

PERFORMANCE MANAGEMENT: A BIBLIOMETRIC ANALYSIS FROM 1976 TO 2022

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ABSTRACT

Performance management is a topic of great interest both for academics and practitioners. Much has been written on this complex subject over time, which has led to the development of a considerable academic literature on the topic.

The paper is part of a more comprehensive study that aims to explore the topic performance management from a bibliometric perspective. The objectives of the present paper are to present and analyze: (1) the scientific production over time; (2) the most prolific and influential contributors – authors, organizations, and countries; (3) the most utilized keywords. To create the research sample, a search was initiated in July 2022 by querying the Web of Science (WoS) Core Collection database, on the topic: "performance management". All WoS categories were included without applying any restrictions other than the English language filter. Following this procedure, 6,730 documents were retrieved, of which 6,580 in English which were then retained in the final research sample. Processing, analysis, and visualization of data related to the timespan of 1976-2022, was performed using VOSviewer, Excel and Bibliometrix/ Biblioshiny software.

The main results presented and analyzed: citation report; top 15 WoS categories and publishers; source dynamics (journals, books, etc.); co-authorship with three units of analysis (authors, organizations, and countries), and the most relevant keywords (authors keywords and keywords plus). The conceptual structure: co-occurrence network analysis on keywords, thematic map, theoretical evolution, trends, future direction, etc. - are also included in the research, but will be presented in a separate paper.

KEYWORDS: *bibliometric analysis, co-authorship analysis, keyword, performance management, scientific production.*

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1. INTRODUCTION

Performance management is a topic of great interest both for academics and practitioners. Countries, regions, communities, organizations, projects, teams, and people all aim to achieve performance. Regardless of discussing either the public sector – governments, public administration, healthcare, education – or the private one, performance constitutes a fundamental element which facilitates the creation of competitive advantages over time. However, the topic is complex and to a certain extent sensitive, especially as performance can take multiple guises – depending on an extensive host of different criteria.

Scholars' interest for this topic has grown dramatically (Cuccurullo et al., 2016, p. 596). Much has been written on this topic over time, leading to the development of a considerable academic

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literature, with numerous performance measurement and management frameworks identified and developed, which reference the multiple facets of performance depending on the interests and points of view of the enterprise (Yadav et al., 2018).

Performance management addresses a diversity of management areas and fields ranging from logistics to marketing to human resource management and many others (Busi & Bititici, 2006), being considered a central exercise in any organization, be it private or public (Bourne et al., 2018). In the public sector – governments, public administration, healthcare, education, etc. – the primary aim of the entities is to improve services levels and the quality of life. This endeavor is not straightforward for policy makers given the existing barriers. Learning and development, recalibration and a dynamic approach towards performance management are required (Bianchi, et al., 2017). New public management aims to improve performance – in terms of effectiveness and efficiency – as well as accountability. As a consequence, there is a need to deploy the holistic approach of a balanced performance management system, that "fits" an organization's objectives and strategy, and allows it to align both the internal and external environments. (Bracci et al., 2017, p. 21).

When referring to the private sector, regardless of the industry in which a company operates – manufacturing, technology, telecommunications, tourism and hospitality, commerce, consulting, training etc. – performance constitutes a fundamental element which facilitates the creation of competitive advantages over time. In the industrial sector, especially in industrial automation, there is a need for control benchmarking techniques, control performance assessment and monitoring, and improvement strategies. Not just product quality, but also resource consumption and financial performance are directly and indirectly linked with control performance management – CPM (Jelali, 2013). Vernadat et. al (2013, p.7425) have proposed a value-based and risk-based framework for performance measurement and management (VR-PMS).

Hospital performance management is another important domain/ area that is taken into serious consideration by researchers. Cloud computing – as an emerging technology – can provide the infrastructure for acquiring interoperable healthcare solutions and, in the same time it can significant support for the monitoring and performance management functions of a healthcare system. (Eze, et al., 2016, 2017, 2019).

In their bibliometric literature review on public performance management and measurement, Garengo & Sardi (2021, p.1635), recognize the growing research output published in the aforementioned field, identifying the most prolific authors: Moynihan, Poister, Modell, Laihonon, Jääskeläinen, Arnaboldi and Kroll, as well as the most relevant keywords: (1) performance management; (2) performance measurement; (3) public sector; (4) balanced scorecard; (5) performance; (6) benchmarking; (7) accountability; (8) performance measures; (9) new public management.

The scope of the study is to identify, present and analyze key aspects regarding the topic of performance management based on a bibliometric approach. The main objectives of the paper are:

1. To present the scientific production over time – the evolution of the number of documents published over time, categories of research, the most important scientific journals and publishers, and the sources' dynamics on the topic of performance management.
2. To identify the most prolific and influential contributors – authors, organizations, and countries – as well as the collaboration between them in their research activity on performance management.
3. To identify the most used keywords and create a density visualization map.

It is important to mention, that the present paper is part of a more comprehensive study that aims to approach other aspects besides those previously highlighted. These additional aspects will be presented in a following paper that will complement the present one and include the conceptual structure: co-occurrence network analysis on keywords, thematic map, theoretic evolution, trends, future direction etc. In this regard, for the whole study, contribution was examined using Web of Science (WoS) and the results were then processed by utilizing the calculating algorithms and

graphic representations of VOSviewer, Excel and Bibliometrix/ Biblioshiny software (Aria & Cuccurullo, 2017).

Data collection and extraction was conducted on the database provided by Web of Science (WoS) Core Collection. Introduced by Eugene Garfield in 1964, Web of Science (WoS) has at its basis the Science Citation Index (SCI). At that particular time Garfield proposed the idea of citation indexing, which stands at the foundation of what will eventually become both SCI and WoS. In this regard the importance of introducing an unified index for all scientific documents which utilizes the efforts of all researchers, which Garfield names an "army of indexers", has been demonstrated (Garfield, 1955, p.110). Web of Science (WoS) currently represents not just the oldest and most authoritative scientific database, but also the most frequently utilized by researchers across the globe. In addition to facilitating the search and discovery of academic works, WoS allows users to perform data query actions with the purpose of utilizing results in academic and research endeavors. At this moment in time Clarivate Analytics' WoS (Clarivate, 2017) is one of the world's leading platforms for discovery, searching scientific citations, and analytical information. Covering a wide range of knowledge domains, WoS has a growing importance as a tool for scientists across the world (Li et al., 2018, p. 16).

The processing of the data extracted from WoS was completed by utilizing VOSviewer, Excel and Bibliometrix/ Biblioshiny software. The analysis based on VOSviewer was aimed at creating, visualizing and exploring maps based on bibliographic data (Van Eck & Waltman, 2010, 2022). Two types of analyses were pursued: co-authorship analysis (authors, organizations, and countries) and the words co-occurrence map – which took into account all keywords (author keywords and keywords plus).

2. METHODOLOGY

For the purpose of creating the research sample, a comprehensive bibliometric analysis was carried out in July 2022 in the Web of Science (WoS) Core Collection database, focusing on the topic: "performance management". Searching based to the topic refers to querying the database according to the title, abstract and keywords. To gain a thorough understanding of the field of study, "performance management", the search included both author keywords and keywords plus. Keywords plus help the academic to fully understand the research efforts related to a certain field (Zhang, J. et al., 2016).

By performing the above highlighted search, a number of 6,730 documents in various languages emerged: English (6,580), Chinese (27); Portuguese (21); French (17); German (17); Spanish (16); Russian (14); Turkish (13); Czech (6) Croatian (3); Norwegian (2); Polish (2); unspecified (2) and Arabic, Finnish, Hungarian, Malay and Slovenian (1 of each). An exclusion criterion was established based on the language, English in our current research topic, thus yielding a final number of 6,580 documents.

To provide a broad view of the information contained in WoS no other exclusion criteria, except document language have been computed. As such, for the researched topic, all document types have been selected in order to have the most diversified information from researchers, academics and practitioners. It was considered a meaningful starting point for the research, to include aside from articles, proceedings papers, book chapters, books and editorial materials. Furthermore, in order to better depict emerging topics, early access publications have also been included in our sample.

In terms of Web of Science Categories, all 200 categories have been kept in order to identify the full extent and complexity of the concept of performance management, as well as the trends in research, regardless of specific domains – management, business, finance, computers, psychology, health, education etc. In future research endeavors domain specific elements will be identified, specifically the ones with high frequency of occurrence.

No filters have been established neither for affiliation, publications titles nor publisher. Thus all 6,580 documents in English have been exported in Excel (.csv format) and Plain Text File (.txt format) with the purpose of further processing and analyzing. Documents in Plain Text Files were downloaded sequentially in batches of 500. These outputs (.txt format) were then consolidated (merged) into one single file which provided the input for processing via VOSviewer and Bibliometrix/Biblioshiny. The present paper the focus is on presenting results from Web of Science (WoS) and VOSviewer analysis, the remaining findings, resulting from Biblioshiny, will be presented in a separate but closely related paper.

In regards to the authors, organizations and countries, although all information has been fully exported in Excel, within the VOSviewer analysis only authors, organizations and countries with more than 5 documents have been taken into consideration.

3. RESULTS

Results obtained based on querying Web of Science (WoS) Core Collection on the topic: “performance management” and then processed by using VOSviewer, encompass 1976-2022 as a timespan and are detailed in the following paragraphs.

3.1 Citation Report

Figure 1 presents the cumulated evolution of both documents published, as well as associated citations in the period between 1976 and 2022.

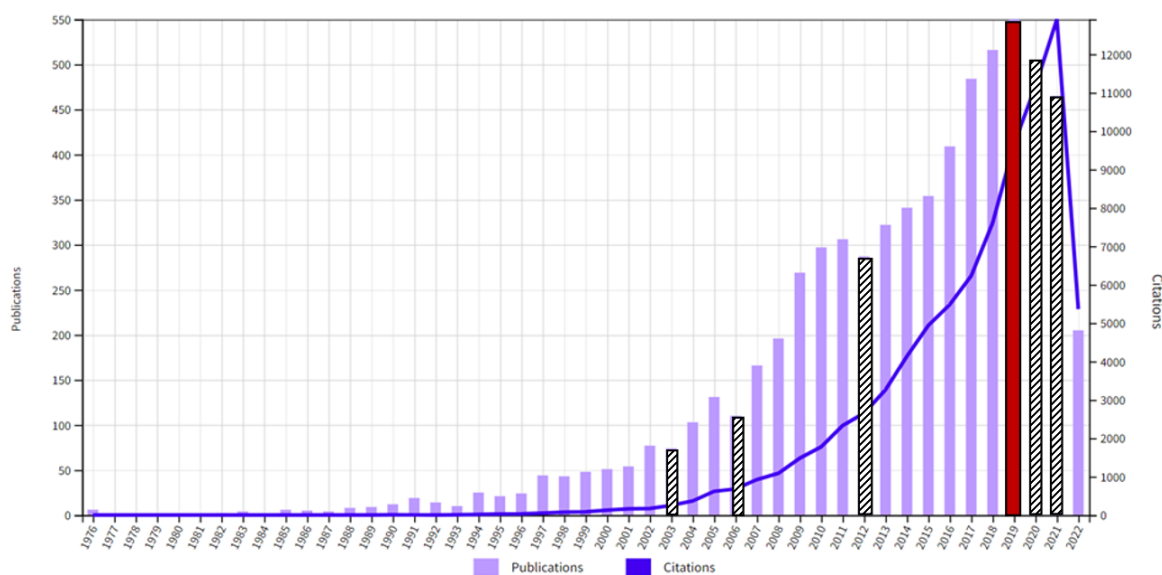


Figure 1. The evolution of the number of documents published and of citations

Source: Adapted by authors from WoS

As can be seen, the number of documents published was at low levels between 1976 and 1997. Since then, numbers have increased in an approximately constant manner with some exceptions of: (a) 2003 – when a slight drop was registered – of 5 documents – from the previous year (from 79 to 74); (b) 2006 – when a 19 document drop was recorded compared to 2005 (from 131 to 112); (c) 2012 – when output went below 2011 by 10 documents (from 307 to 297); (d) 2020 and 2021 in which the output was significantly reduced – by 53 in 2020 compared to 2019 (from 568 to 515), and 36 respectively in 2021 compared to 2020 (from 515 to 479). It would be relevant to highlight the most likely causes that have determined this significant drop in the quantity of academic work being published. The COVID-19 pandemic and the surrounding crisis that it created represents the

core reason that led to the curtail which can be observed in 2020 and 2021. That being said, it can be considered as an understandable reaction, given the fact that people, organizations and governments were faced with an unprecedented (in recent history) event. Thus, efforts and attentions were focused on areas which were more connected – directly and indirectly – with solving pressing issues raised by COVID-19.

3.2 Web of Science Categories. Publishers and Publications Titles

As observed in Figure 2 – which highlights the 15 main domains of interest from Web of Science (WoS) – the majority of papers (3,619) come from the composite domain Management-Business-Economics-Finance (red in the graphic) with adjacent areas: Management (1,939); Business (731); Operations Research Management Science (352); Economics (334); Business Finance (290). Another important composite domain is Engineering-Computers-Telecommunications (blue) with 2,368 documents as follows: Computer Science Information Systems (568); Engineering Electrical Electronic (456); Computer Science Theory Methods (442); Telecommunication (333); Engineering Industrial (322); Computer Science Interdisciplinary Applications (247). Public Administration (778, green) is not a composite domain because no other adjacent areas have been found in the top 15. It would be important to note that in the top 15 domains composite domains such as Social-Psychology-Education (yellow) with 847 documents: Applied Pshychology (325); Educational Research (287) and Social Sciences (225) can be found.

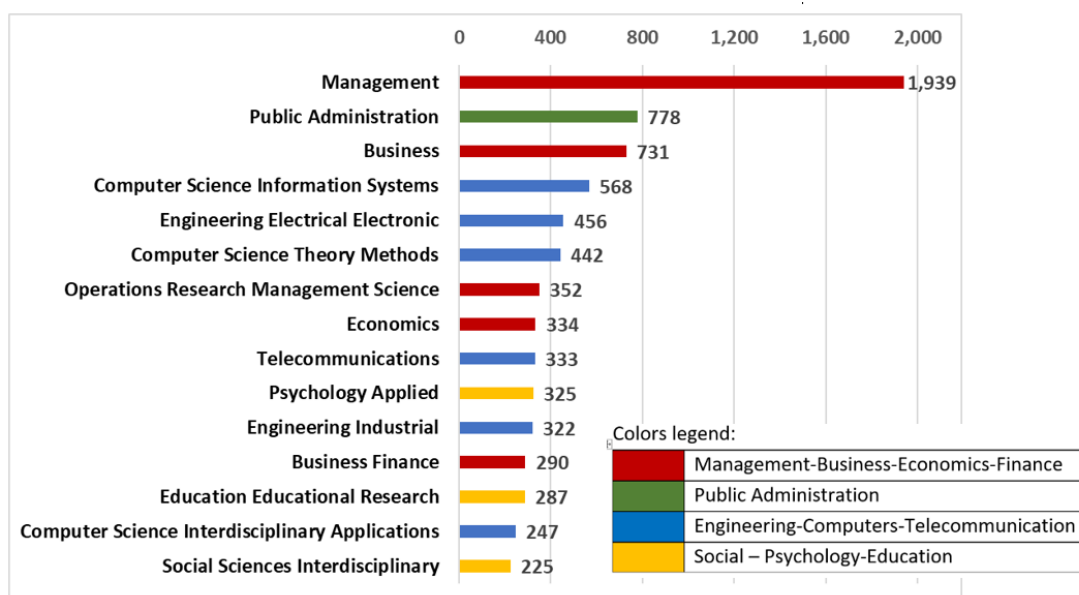


Figure 2. Web of Science Categories (top 15)
 Source: Authors' processing with the data from WoS

For the purpose of the research the focus was not limited within the realm of economics as the aim was to identify a relevant structure and global trends – without being domain specific. This approach was chosen particularly because of its intrinsic interdisciplinary theme and its connectivity with other domains.

As an overview of the 200 publishers present in WoS, Figure 3 highlights the first 15 (in terms of number of documents published). Emerald Group Publishing (737), Taylor & Francis (683) and IEEE (680) are placed in the top three, followed by Elsevier (576), Springer Nature (569), Wiley (492), Sage (305), Mdpi (100), Oxford Univ Press (88), Atlantis Press (80), Routledge (77), Academic Conferences Ltd (69), Cambridge University Press (69), Emerald Group Publishing (60), and Electronic Science & Technology China Press (56).

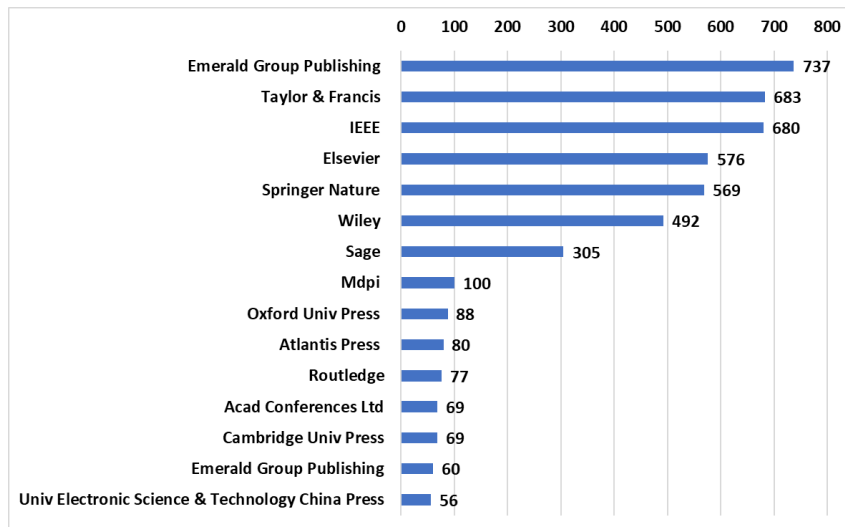


Figure 3. Publishers (top 15)
 Source: Authors' computation of WoS data

Figure 4 provides an overview of the 10 main sources (journals, books etc.) – the most relevant in terms of number of documents published historically on the topic of performance management.

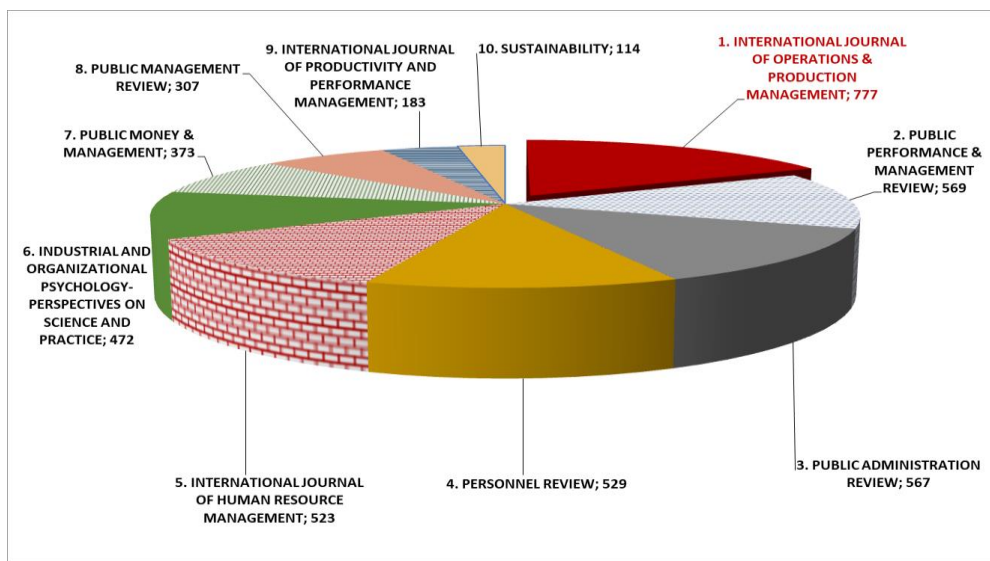


Figure 4. Most relevant sources – in number of documents
 Source: Authors' computation of WoS data

As can be drawn from the figure, the top three are: International Journal of Productivity and Performance Management (777), followed by Public Performance & Management Review (569) and Public Administration Review (567). They are followed by the International Journal of Human Resource Management (523), Industrial and Organizational Psychology-Perspectives on Science and Practice (472), Public Money & Management (373), and Public Management Review (307). Rounding up the final two spots in the top 10 are the International Journal of Productivity and Performance Management (183) and Sustainability (114). Articles on performance management topic in the final two sources have begun to appear later than the others (namely in 2017), but they seem to present a significant rise in quantity recently – as will be presented in the upcoming analysis.

Proceeding forward, the focus is on representing the evolution of the first 10 sources, beginning with the year 1989 – when the first two articles were published in Public Administration Review.

Year	1	2	3	4	5	6	7	8	9	10
1989	0	0	0	2	0	0	0	0	0	0
1990	0	0	0	2	0	0	0	0	0	0
1991	0	0	0	2	0	0	0	0	0	0
1992	0	0	0	2	0	0	0	1	0	0
1993	0	0	0	2	0	0	0	1	0	0
1994	0	0	0	2	0	0	0	2	0	0
1995	0	0	1	2	0	0	0	2	0	0
1996	0	0	2	3	0	0	0	3	0	0
1997	0	0	3	3	0	0	0	3	0	0
1998	0	0	3	3	0	0	0	3	0	0
1999	0	0	4	3	0	0	0	3	0	0
2000	0	0	4	3	0	0	0	3	1	0
2001	0	0	6	4	2	0	0	3	2	0
2002	0	0	6	5	4	0	0	5	2	0
2003	0	0	10	5	5	0	0	7	2	0
2004	0	0	12	5	6	0	0	7	2	0
2005	0	0	17	6	6	0	2	9	4	0
2006	0	0	19	6	7	0	3	11	7	0
2007	0	0	24	10	11	0	4	17	8	0
2008	0	0	28	13	14	0	5	19	9	0
2009	2	0	31	16	14	0	5	21	11	0
2010	6	0	35	20	17	0	8	23	11	0
2011	16	0	37	20	22	24	8	26	14	0
2012	21	0	39	21	24	24	9	27	15	0
2013	21	0	43	25	27	24	13	27	20	0
2014	25	0	43	26	28	24	13	29	20	0
2015	39	0	43	29	32	34	15	29	21	0
2016	45	0	46	37	36	47	19	31	24	0
2017	49	8	48	38	38	48	21	34	26	2
2018	56	16	52	42	39	49	25	34	30	6
2019	59	29	54	46	44	49	35	35	34	15
2020	67	36	55	52	46	49	38	35	34	21
2021	79	42	56	56	49	50	41	39	38	33
2022	84	52	56	56	52	50	43	40	38	37
TOTAL	569	183	777	567	523	472	307	529	373	114

Legend

- 1 PUBLIC PERFORMANCE & MANAGEMENT REVIEW
- 2 INTERNATIONAL JOURNAL OF PRODUCTIVITY AND PERFORMANCE MANAGEMENT
- 3 INTERNATIONAL JOURNAL OF OPERATIONS & PRODUCTION MANAGEMENT
- 4 PUBLIC ADMINISTRATION REVIEW
- 5 INTERNATIONAL JOURNAL OF HUMAN RESOURCE MANAGEMENT
- 6 INDUSTRIAL AND ORGANIZATIONAL PSYCHOLOGY-PERSPECTIVES ON SCIENCE AND PRACTICE
- 7 PUBLIC MANAGEMENT REVIEW
- 8 PERSONNEL REVIEW
- 9 PUBLIC MONEY & MANAGEMENT
- 10 SUSTAINABILITY

Figure 5. Source dynamics (tabular representation)

Source: Authors' computation in Excel based on Bibliometrix/Biblioshiny outputs

In Figure 5 sources are numbered from 1 to 10 in the header, while in the accompanying legend, situated in the bottom right, source names are listed. Furthermore, the yellow formatted cells highlight the years in which the first articles were published in each individual source.

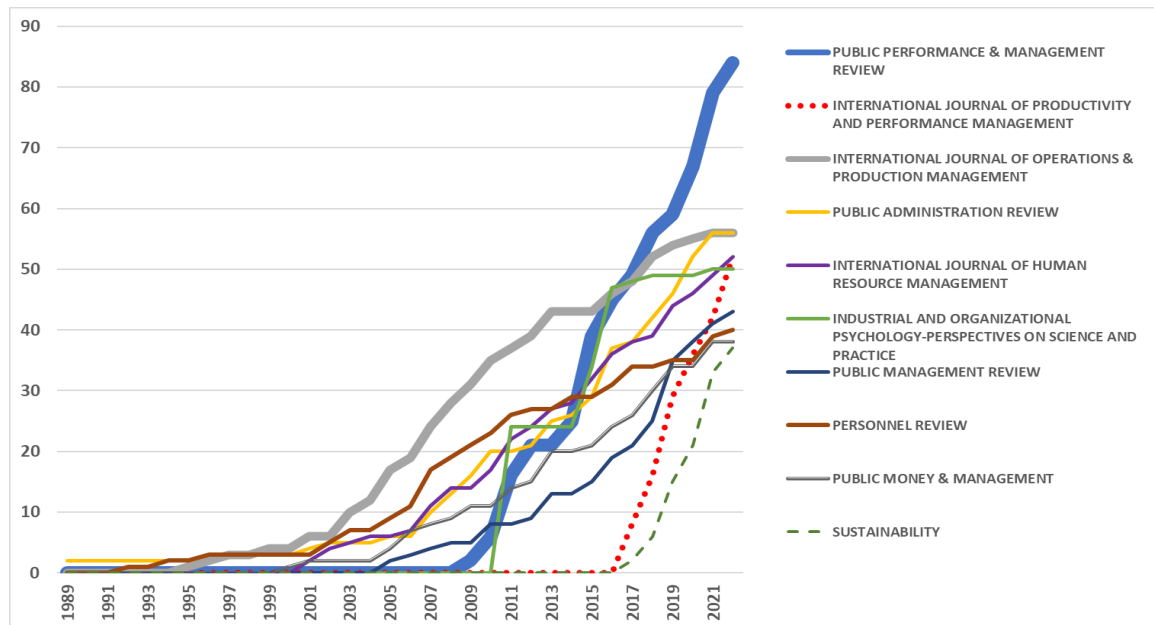


Figure 6. Source Dynamics

Source: Authors' computation in Excel based on Bibliometrix/Biblioshiny outputs

As can be seen in Figure 6, a significant increase in volume is registered by Public Performance & Management Review, publishing its first two articles in 2009. Older journals such as: Public Administration Review (1989 – first 2 articles) and International Journal of Productivity and

Performance Management (1995 – first article) present significantly lower growth rates (historically their growth rates have been different, but nowadays they seem to be similar). Personnel Review (1992 – first article) registered the lowest growth rate. As a result of slow growth rates, it is possible that, in the near future these journals would be overtaken and overshadowed by other newer ones. It is also important to highlight two other sources – International Journal of Productivity and Performance Management and Sustainability – which present an impressive growth rate, even though their first published articles appear much later (2017).

3.3 Co-authorship analysis

The analysis was completed in WoS and it contains three units of analysis: (a) authors; (b) organizations; and (c) countries.

(a) Authors

Since the early stages of performance management related research, there has been an important number of academics and practitioners who have made significant contributions to the current field of study. As part of the WoS query performed, a number of 13,751 authors emerged. For the purpose of the current research, only authors that have published at least five documents have been included, without taking into consideration a minimum number of citations (therefore 0 was established as a minimum for the number of citations of an author).

The left side of Figure 7 presents in descending order the 25 most prolific authors, that have published 10 or more documents as per WoS, while the remaining 179 authors not included in the figure have released between 5 to 9 (inclusively) documents. This led to a classification of authors based on the volume of documents published, where Bianchi C. (23) is in first place, followed by other preeminent authors: Aguinis H. (18), Moynihan D.P. (18), Bititci U.S. (17), Decramer A. (15), Kroll A. (15), Peyton L. (15) etc. These 25 most prolific authors have published a total of 335 documents, resulting in an average of 13.4 documents per author. Based on this average it can be concluded that 12 out of the 25 presented authors have published more documents than the average.

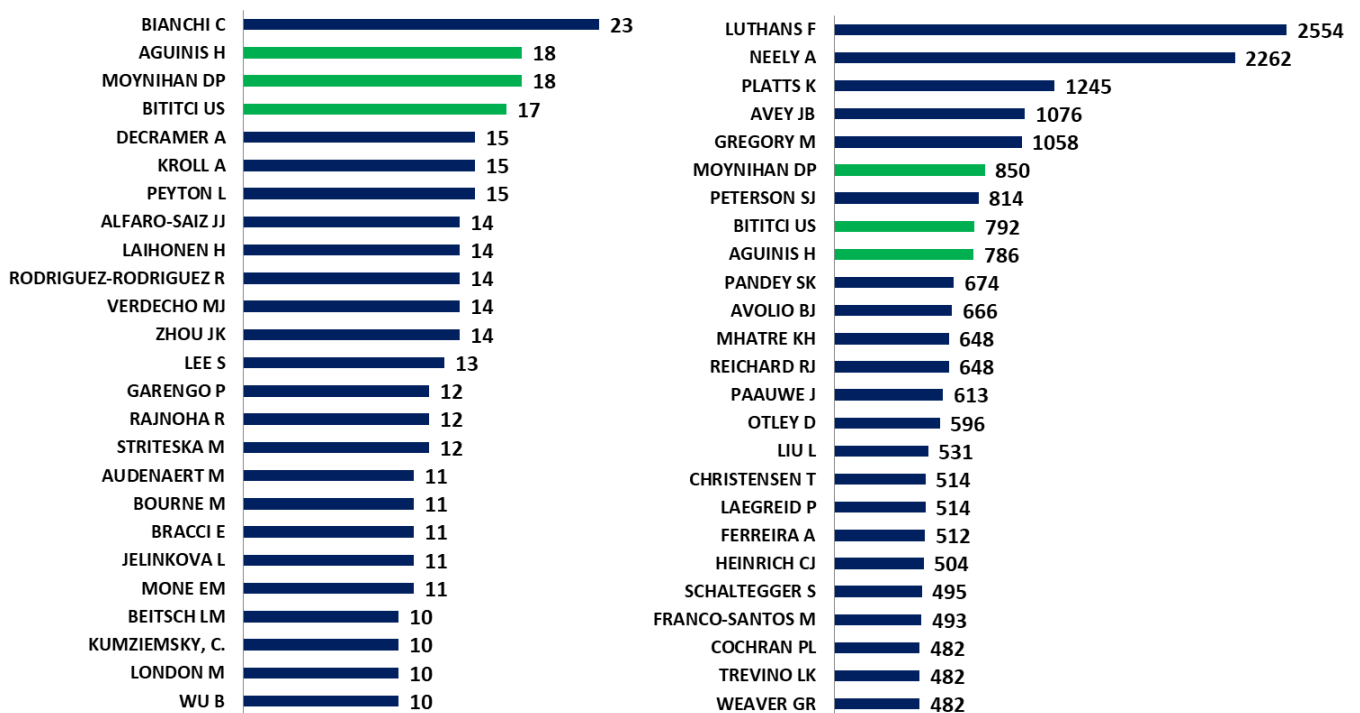


Figure 7. Top 25 most prolific authors and Top 25 most cited authors

Source: Authors' computation in Excel of data from WoS

On the right-hand side of Figure 7 the top 25 most cited authors are presented in descending order. In terms of citations Luthans F. (2,554) is leading the chart, proceeded by Neely A. (2,262), Platts K. (1245), Avey J.B. (1076), Gregory M. (1,058), Moynihan D.P. (850), Peterson S.J. (814) etc. The top 25 most cited authors have a total number of 20,291 citations, with an average citation number of 811.64. Based on this average it can be concluded that 6 out of the 25 most cited authors have more citations than the average.

Finally, highlighted in green there are the authors which are present in the top 25 from both an output number point of view, as well as citations. There are three main contributors here: (1) Aguinis H., his research being primarily focused on performance management at the individual level; (2) Moynihan D.P. who mainly concentrated on performance management in the public sector (primarily within the US administration); (3) Bititci U.S. who explored a wider array of industry-based applications of performance management (manufacturing, banking, SMEs, etc.).

(b) Organizations

In the present analysis only organizations for which the number of published works in WoS was at least 5 (minimum five documents per organization) were taken into consideration, regardless of the number of citations (inclusive of 0 citations). This resulted in a number of 491 items (organizations) that have been included in the map. Through VOSviewer automated clustering algorithms were calculate also the number of links and total strength of co-authorship with other organizations.

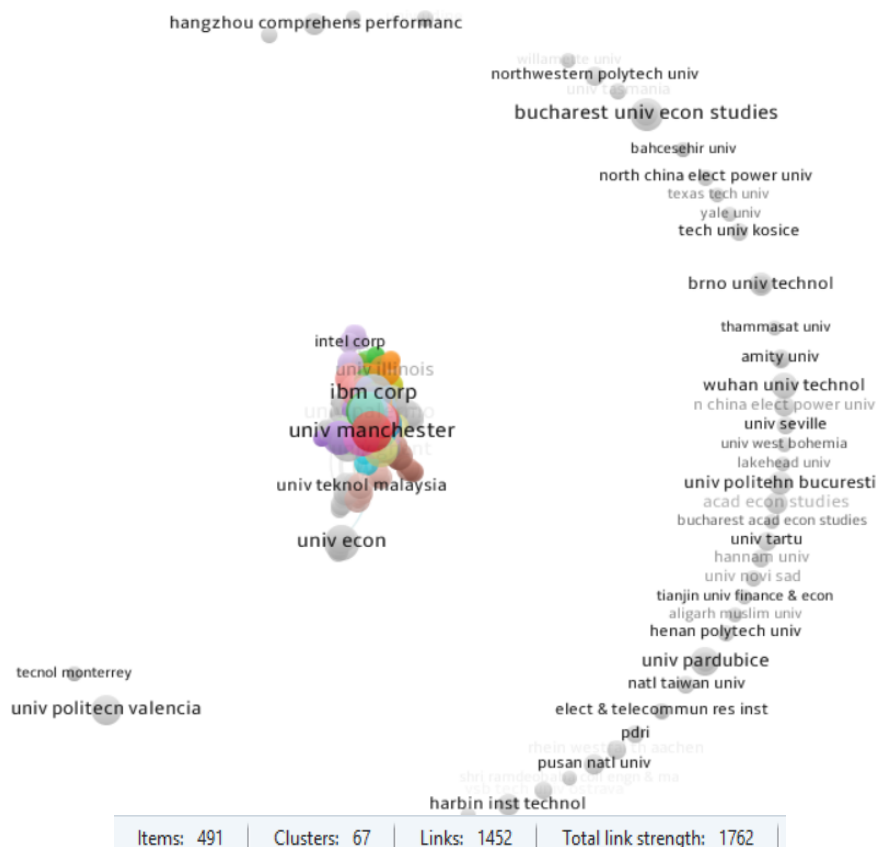


Figure 8. Organization unit of analysis – Network Visualization

Source: Authors computation with VOSviewer

In Figure 8 the 491 items identified are distributed across a large number of clusters (67) which are characterized by a reduced number of links (1,452). Total link strength is also low – 1,762. As can be seen in Figure 9, there is a central nucleus of organizations (440 items) which are interlinked, while the rest occupy peripheral positions on the map (on a large radius arc). This distribution might have at least two causes: (1) for the creation of the research sample all possible domains were

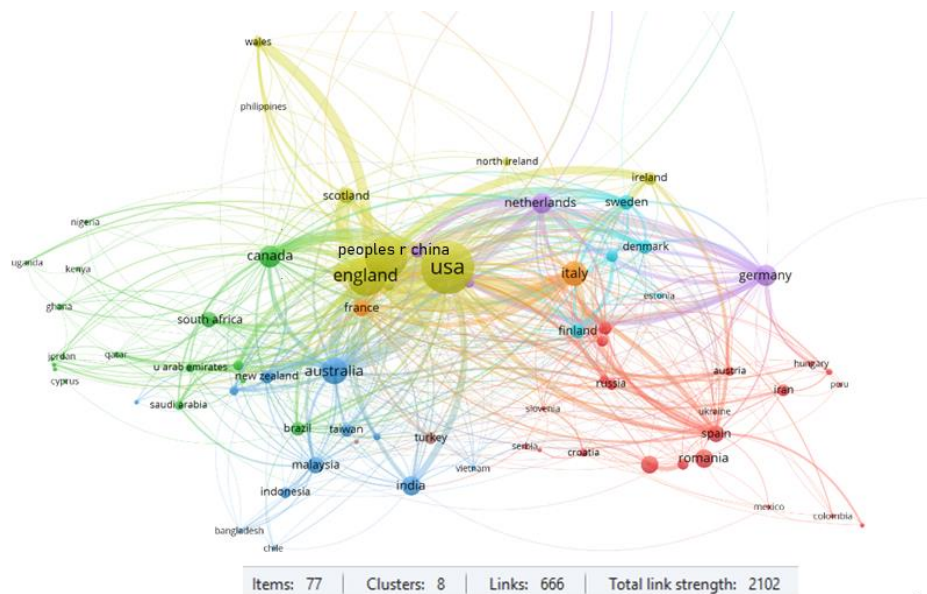


Figure 10. Country as a unit of analysis – Network Visualization
 Source: Authors’ computation with VOSviewer

The central nucleus of the map is formed by three countries, which are most prolific in terms of quantity of documents – USA, England, and China (people r china), followed by Australia, Italy, Canada, Germany, Netherlands, India, Romania, the Czech Republic, South Korea, Spain, Malaysia, and France. For a more detailed analysis, in addition to the number of documents criteria, other two were also taken into consideration: the number of citations and the total link strengths. Thus, in Figure 11 the top 15 countries based on the three criteria are represented graphically.

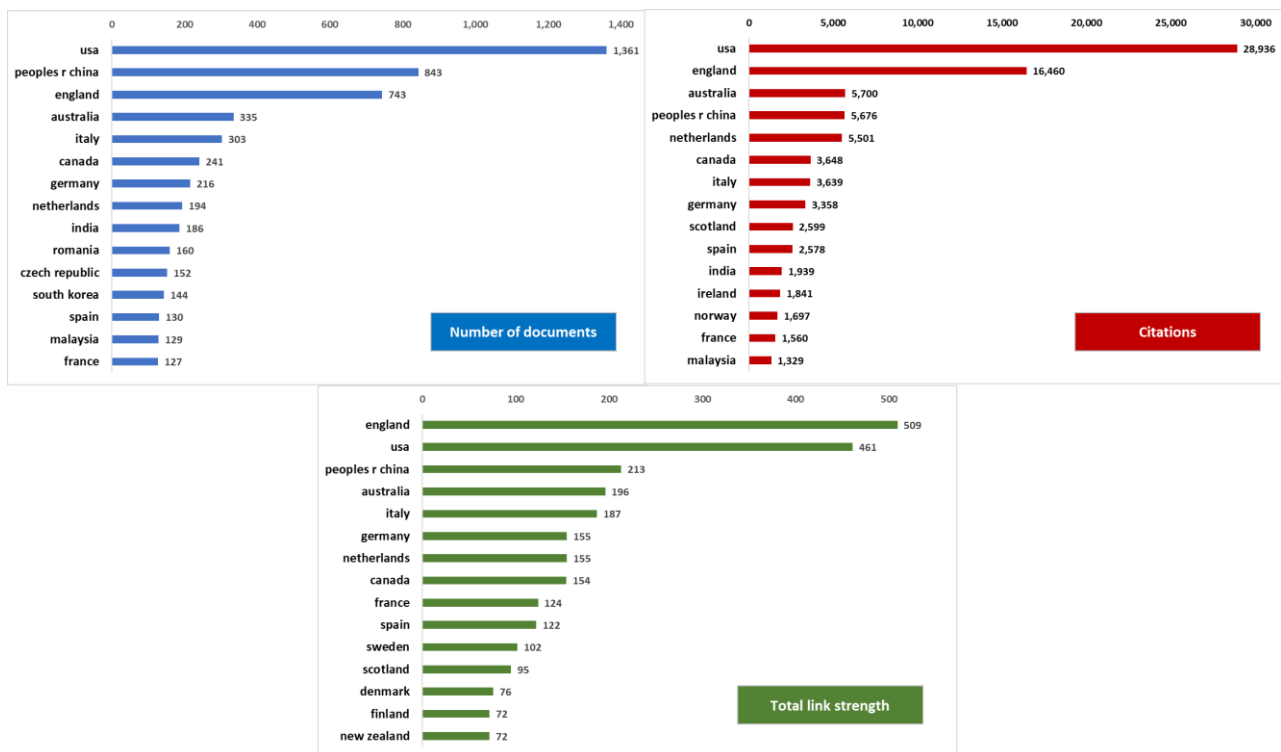


Figure 11. Top 15 countries – Number of documents, Citations and Total Link Strength
 Source: Authors’ computation in Excel with data exported from VOSviewer

It is an interesting task to analyze the top 15 countries hierarchically – on these three criteria: document number (DN), citations (C), total link strength (TLS). As can be observed in Figure 12, the first eight countries in terms output of number of documents (DN) find themselves, with minor changes, in the same spots both for citations (C) and total link strength (TLS). Spain and France remain also in top 15. When it comes to Spain – it occupies 13th place as DN but climbs to 10th for the other two criteria (C and TLS). France, which even though is 15th based on DN, goes to 14th as C criteria and to 9th based on TLS criteria. Aspects worth mentioning would be regarding India – 9th in DN and 11th in C – but outside the top 15 based on TLS criteria (occupies 19th place) and Malaysia – 14th in DN, 15th in C, but outside the top 15 as TSL (20th place). Three countries from the top 15 (based on DN criteria) are left outside the top after applying the other two criteria – C and TLS. The Czech Republic (11th in DN) only occupies 29th and 33rd respectively based on C and TLS, while South Korea (12th in DN) occupies 22nd and 29th for C and TLS. The most unfortunate drop is represented by Romania which occupies 10th in DN, but then only 41st (C) and 50th (TLS). This aspect shows the fact that these countries are on the one hand, not cited sufficiently, while on the other hand, they do not have connections with other countries in performance management related research exercises. Another element which proves interesting to note is represented by countries which are not in the top 15 based on documents numbers (DN) but climb to the top 15 in terms of citations (C) and/ or total link strength (TLS). This would be the case for countries such as Ireland, Norway, Sweden, Denmark, Finland, and New Zealand. Most likely, this is due to Irish papers being cited by the English/ British, New Zealand is very much connected with Australia, while the Nordic countries are primarily cited and better connected with the Netherlands – which finds itself in the top 8 based on all three criteria.

Place	Country	Document	Place	Country	Citations	Place	Country	Total link strength
1	USA	1361	1	USA	28936	1	England	509
2	P.R. China	843	2	England	16460	2	USA	461
3	England	743	3	Australia	5,700	3	P.R. China	213
4	Australia	335	4	P.R. China	5,676	4	Australia	196
5	Italy	303	5	Netherlands	5501	5	Italy	187
6	Canada	241	6	Canada	3648	6	Germany	155
7	Germany	216	7	Italy	3639	7	Netherlands	155
8	Netherlands	194	8	Germany	3,358	8	Canada	154
9	India	186	9	Scotland	2,599	9	France	124
10	Romania	160	10	Spain	2578	10	Spain	122
11	Czech Republic	152	11	India	1939	11	Sweden	102
12	South Korea	144	12	Ireland	1,841	12	Scotland	95
13	Spain	130	13	Norway	1,697	13	Denmark	76
14	Malaysia	129	14	France	1560	14	Finland	72
15	France	127	15	Malaysia	1329	15	New Zealand	72

Figure 12. Top 15 countries (documents, citation, total link strength)

Source: Authors' computation with data from VOSviewer

3.4 Co-occurrence analysis – top keywords and density visualization

To identify the most frequently used terms, VOSviewer co-occurrence analysis with all keywords as unit of analysis has been utilized. The "Very selected keywords" option – including occurrence (occ.) and total link strength (TLS) have been exported in Excel software for analyzing. In Figure 13 the top 50 most frequent used keywords are presented – both author keywords and keywords plus – found in WoS documents on the topic of performance management. The most prevalent and central item (term/ keyword) for our research is performance management – with a number of 2.290 occurrences – followed by others important topics, also emerging from the mentioned search on

WoS database, such as: management (634); performance (548); impact (450); model (416); performance measurement (372); systems (362); balanced scorecard (356); HRM (300); strategy (277); framework (236); organizations (232); Leadership (231); innovation (195); and quality (190) – as the top 15 most frequent keywords.

No	keyword	Occ.	TLS	No	keyword	Occ.	TLS
1	performance management	2,290	10,164	26	appraisal	132	834
2	management	634	3,419	27	services	132	759
3	performance	548	2,784	28	sector	122	818
4	impact	450	3,159	29	organizational performance	121	831
5	model	416	2,557	30	performance evaluation	119	358
6	performance measurement	372	2,036	31	public management	118	719
7	systems	362	2,121	32	healthcare	116	652
8	balanced scorecard	356	1,724	33	policy	116	649
9	hrm	300	1,879	34	knowledge	114	705
10	strategy	277	1,745	35	performance appraisal	114	677
11	framework	236	1,581	36	sustainability	113	788
12	organizations	232	1,613	37	feedback	112	702
13	leadership	231	1,541	38	efficiency	111	546
14	innovation	195	1,305	39	kpi	110	368
15	quality	190	1,159	40	local government	110	671
16	accountability	179	1,064	41	motivation	108	707
17	work	173	1,145	42	supply chain management	108	682
18	public sector	168	1,057	43	technology	107	690
19	implementation	164	1,085	44	decision-making	102	559
20	design	162	971	45	firm performance	102	802
21	performance management system	156	707	46	reform	102	625
22	governance	151	941	47	perspective	101	712
23	government	151	922	48	perceptions	99	777
24	information	142	918	49	satisfaction	99	744
25	behavior	139	927	50	indicators	98	621

Legend: TLS - total link strength; Occ. - occurrences

Figure 13. Top 50 keywords

Source: Authors' computation with data from VOSviewer

In order to provide an overview of the topic and facilitate the identification of the main themes and areas resulting from the bibliometric analysis, the Density Visualization Map from VOSviewer was used. This map option can represent both – item density and cluster density. In the present paper item density has been deployed, so as to have a general picture of the most important keywords – identified by label size and color (Van Eck & Waltman, 2014, 2019). Spectral colors – red, orange, yellow, green, cyan, blue – have been used to represent the item density map. On this spectrum red areas have the highest density and encompass the larger number of topics, while the blue ones include keywords with small numbers of terms in vicinity. At the same time, different label sizes can be noticed – which is impacted by the frequency (occurrence) of the items. In Figure 14 the color red can be seen just in the middle of the map, encompassing big size label keywords – performance management, performance, management, model, systems, impact – and even some of the smallest ones (but arranged in the same area) – decision, paradigm, covid-19, future, perspective, knowledge etc. Other important keywords are displayed in orange and yellow, which revolve around different themes: (1) balanced scorecard, strategy, innovation, sustainability, CSR, etc.; (2) framework, design, capabilities, technology, ICT, efficiency etc.; (3) performance measurement, corporate governance, benchmarking, dynamics, companies, management control systems etc.; (4) accountability, public sector, government, public management, governance, reform, universities etc.; (5) HR, HRM, assessment, effectiveness, leadership, motivation, behaviour, work, perception, engagement, appraisal, feedback etc.

categories: (a) 2003, 2006, 2012 (slight drops) and (b) a notable drop – the period 2020-2021 – when the quantity of academic work being published was significantly reduced. The most likely cause of the significant drop are the COVID-19 pandemic and the surrounding crisis that it created. Based on reviewing the data search in WoS, the top 15 publishers, WoS categories, journals, and sources (journals, books etc.) have been presented and analyzed in the paper. As can be seen from the WoS categories, performance management topic has a huge interest in all types of domains starting from management, business, economics, engineering, computers, telecommunication, but also social, education, psychology healthcare etc.

The most prolific contributors – authors, organizations, and countries – have been presented and analyzed, based on the Co-authorship analysis, conducted with VOSviewer software. In regard to the authors, two criteria were taken into consideration for the comparative analysis of the top 25 – the number of documents published and associated citations. From the top 25 of authors identified based on the number of documents criteria, only three can be also found in top 25 for citations: Aguinis H.; Moynihan D.P.; Bititci U.S. Regarding the organization criteria, a central nucleus of 440 items that are interlinked was identified, while the other 51 are dispersed across multiple clusters with less relevant links. Based on the country analysis it can be conclude that USA, England and China and Australia occupy the first four places on all three criteria deployed – number of documents (DC), citations (C) and total link strength (TLS).

A final result generated through the research endeavor was aimed at identifying the most relevant keywords – both author keywords and keywords plus. The most frequent keyword is performance management – with a number of 2,290 occurrences – followed by a host of other topics, such as: management, performance, impact, model, performance measurement, systems, balanced scorecard, hrm, strategy framework, organizations, leadership, innovation, quality, accountability, public sector, etc. To provide an overview of topic and highlight of the main themes resulting from the analysis, a Density Visualization Map in VOSviewer was created. This again reinforced the centrality of performance management as the core concept, but also facilitated visualization of the main themes and areas resulting from the co-occurrence analysis. The conceptual structure: co-occurrence network analysis on keywords, thematic map, theoretical evolution, trends, future direction, have also been researched, but will be presented in an upcoming paper.

REFERENCES

- Aria, M., & Cuccurullo, C. (2017). Bibliometrix: An R-tool for comprehensive science mapping analysis. *Journal of Informetrics*, 11(4), 959-975. <https://doi.org/10.1016/j.joi.2017.08.007>
- Bianchi, C., Loeffler, E., Bovaird, T. (2017). Applying a Dynamic Performance Management Framework to Wicked Issues: How Coproduction Helps to Transform Young People's Services in Surrey County Council, UK. *International Journal of Public Administration*, 40(10), 833-846. <https://doi.org/10.1080/01900692.2017.1280822>
- Bourne, M., Melnyk, S., Bititci, U. S. (2018), Performance measurement and management: theory and practice. *International Journal of Operations & Production Management*, 38(11), 2010-2021. <https://doi.org/10.1108/IJOPM-11-2018-784>
- Bracci, E., Maran, L., Inglis, R. (2017). Examining the process of performance measurement system design and implementation in two Italian public service organizations. *Financial Accountability & Management*, 33(4). 406-421. <https://doi.org/10.1111/faam.12131>
- Busi, M., Bititci, U. S. (2006). Collaborative performance management: present gaps and future research. *International Journal of Productivity and Performance Management*, 55(1), 7-25. <https://doi.org/10.1108/17410400610635471>
- Clarivate Analytics. (2017). *Web of Science product webpage*. Retrieved July 18, 2022, from <https://clarivate.com/products/web-of-science/>

- Cuccurullo, C., Aria, M., Sarto, F. (2016). Foundations and trends in performance management. A twenty-five years bibliometric analysis in business and public administration domains. *Scientometrics*, 108, 595–611. <https://doi.org/10.1007/s11192-016-1948-8>
- Eze, B., Kuziemy, C., Lakhani, R., Peyton, L. (2016). Leveraging Cloud Computing for Systematic Performance Management of Quality of Care. *Procedia Computer Science, Volume 98*, 316-323. <https://doi.org/10.1016/j.procs.2016.09.048>.
- Eze, B. Kuziemy, C. & Peyton, L. (2017). A Patient Identity Matching Service for Cloud-based Performance Management of Community Healthcare. *Procedia Computer Science. 113*, 287-294. <https://doi.org/10.1016/j.procs.2017.08.321>
- Eze, B., Kuziemy, C., & Peyton, L. (2020). A configurable identity matching algorithm for community care management. *Journal of Ambient Intelligence and Humanized Computing*, 11, 1007–1020. <https://doi.org/10.1007/s12652-019-01252-y>
- Garengo, P., Sardi, A. (2021). Performance measurement and management in the public sector: state of the art and research opportunities. *International Journal of Productivity and Performance Management*, 70(7), 1629-1654. <https://doi.org/10.1108/IJPPM-03-2020-0102>
- Garfield, E. (1995). Citation Indexes for Science: A New Dimension in Documentation through Association of Ideas. *Science*, 122(3159), 108-111. <https://www.science.org/doi/10.1126/science.122.3159.108>
- Jelali, M. (2013). *Control Performance Management in Industrial Automation. Assessment, Diagnosis and Improvement of Control Loop Performance*. Springer, London
- Li, K., Rollins, J., Yan, E. (2018). Web of Science use in published research and review papers 1997-2017: a selective, dynamic, cross-domain, content-based analysis. *Scientometrics*, 115, 1-20. <https://doi.org/10.1007/s11192-017-2622-5>
- Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. *Scientometrics*, 84, 523-538. <https://doi.org/10.1007/s11192-009-0146-3>
- Van Eck, N. J., Waltman, L. (2014). Visualizing bibliometric networks. In Y. Ding, R. Rousseau, & D. Wolfram (Eds.), *Measuring scholarly impact: Methods and practice* (pp. 285-320). Springer, Cham, Switzerland. https://doi.org/10.1007/978-3-319-10377-8_13
- Van Eck, N. J., Waltman, L. (2019). VOSviewer Manual. Retrieved July 18, 2022, from https://www.vosviewer.com/documentation/Manual_VOSviewer_1.6.13.pdf
- Van Eck, N. J., & Waltman, L. (2022). *Manual for VOSviewer version 1.6.18*. Retrieved July 18, from https://www.vosviewer.com/documentation/Manual_VOSviewer_1.6.18.pdf
- Vernadat, F., Shah, L., Etienne, A., Siadat, A. (2013) VR-PMS: a new approach for performance measurement and management of industrial systems, *International Journal of Production Research*, 51(23-24), 7420-7438. <https://doi.org/10.1080/00207543.2012.752593>
- Yadav, N., Sushil, S., & Bititci, U. S. (2018). Development of performance management system incorporating dual perspectives of enterprise and customers. *Measuring Business Excellence*, 22(3), 201-219. <https://doi.org/10.1108/MBE-10-2017-0069>
- Zhang, J., Yu, Q., Zheng, F., Long, C., Lu, Z., Duan, Z. (2016). Comparing keywords plus of WOS and author keywords: A case study of patient adherence research. *Journal of the Association for Information Science and Technology*, 67(4), 967-972. <https://doi.org/10.1002/asi.23437>