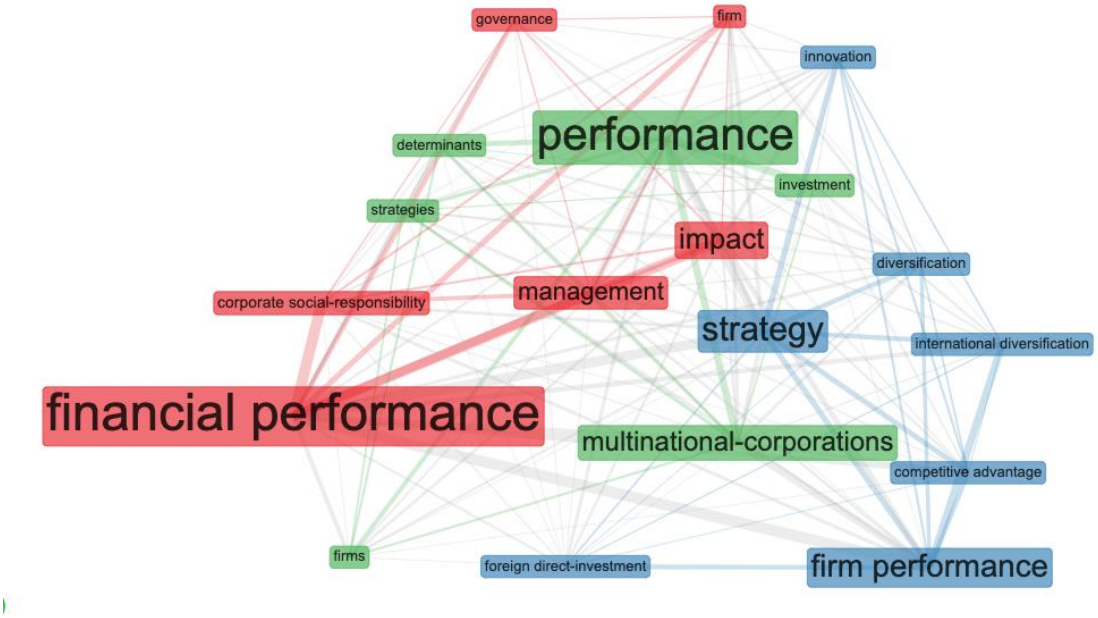
Figure 5. Co-occurrence analysis of keywords



Source. Own work.

3.8. Co-citations documents analysis

The co-citations analysis was used to determine the citations' relation degree of the documents (nodes) of the network created from the references of the 687 records obtained from the databases. In this study, the network comprises a total of 4931 nodes. Table 6 presents the ten documents with the largest number of citations. The most common method to determine the importance of an article is to establish the number of citations it has received (Ding & Cronin, 2011). Therefore, each document is related to the citations it has received within the network (local citation) and outside the network (global citation.) The local citation indicates the number of times another has cited the document on the network. The global citation shows the number of times the work has been referenced in WoS and Scopus.

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An indicator that allows relating the impact of the articles is the citations average, which is calculated by dividing the local citations by the number of years that have elapsed since their publication. Waddock *et al.* (2002) and Delios and Beamish (2001) had more than 48 citations per year, which makes them the most influential today.

Table 6. Top 10 papers

Authors, year	Local Citation	Average citation	Global Citation	
			WoS	Scopus
Delios & Beamish (2001)	962	48.10	438	485
Strike *et al.* (2006)	366	24.40	321	346
Waddock *et al.* (2002)	927	48.79	287	339
Zahra *et al.* (2005)	732	45.75	271	329
Rodriguez *et al.* (2006)	285	19.00	250	275
Luo *et al.* (2006)	633	42.20	248	279
Frias-Aceituno *et al.* (2013)	256	32.00	224	237
Uhlenbruck *et al.* (2006)	258	17.20	221	245
Campbell *et al.* (2012)	224	24.89	205	222
Hope *et al.* (2008)	306	23:05	205	234

Source. Own work.

3.9. Evolution of the study of the financial performance of MNEs

The Tree of Science methodology, based on the graph theory, allows the grouping of the articles into three types (Robledo *et al.*, 2014). First, the articles in the roots are considered seminal in the researched topic. Second, the articles in the trunk are considered the structural publications that have carried out intermediation, *i.e.*, the paths taken by the researched topic. Third, the articles located in the leaves guide future research. The leading publications on the researched topic (Performance of MNEs) are mentioned.

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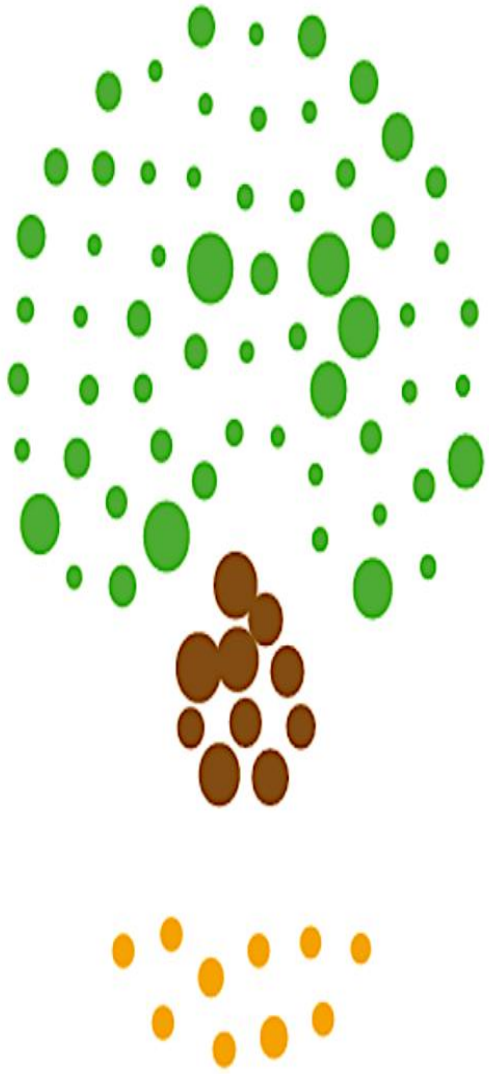
Figure 6. Tree of Science - Multinational financial performance



Leaves:

Nguyen (2017); Nguyen & Almodóvar (2018); Zhang *et al.* (2018); Cui *et al.* (2019); Kim *et al.* (2020); Purkayastha *et al.* (2017); Aguilera-Caracuel *et al.* (2017); Voinea *et al.* (2018); Kawai *et al.* (2019); Ceipek *et al.* (2019).

Trunk:

Campbell *et al.* (2012); Rodriguez *et al.* (2006); Delios & Beamish (2001); Gardberg & Fombrun (2006); Lavie & Miller (2008); Nachum (2003); Mellahi *et al.* (2016b); Uhlenbruck *et al.* (2006); Reimann *et al.* (2012); Chacar *et al.* (2010).

Roots:

Barney (1991); Hitt *et al.* (1997); Orlitzky *et al.* (2003b); Zaheer (1995); Waddock & Graves (1997); Johanson & Vahlne (1977); Lu & Beamish (2004); Kogut & Singh (1988); Kostova & Zaheer (1999); McWilliams & Siegel (2001).

Source. Own work.

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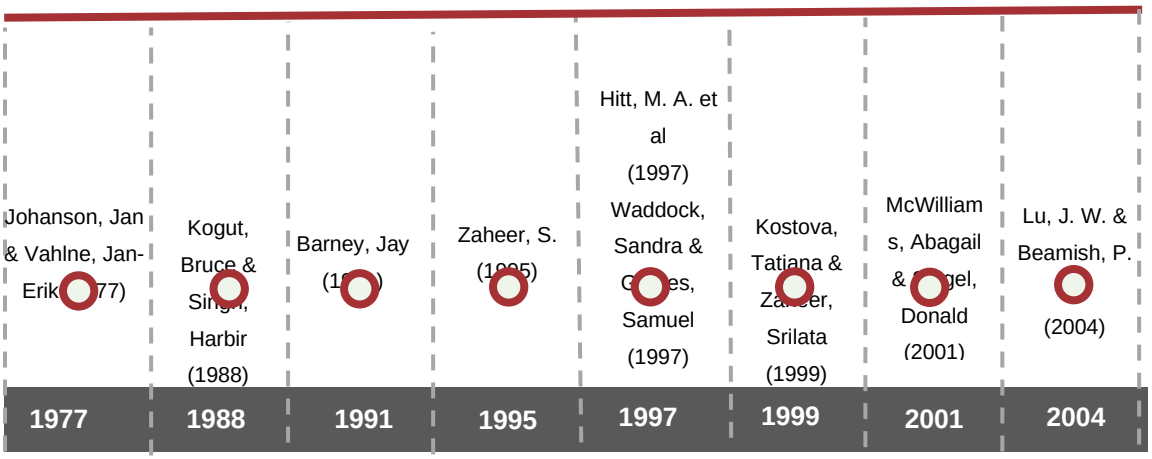
The analysis will be carried out according to the structure of the tree; initially, the authors located in the roots, then those located in the trunk, and, finally, those located in the leaves with their respective perspectives.

3.9.1. Seminal documents or intellectual base (roots)

The seminal documents have high citation rates but do not cite others. In the following figure, we will summarize the top 10 authors on the performance of MNEs.

Figure 7. *Seminar Authors Timeline*



Source. Report prepared from the results of the databases.

Initially, the impact generated by the financial performance of multinational enterprises has been studied according to the internationalization strategy (Johanson & Vahlne, 1977). Subsequently, the authors identified the effects of competitive advantages typical of the country where the MNE has done the internationalization process by analyzing such effects on the firm's financial performance (Barney, 1991; Kogut & Singh, 1988). From the 90s, the interest of the authors began to focus on the financial performance of the MNEs and their internationalization strategies (Hitt *et al.*, 1997; Kostova & Zaheer, 1999; Lu & Beamish, 2004; Zaheer, 1995).

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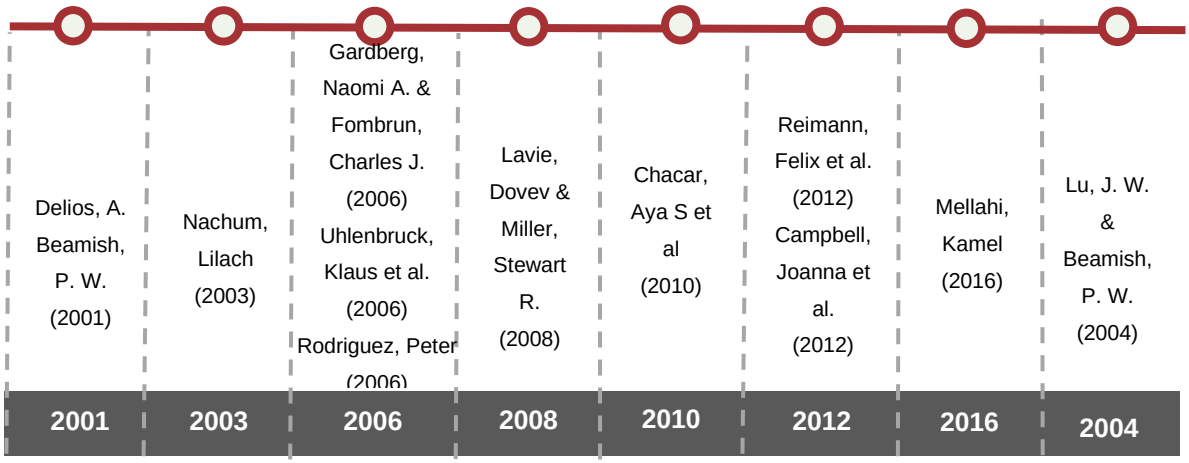
The last authors mentioned in this seminal section on the issue of the financial performance of MNEs conducted research using quantitative methods through econometric models by explaining the effect of MNE Social Responsibility strategies on financial performance (McWilliams & Siegel, 2001; Orlitzky *et al.*, 2003; Waddock & Graves, 1997).

3.9.2. Structural documents (trunk)

The authors identified in the trunk cite other authors and, at the same time, are cited by other authors. They carry out significant intermediation of knowledge, connected to the seminal part (root) with the most recent publications (leaves). The ten authors with the highest bibliometric betweenness indices shown in the graph were taken for the analysis.

Figure 8. Authors with a high degree of co-citation (Trunk)



Source. Report prepared from the results of the databases.

In this section, the study of the performance of MNEs is divided into three large subtopics: some authors researched the performance from the financial perspective by evaluating the performance of the investments of the companies that carry out OFDI, their assets, costs, income, and profitability (Chacar *et al.*, 2010; Lavie & Miller, 2008; Nachum, 2003). Other authors focused their MNEs research on the performance framed in the corporate social responsibility strategy (Campbell *et al.*, 2012; Delios & Beamish, 2001; Mellahi *et al.*, 2016).

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Finally, a group of authors gathered the works of research into MNEs performance issues, according to the sector's legal requirements, the country's corruption, and industry matters (Reimann *et al.*, 2012; Rodriguez *et al.*, 2006; Uhlenbruck *et al.*, 2006).

3.9.3. New Research Trends (Sheets)

In this section, we analyze the publications that cite seminal authors (roots) and structural authors (trunk) and have a low index of references. These publications show new research topics or perspectives.

The bibliometric analysis allowed us to identify four perspectives that group 66.97% of the research topics. The first perspective proposes to focus research on the relationship between financial performance and Corporate Social Responsibility (CSR) practices in MNEs.

Table 7. Future Research agenda

PERSPECTIVE	FUTURE RESEARCH AGENDA	AUTHORS
RELATION BETWEEN FINANCIAL PERFORMANCE AND CORPORATE SOCIAL RESPONSIBILITY (CSR) PRACTICES IN MNES	Influence of other types of socially responsible activities in a host country. Relation between a firm's home-country CSR and its behaviors outside the home country.	(Cordeiro *et al.*, 2018; Jung & Lee, 2018; Kühn *et al.*, 2018; Luxmore *et al.*, 2018; Rygh, 2019)
FINANCIAL PERFORMANCE OF MNES AND THEIR SUBSIDIARIES ABROAD	Identify the specific value of international expansion in one particular country as a parallel study. Explore the interrelations between overall MNE strategies and the use and	(Kawai & Chung, 2019; Luo & Zheng, 2018; Nguyen & Almodóvar, 2018; Pangboonyanon & Kalasin, 2018; J. Zhang *et al.*, 2019; Y. Zhang *et al.*, 2018)

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	effects of legitimacy strategies in different countries. Strategic MNE decisions about country and subsidiary resources.	
FINANCIAL PERFORMANCE OF R&D PROCESSES IN MNES	Impact of R&D processes and financial performance of MNEs in specific countries. Financial performance of MNEs, according to the investments made in R&D Differential effect on radical and incremental product innovations on MNE	(Beugelsdijk & Jindra, 2018; Ceipek *et al.*, 2019; Cuervo-Cazurra *et al.*, 2018; J. (John) Zhu *et al.*, 2019)

Source. Own work.

4. Conclusions

This article presents a structured examination of the literature on the financial performance of multinational enterprises published in the last 20 years, a period in which the most influential documents in the field have been written and recorded in the two largest and most important databases in the management area. Although different reviews have been published on the financial performance of MNEs, the bibliometric and network analyzes allow the most influential publications and authors to be objectively identified in this area of knowledge.

Likewise, the financial performance of MNEs is an issue that has attracted the attention of the academic and scientific community. This is reflected in the number of publications related to the subject, which has grown steadily in the last five years.

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Regarding the largest number of publications, the International Business Review of the United Kingdom is in the first position. However, the Journal of International Business Studies is currently the most influential journal thanks to its h index and the average number of citations received for each document recorded there.

The University of Granada is the institution that has studied this issue the most; it has the largest number of publications related to the financial performance of MNEs. By region, European universities have been most interested in the subject; 6 out of 10 institutions that contribute the most to production in this field are from that region.

The analysis of co-citations shows that Andrew Delios is the most cited author in the area; he is also among the five authors with the largest number of publications on the subject. His publication "Survival and profitability: The roles of experience and intangible assets in foreign subsidiary performance" has the highest average citations per year. These elements demonstrate the main role of this author within this field of study.

Finally, the sub-areas of research on the financial performance of MNEs that emerge from the literature were identified. The study reveals the conformation of four main streams: the relationship between financial performance and the MNEs that carry out CSR practices, Geographic expansion of MNEs, transfer and use of competitive advantages of MNEs, and geographic location of MNEs. The explanation of these topics is related to each of the analyzed clusters.

4.1. Implications

This research identifies the most influential authors, papers, journals, institutions, and countries that have contributed to shaping the financial performance of MNEs as a field of study. Likewise, this study presents the knowledge structure of this area through the representation of its social network or map of cocitations. Likewise, the main contribution of this document is delineating of the trends and emerging research topics on the financial performance of MNEs.

4.2. Limitations

Despite the study's rigor, relevance, and breadth of the study, there are some limitations. Although the documents were selected from an objective procedure based on quantitative techniques, the content analysis of each cluster or research stream was carried out by the authors of this research, which implies a natural bias in the results. The scientific community has validated this study's the bibliometric techniques and tools. However, for the results to be conclusive, it is necessary to contrast the results reported in this document with other instruments.

Since this is an emerging area with accelerated growth, it is necessary to carry out bibliometric studies frequently; a frequency of 5 years is suggested to keep trends identified and contribute to their permanent progress.

The time variable was not involved in this study. However, a longitudinal analysis would be useful since it would allow us to know how the documents, authors, institutions, and countries have contributed over the years.

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