ISSN 1611-1699 / eISSN 2029-4433

VILNIUS TECH
Vilnius Gediminas Technical University

JOURNAL of BUSINESS ECONOMICS & MANAGEMENT

2025
Volume 26
Issue 3
Pages 669–691

https://doi.org/10.3846/jbem.2025.24199

PERSPECTIVES CONCERNING LEADERSHIP RESEARCH IN THE FRAMEWORK OF CORPORATE SUSTAINABILITY

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Article History:
- received 21 November 2024
- accepted 23 April 2025

Abstract. The main purpose of this paper is to explore current perspectives on the approach to the concept of leadership in relation to sustainability. The research question is focused on the importance of leadership and its contribution as a driver of change, in the organizational sustainability context. The methodology of research has as main framework the bibliometric analysis approach. This quantitative research method allowed achieving some specific objectives, such as: determining the scientific interest in the studied topic and the main authors in the field, identifying the key concepts that interfered with leadership and sustainability and highlighting the main leadership style that facilitates the transition to sustainability. It is thus intended to make a valuable and up-to-date contribution to 2024 on the main trends manifested in leadership research as theory and practice. Among the main findings obtained, it is highlighted that, after 2020, the top three leadership styles that have created links in correlation with other concepts, thus generating organizational change, are: transformational leadership, ethical leadership and authentic leadership. Of these, transformational leadership stands out as a key factor in driving innovation and sustainable performance, this fact being valuable to managers and researchers.

Keywords: authentic leadership, corporate, ethical leadership, mediating role, transformational leadership, sustainability.

JEL Classification: M14, D83, C88.

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1. Introduction

The link between leadership and sustainability stands out as an object of study in the context of the constant efforts of organizations to maintain themselves in a volatile market that requires permanent adaptation. The article is part of the efforts to identify the scientific interest for this topic and contains a quantitative analysis of the scientific literature with the aim of identifying possible links that have been created between leadership styles, leadership practices and sustainable organizations.

As arguments with which we highlight the importance of this topic for organizational theory and practice, we mention the connection between leadership and organizational change,

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between organizational change and sustainability. Studies show that leadership positively and significantly influences the readiness for change (Santhidran et al., 2013), the leader always being one step ahead, anticipating problems and detecting opportunities long before others (Rincon Fernández, 2022). On the other hand, change, both under the human paradigm and aiming at the institutional framework, such as vision and strategy (Rieg et al., 2021), is a condition for ensuring sustainability.

The article contains a bibliometric quantitative analysis of publications from the Web of Science database, to determine the scientific interest in the topic addressed and how the concept has evolved over time, where it is now and what conclusions we can draw to come in support of the development of organizations.

The research gap covered by the article resides in the fact that it provides a 2024 level overview of the literature on leadership as a facilitator of sustainability. The originality also resides in the highlighting of leadership styles as a moderator of sustainability, drawing from all studies and research conducted up to 2024. Related to our niche some researches that were carried out should be highlighted: Jusoh et al. (2024) explored sustainable leadership using a bibliometric research applied in Business and Management; Şengür (2023) investigated sustainable leadership using visual general mapping; Saeed et al. (2023) concentrated their efforts on responsible leadership based on bibliometric analysis using Scopus database; Eustachio et al. (2023) were preoccupied with sustainability leadership indicating the main clusters. Our research is more detailed and focused on conceptual links determined by leadership in terms of styles in correlation with corporate sustainability being a contribution to augment the recent research and findings in the fields of leadership theory and practice.

The research team was concerned with providing a general conceptual and semantic framework of understanding new leadership contemporary realities. We are aware of the necessity of further research in a more comprehensive and scientific (as soundness) format that could be accomplished using meta-analysis method for quantitative analysis as it is exposed by Card and Casper (2013). However, what we obtained in this stage of research is not enough in order to formulate and design lines of development useful for statistical interpretations.

The article starts by outlining the main milestones in the contemporary approach to leadership and then presents aspects of research methodology. The third part and the main chapter highlight the main research findings, the authors that stand out and the concepts that stand out through the links created.

2. Milestones in contemporary leadership approach

Keith Grint posits that leadership, or its absence, seems to be responsible for a multitude of contemporary issues (Grint & Jones, 2022). The "Sustainability Oriented Theory of the Firm" develop by Lozano, presents a valuable framework to offer leaders' and organizations' stakeholders a comprehensive perspective on their responsibilities, opportunities, challenges, relationships, and operational mechanisms. This framework guides leaders in addressing these aspects while contributing to the advancement of more sustainable societies – both in immediate and long-term timeframes (Lozano et al., 2014).

The role of leadership in directing corporate sustainability (CS) initiatives has gained prominence in contemporary literature (Abraham, 2024), being seen as an ethically and morally grounded construct with a focus on a diversity of stakeholders. As Lozano emphasizes (2013), leadership is the main internal driver for advancing CS efforts within organizations.

The findings explain the transformative role of leadership in breaking away from unsustainable norms and practices while recognizing the need for institutional support to sustain these changes. Socially responsible practices and employee-centred leadership are also considered to ensure overall socio-economic sustainability (Khattak et al., 2019). Furthermore, the acknowledgment of ethical leadership's role highlights the growing awareness of the interplay between leadership and sustainability, as it is already demonstrated that ethical leadership is essential for leaders to achieve their goals and should therefore be implemented (Asamoah, 2023). Piwowar-Sulej and Iqbal (2025) also demonstrated a direct effect of sustainable leadership on change-oriented organizational citizenship behavior of employees.

The factors defined to form the sustainability model developed by the international agency MNFORCE are: human resources management, business ethics, corporate social responsibility, company digitalization, environmental considerations, financial management and SME sustainability (Zvarikova et al., 2024). These indicators are under the influence of the leader who can govern the change towards a sustainable organization, statement validated by studies that have shown that employees have positive attitudes towards change in the direction of implementing environmental sustainability strategies, due to practiced leadership (Jóhannsdóttir et al., 2015). The change in organizational culture that occurred due to the social awareness (Martínez & Michel, 2016) initiated by the leader, can be a good conductor and integrator of sustainability ideas.

Transformational leadership, servant leadership, charismatic leadership, ethical leadership, responsible leadership, sustainable leadership are only a part of the leadership styles that impact talents development. Regarding the previous mentioned research theme, Kafetzopoulos and Gotzamani addressed four leadership styles – authoritative, entrepreneurial, transactional, and transformational – and analyze their impact on talent development – as a valuable intangible asset for achieving sustainable performance of businesses. The study reveals that in terms of economic sustainability, entrepreneurial leadership emerges as the most impactful style, while for social and environmental sustainability performance, transformational and transactional leadership styles hold the greatest influence (Kafetzopoulos & Gotzamani, 2022). In higher education, servant leadership is most effective because it ensures sustainable performance over time and encourages the idea of serving stakeholders (Ghasemy, 2024).

A more current approach to leadership, displayed in the context of the growing need to build organizational flexibility and adaptability, is agile leadership, suitable for engaging organizational members in digital transformation projects and beyond (Rialti & Filieri, 2024). Agile leadership can improve innovation efficiency, employee performance and team effectiveness (Porkodi, 2024). Although a direct link between agile leadership and results has not been identified, there are studies that attest that dynamic capabilities have a full mediating effect on the impact of agile leadership on value creation (Kaya, 2023). Agile leadership was associated with how the COVID-19 crisis was managed in a higher education institution, with managers relying on communication, multifaceted skills and competencies (Yonit & Simon, 2023); other studies in the field of education have also found a link between agile leadership characteristics of leadership and school effectiveness in a positive and significant way (Yilmaz & Özgenel, 2023).

Another important aspect regarding the role of leadership in sustainable organization is linked with the environmental dimension of sustainability. In this context, the pivotal role of employees' pro-environmental behavior in advancing organizational sustainability initiatives is widely acknowledged. Conversely, leadership's influence on shaping these behaviors is of paramount importance. In this regard, empirical evidence indicates that green servant

leadership exerts an impact on pro-environmental behavior, mediated by the intermediary process of green intrinsic motivation (Faraz et al., 2021). Green business strategies involve the interweaving of green HR practices with the practice of green leadership (Amjad et al., 2024). Another research study illustrates that the impact of environmental transformational leadership is partially mediated by employees' environmental beliefs (Kim et al., 2019). There are studies that have motivated the importance of sustainable management in identifying a link between the disclosure of carbon emissions by companies and the reporting of climate change risks (Toukabri & Kalai, 2023).

In the context of environmental or green shift, Graves and Sarkis address the topic of environmental transformational leadership (ETL) in correlation with employee's motivation, both internal and external. Their research shows that ETL seems to exhibit its greatest positive impact on enhancing internal motivation in employees with strong environmental values (Graves & Sarkis, 2018). Green innovation should also be mentioned, with a mediating role in the relationship between green transformational leadership and environmental performance (Ledi et al., 2024).

In an attempt to cope with the expectations and demands of societies, corporations are striving to respond to societal challenges and act as responsibly as possible (Amir et al., 2022), actions driven by a shareholder value-centered approach and a stakeholder-oriented view of business strategy (Klettner et al., 2014). Thus, the need has emerged to define new competencies of leaders to meet the challenges and ensure the achievement of sustainability goals (Baporikar, 2017). Altman and Fry (2024) carried out a research through which they proposed a model of global leadership for sustainability that integrates several competencies useful in the development of multi-sector partnerships, in which complex issues in the area of sustainable development objectives are addressed.

In this context, out of the need for adaptive leadership practices, we can mention distributed leadership, to which the literature (Nadeem, 2024) attributes a number of characteristics, such as: shared vision, clear roles, distributed decision-making, collaborative learning communities, continuous professional development, emphasis on team relationships and trust-based collaborations with employees (Hasselgren et al., 2021), mobilization of collective commitment (Bolden, 2011). Distributed leadership also positively intervenes in the relationship between organizational learning and organizational sustainability (Zgrzywa-Ziemak et al., 2024).

3. Methodology

Under the umbrella of exploring the current mainstream of leadership, as science and practice, applied in the field of sustainable organization, given the extensive nature of the research and the complexity of the analysis regarding leadership, this paper will address the following specific objectives:

1. Determining the scientific interest for this research topics over time;
2. Determining the most relevant authors and their production over time;
3. Identifying the geographical distribution of the research results on this topic, respective the leading countries in terms of number of publications, emerging and new entrants, and countries collaboration network;
4. Identifying core concepts – in term of occurrences and links between them;
5. Identifying the prevalence of different leadership styles within the researched field;
6. Identifying of the most prominent leadership style in the context of the researched topic;
7. Identifying emerging trends and new approaches related to the research subject.

Detailed, the steps used to investigate our topic were: a search of the Web of Science was conducted, based on a criterion that combined two topics; the resulting sample was exported for further investigations using VOSviewer and R Studio Bibliometrix/ Biblioshiny software; the main concepts were discussed in the framework of resulted network maps.

A clear approach to the application of such a methodology is made by the authors Kirby (2023) and Passas (2024). The conclusions of the two studies, with good practice value, were taken into account.

In order to fulfil the above emphasized objectives, a search of the Web of Science (WoS) was conducted in April 2024, according to a criterion that combined two topics, with AND as the Boolean operator. The first topic encompassed concepts related to organization sustainability and sustainable organization. Under this umbrella, Topic 1 covered all types of entities – company, corporate, enterprise, firm, institution, organizations, small and medium enterprise. For Topic 1 the search included both singular and plural forms for each entity and in this regard asterisk symbol (*) was used. Moreover, in order to identify both terms – sustainable and sustainability the asterisk symbol (*) symbol was used again. The second topic (Topic 2) included in the search was "leader*" – in order to cover leader, leaders and leadership terms (Figure 1).

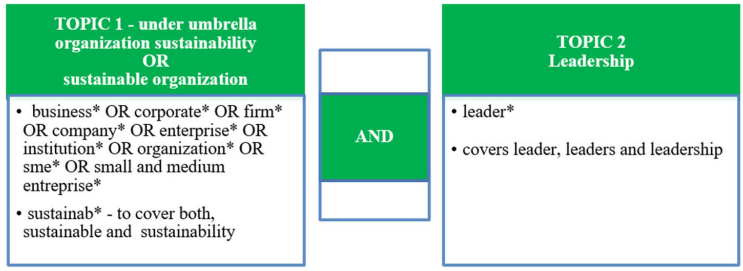

Figure 1. The structures of main topics studied (source: authors)

The sole criterion applied was language, specifically English. Consequently, 1230 results were identified, of which 1211 were in English. The resulting sample of documents was exported in plain text format for further processing and analysis with VOSviewer and R Studio Bibliometrix/ Biblioshiny software.

In this regard, Biblioshiny was used to identify:

(1) the main information about the researched sample – sources, annual growth rate, average citation per document, number of references;
(2) information regarding the authors – number of authors, average number of authors per document, international co-authorship, most relevant authors production over time, countries collaboration network;
(3) word clouds – based on authors keywords (AK) and keywords plus (KP).

VOSviewer software was also extensively used to represent and analyze the following aspects:

(1) The geographical distribution of the research, based on countries production, the most influential countries and the links between them, but also the emerging and new entrants;
(2) Concepts analysis, respectively the keywords map – based on Network visualization, Overlay visualization, and Density visualization.

In this regard, the co-occurrence analysis was chosen, with All keywords as unit of analysis. This means that the analysis takes into consideration both – author keywords (AK) and keyword plus (KP). Moreover, a thesaurus file was also created and subsequently ingested into the software to merge similar terms (singular and plural, whole names or abbreviations). A total of 46,390 keywords (AK + KP) were identified from the sample of 1211 documents. In order to represent the maps, it was decided to retain only keywords that appeared with a frequency greater than 5. This resulted in 374 keywords distributed in 9 clusters.

4. Results and discussions

All analyses yielded highly interesting aspects and concepts with close links to our research topics, and these are presented and discussed in this section.

4.1. Formatting lists

From Figure 2 is noticed the attention, which denotes an increase in the interest and importance given to the subject in question, both the number of citations registered for each document considered, and the number of authors with concerns on the subject addressed.

MAIN INFORMATION ABOUT DATA						
Timespan	Sources (Journals, Books, etc)	Documents	Annual Growth Rate	Document Average Age	Average citations per doc	References
1999:2024	553	1211	17.72 %	5.28	19.49	63072
AUTHORS						
Authors	Authors of single-authored docs	Single-authored docs	Co-Authors per Doc	International co-authorships		
3180	206	223	2.91	30.80 %		

Figure 2. The framework of analysed data (source: authors)

4.2. Annual scientific production

Figure 3 shows the quantitative growth trend of the scientific research developed for the defined topics of interest, generally after 2010 and especially after 2020, which is also motivated by an increase in awareness of the importance of leadership in the context of the crises it has faced global society at that time (pandemic crisis, economic crisis).

4.3. Most relevant authors production over time

As for the scientific production of the most relevant authors in Figure 4, an intensification in the last 10 years can be noticed, the most prolific author being Kantabutra S. (his special concerns are also supported by the topics of interest and the number of citations in the last five years, declared by Google Scholar).

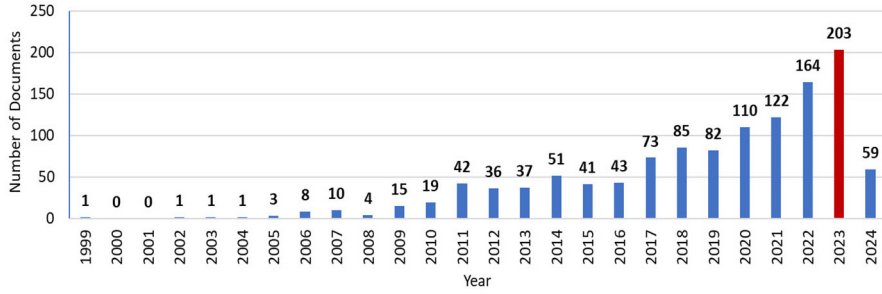

Figure 3. Scientific production over time (source: authors)

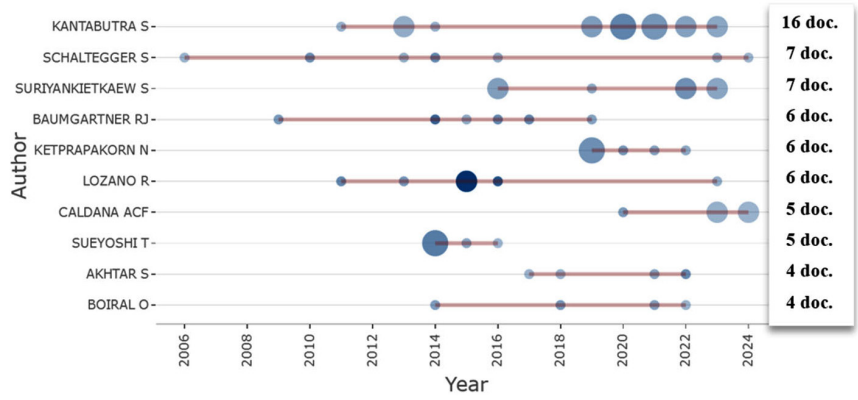

Figure 4. Top 10 authors and their scientific output over time (source: authors)

The author is notable for engaging in this multifaceted process, which encompasses the Triple Bottom Line (TBL) approach, in which leaders not only define the trajectory for the entire organization, but also pave the way for continuous adaptation to future change (Kantabutra, 2022, p. 20). The author also stands out by highlighting the importance of integral leadership, which involves a consistent alignment of behavior and actions with fundamental values (Ketprapakorn & Kantabutra, 2019, pp. 6, 7, 10).

4.4. Geographical distribution of the research results

The VOSviewer software was employed to analyze countries' production. As the type of analysis was selected the co-authorship approach, with country as the unit of analysis. The resulting sample was formed from countries that have exceeded the thresholds of at least five documents per country. In order to identify not only the most influential countries and the links between them, but also the emerging and new entrants, the time scale representation was chosen. As remarked in Figure 5a, in Overlay Visualization Map, the countries are represented by dots of varying sizes, based on the number of documents produced. The relationships between countries are also evident and represented by arcs of varying thicknesses. Furthermore, a time-series visualization and analysis are facilitated by the countries position on a spectral color scale, ranging from violet for those with the oldest tradition, to red for the newest entrant in this domain.

For representing the countries collaboration network, Biblioshiny in RStudio software was used (Figure 5b).

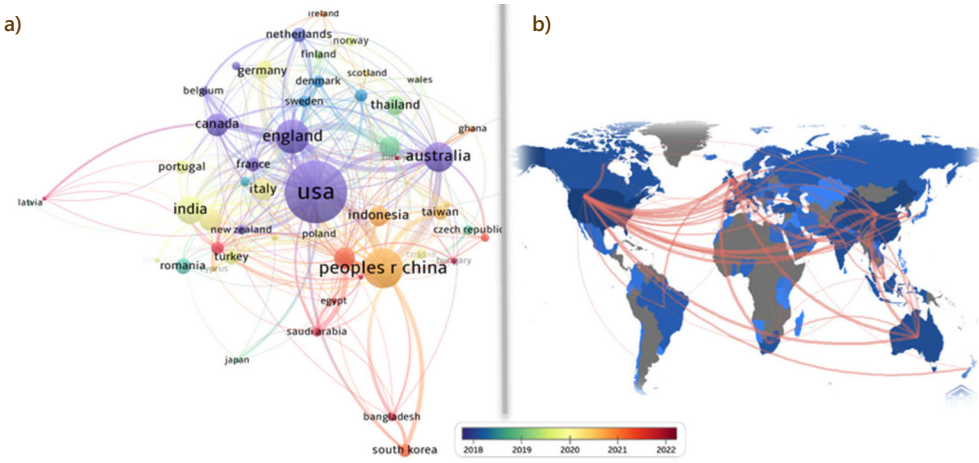

Figure 5. Geographical distribution of the research results (source: authors)

USA (231 documents), People of China (121 documents) and England (98 documents) – are the top three countries. As can be seen also in Figure 5a, the USA has strong links with England, Canada and Australia. They have a long tradition in this area – the color on the timeline is violet. Although it started much later (orange on the timescale), China has become a reference country for the production of documents on this topic. Also noteworthy are the new entrants: Pakistan, South Korea, Bangladesh, South Arabia, Egypt, United Arab Emirates (UAE), Hungary, Vietnam, etc.

4.5. Concepts analysis based on Biblioshiny Word Clouds

The sample of documents identified in WOS was exported in plain text format for further processing and analysis. This paper presents the Word Clouds processed in Biblioshiny and keywords maps obtained using the VOSviewer software.

In Biblioshiny were represented two Word Clouds – the first based on AK and the second based on KP (Figure 6a and 6b). The processed data reveals important differences in terms of occurrence between the most prominent keywords and the rest of them. Taking into account the fact that the font dimension is proportional with the keyword occurrence, in order to have more intelligible figures, it was taken the decision to represent only the first 30 (thirty) concepts – with the highest frequency.

Comparing Figures 6a and 6b in terms of content, a greater diversity of terms generated by KP research is noted, opening new research windows and creating the possibility of new correlations between terms of interest. Figure 6b validates certain statements from the literature review that highlighted the contribution of transformational leadership in driving innovation and increasing performance.

a) Based on AK b) Based on KP

Figure 6. Word Clouds – The most prominent AK and KP (source: authors computation based on Biblioshiny)

4.6. Concepts analysis based on VosViewer

In this regard, the co-occurrence analysis in VosViewer was chosen, with All keywords as unit of analysis. This means that the analysis takes into consideration both – author keywords (AK) and keyword plus (KP). Moreover, a thesaurus file was also created and subsequently ingested into the software to merge similar terms (singular and plural, whole names or abbreviations). A total of 46,390 keywords (AK + KP) were identified from the sample of 1212 documents. In order to represent the maps, it was decided to retain only keywords that appeared with a frequency greater than 5 (five). This resulted in 374 keywords.

In Table 1 are presented the first 50 keywords, based on their occurrence (Occ.) and their Total Link Strengths (TLS) with other keywords in the network map. As can be remarked, *leadership*, *sustainability*, and *performance* are situated in the first three places. This are followed by, *corporate sustainability*, *management*, *csr*, *innovation*, *impact*, *model* and *transformational leadership* – in the group of first ten. Besides this, also other important concepts are identified in top 50: *social-responsibility*, *strategy*, *hrm*, *governance*, *values*, *culture*, *knowledge*, system and so on. Keywords like: *behavior*, *work*, *hrm*, *governance*, *values*, *culture*, *knowledge*, *organizational culture*, *commitment*, *education*, *responsibility*, *satisfaction*, *capabilities*, *ethics*, *job-satisfaction*, and *knowledge management* can be includes in soft category – linked with the human resource. It can be also remarked that besides the keyword *leadership* (Occ.: 311), two leadership styles are identified as most prevalent in top 50 – *transformational leadership* (Occ.: 116) and *ethical leadership* (Occ.: 34).

Table 1. The most important keywords based on occurrence an total link strengths bibliometric indicators (source: authors)

id	keyword	Occ.	TLS
1	leadership	311	2046
2	sustainability	273	1760
3	performance	2SS	1875
4	corporate sustainability	212	1407
5	management	207	1500
6	csr	19S	1327
7	innovation	153	1142
8	Impact	148	1214

id	keyword	Occ.	TLS
26	values	46	312
27	culture	45	337
28	knowledge	45	334
29	system	45	311
30	organizational sustainability	42	257
31	antecedents	40	338
32	moderating role	39	340
33	implementation	38	274

End of Table 1

id	keyword	Occ.	TLS
9	model	137	1030
10	transformational leadership	116	894
11	sustainable development	102	619
12	social-responsibility	85	622
13	strategy	83	619
14	framework	69	491
IS	behavior	65	478
16	business	65	462
17	perspective	65	548
18	mediating role	60	523
19	firm performance	59	507
20	financial performance	55	434
21	work	55	419
22	organization	54	412
23	hrm	51	420
24	firm	50	424
25	governance	48	366

id	keyword	Occ.	TLS
34	organizational culture	37	283
35	sme	37	311
36	commitment	36	301
37	green	36	299
38	competitive advantage	35	283
39	education	35	182
40	responsibility	35	264
41	ethical leadership	34	2S0
42	satisfaction	34	276
43	capabilities	33	291
44	entrepreneurship	33	237
45	ethics	33	206
46	integration	33	255
47	job-satisfaction	33	244
48	knowledge management	32	246
49	supply chain management	32	230
50	quality	31	207

a) Density visualization

Based on the 374 resulting keywords, in VosViewer a Density Visualization map represented on a Spectral scale was created (Figure 7).

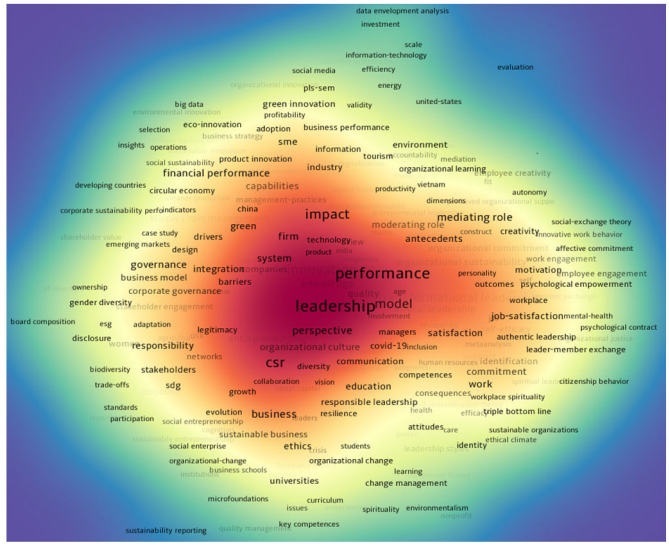

Figure 7. Density visualization (source: authors)

Taking into account that in the middle of the Density visualization map a great number of keywords are located, situated very close to each other, there is not enough room to see

them all. In this regard, in order to identify the most central concepts for the present research, in Figure 8 a zoom of this map for the central position is represented. As can be noticed, the keywords *leadership*, *corporate sustainability*, *management*, *strategy*, *culture*, *innovation*, *behavior* are well represented in terms of occurrence, closely to each other's, and situated in the center of the map – marked with red color.

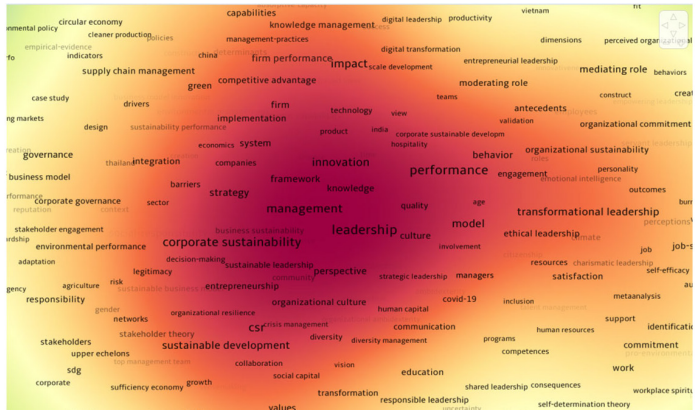

Figure 8. Density visualization – the centre of the map (source: authors)

b) Network visualization

Figure 9 presents the Network visualization of the keywords associated with the research topic. A total of nine clusters can be identified, comprising the 374 words between which there are strong links (links: 12,670, TLS: 26,683).

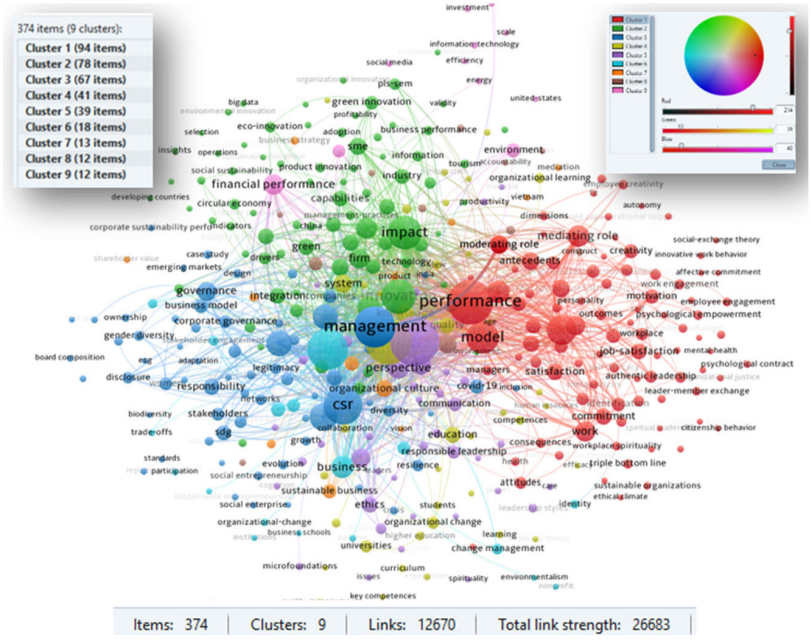

Figure 9. Density visualization – the centre of the map (source: authors)

Table 2 shows a summary of the information related to each cluster, including color, name, occurrence (Occ.), links, total link strengths (TLS). The cluster names are assigned according to the keyword with the highest occurrence in the respective cluster. Consequently, the following names are identified: Performance (Cluster 1); Innovation (Cluster 2); Management (Cluster 3); Sustainability (Cluster 4); Leadership (Cluster 5); Corporate sustainability (Cluster 6); Organizational culture (Cluster 7); Cluster 8: Environmental management (Cluster 8); Financial performance (Cluster 9). The nine clusters were sorted in descending order by frequency of the representative concept for each cluster. Leadership (Occ.: 311); Sustainability (Occ.: 273); Performance (Occ.: 255); Innovation (Occ.: 153) are the most prominent. At a greater distance there are concepts related to much smaller clusters that have much lower occurrences than the previous ones. Financial performance (Occ.: 55); Organizational culture (Occ.: 37); Environmental management (Occ.: 24).

Table 2. Bibliometric particularities of studied words clusters (source: authors)

Cluster Number	Color	Cluster Name	Occ.	Links	TLS
Cluster 5	Magenta	Leadership	311	330	2046
Cluster 4	Yellow	Sustainability	273	331	1760
Cluster 1	Red	Performance	255	322	1875
Cluster 6	Blue	Corporate sustainability	212	293	1407
Cluster 3	Dark Blue	Management	207	331	1500
Cluster 2	Green	Innovation	153	261	1142
Cluster 9	Pink	Financial performance	55	157	434
Cluster 7	Orange	Organizational culture	37	113	283
Cluster 8	Brown	Environmental management	24	88	177

4.7. Leadership network

The following map illustrates the concept of leadership in relation to other key concepts relevant for the research (Figure 10). As can be observed, the leadership concept is represented with a high frequency (Occ.: 311) and exhibits strong interconnections with numerous other concepts in the map (Links: 330, TLS: 2046), distributed across all nine clusters.

Furthermore, it is of interest to identify the strongest links between the concept of leadership and other related concepts (Figure 11). In this context, the most significant Link strengths are between *leadership* and *performance* (LS: 85), *sustainability* (LS: 76), *management* (LS: 62), *corporate sustainability* (LS: 59), and *csr* (LS: 59).

It is of particular importance to identify trends in research related to the chosen topic. For this purpose, Overlay visualization (Figure 12) was chosen to represent the network for the keyword *leadership*. As can be seen, the linked concepts appear in different colors that range on the spectrum scale from violet (APY 2016-2017) to blue, green, yellow, orange and red (APY after 2021). In terms of novelty, the concept of *leadership* is represented by green (APY: 2019.17). As can be seen, the interest in leadership in the context of organizational sustainability is relatively recent – the oldest keywords have APY in the period 2016–2017. On the basis of the constructed map it is possible to identify the traditional and older concerns of the researchers, represented with violet and related to *ethics* (2016.21), *values* (2016.98), *business ethics* (2017.67), *environmental management* (2017.67), *organizational change* (2017.47),

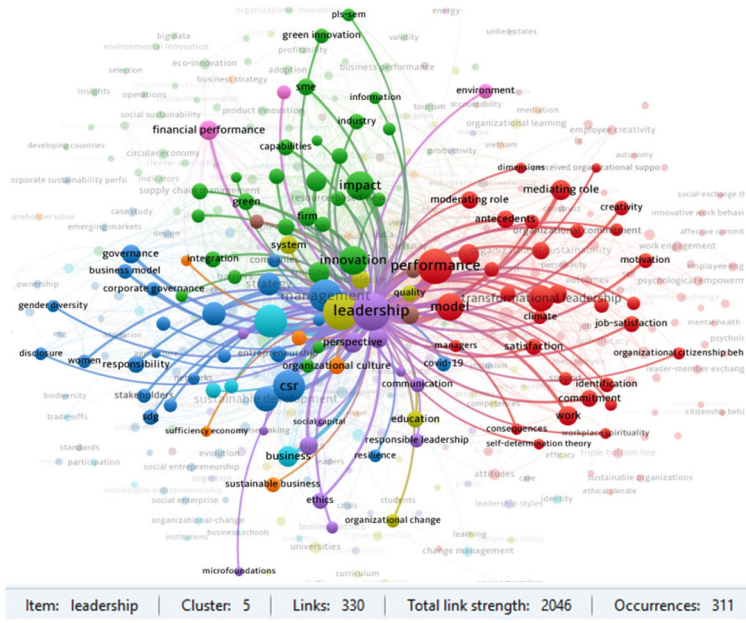

Figure 10. Leadership network visualization map (source: authors)

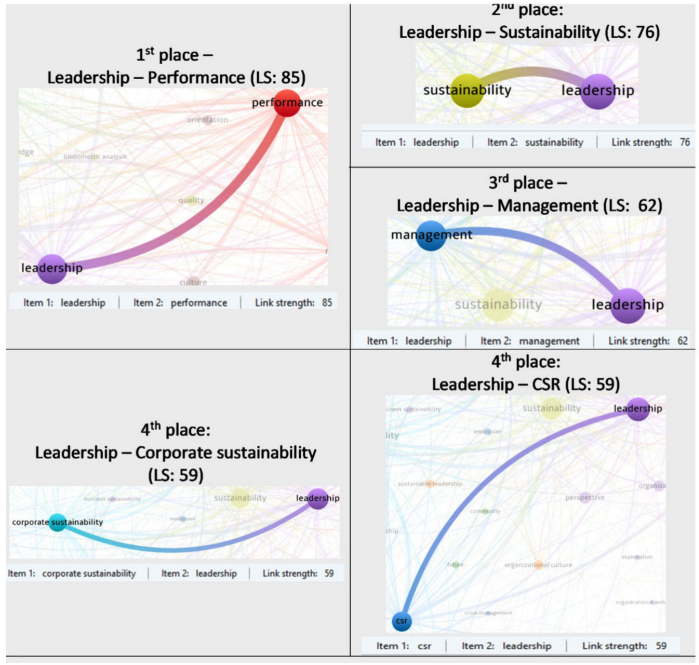

Figure 11. The five strongest links between the leadership concept and other concepts from the research topic (source: authors)

stakeholders (2017.09). The evolution of the concepts addressed by the researchers continues with those colored in blue (*business model*, *csr*, *responsibility*, *education* etc.), green (*corporate sustainability*, *sustainability*, *strategy*, *system*, *green* etc.) and light-green (*sustainable leadership*, *organizational culture*, *management*, *supply chain management*, *barriers*, *drivers* etc.). With APY after 2020, the concepts are marked from more intense yellow (*performance*, *innovation*, *behavior*) to orange (*transformational leadership*, *disclosure*, *sdg*, *job-satisfaction*, *organizational citizenship behavior*, *ethical leadership* etc.).

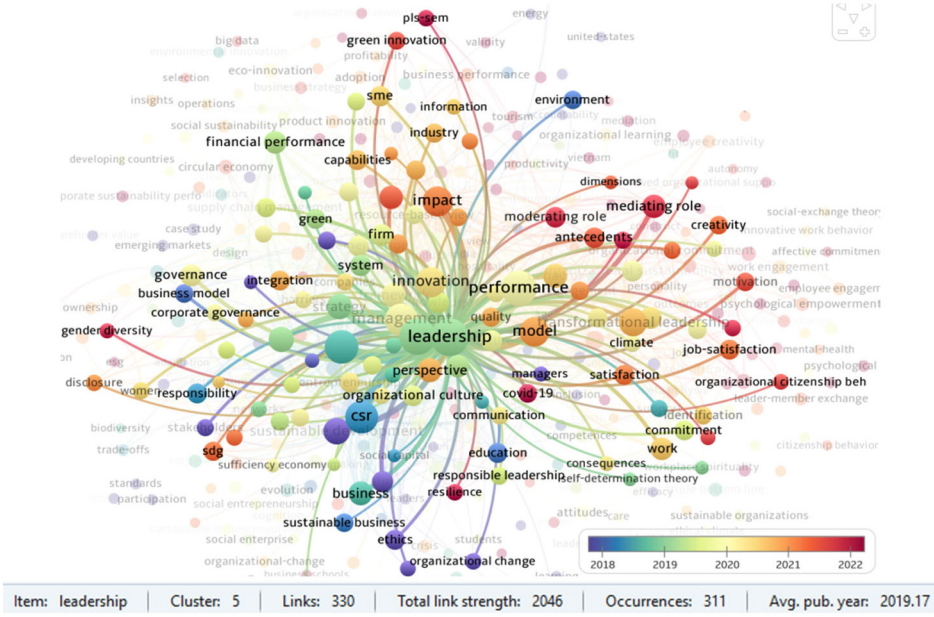

Figure 12. Overlay visualization for *leadership* concept (source: authors)

Given the considerable number of concepts, it was decided to identify, in descending order of occurrence, only those with APY (average publication year) after 2021 (Table 3). As can be seen in Table 3, the most representative three novel concepts are: *moderating role* (Occ. 60), *firm performance* (Occ. 59), and *antecedents* (Occ.: 40). These are followed by: *satisfaction* (Occ.: 34), and *job-satisfaction* (Occ.: 34), *sdgs* (Occ.: 29), *covid-19* (Occ.: 27), *creativity* (Occ.: 27), *motivation* (Occ.: 26), *green innovation* (Occ.: 25), *employees* (Occ.: 22), *organizational commitment* (Occ.: 22), *workplace* (Occ.: 19), *resilience* (Occ.: 18), *disclosure* (Occ.: 18), *pls-sem* (Occ.: 17), *organizational citizenship beh* (Occ.: 16), *gender diversity* (Occ.: 14), *pro-environmental behavior* (Occ.: 14), *perceived organizational support* (Occ.: 8). As can be seen, the newest keyword, with APY after 2022, are: *pls-sem* (APY: 2022,47), followed by the interest for *resilience* (APY: 2022,22), in special in the context of *covid-19* (APY: 2022,07), which is directly related to it.

The next step was to identify the leadership styles that were the focus of the current research theme. These are presented in the Table 4, accompanied by information such as the cluster they come from, the occurrence, links, TLS, and APY. The identified leadership styles have been sorted in descending order of occurrence, and thus the following appear:

leadership (Occ.: 311), *transformational leadership* (Occ.: 116), *ethical leadership* (Occ.: 34), *sustainable leadership* (Occ.: 26), *responsible leadership* (Occ.: 23), *authentic leadership* (Occ.: 19), *transactional leadership* (Occ.: 15), *servant leadership* (Occ.: 14), *sustainability leadership* (Occ.: 10), *entrepreneurial leadership* (Occ.: 10), *charismatic leadership* (Occ.: 9), *shared leadership* (Occ.: 8), *digital leadership* (Occ.: 7), *green transformational leadership* (Occ.: 6), *strategic leadership* (Occ.: 6), *empowering leadership* (Occ.: 5), *spiritual leadership* (Occ.: 5), *distributed leadership* (Occ.: 5), *environmental leadership* (Occ.: 5).

Table 3. The most representative concepts based on APY after 2021 (source: authors)

Keyword	APY	Occ.
mediating role	2021.63	60
firm performance	2021.31	59
antecedents	2021.33	40
moderating role	2021.67	39
satisfaction	2021.09	34
job satisfaction	2021.12	33
sdgs	2021.17	29
covid-19	2022.07	27
creativity	2021.19	27
motivation	2021.38	26
green innovation	2021.44	25
employees	2021.82	22
organizational commitment	2021.18	22
workplace	2021.74	19
resilience	2022.22	18
disclousure	2020.94	18
pls-sem	2022.47	17
organizational citizenship beh	2021.50	16
gender diversity	2021.79	14
pro-environmental behavior	2021.50	14
perceived organizational support	2021.50	8

Table 4. Bibliometric details related to leadership styles (source: authors)

Keyword	Occ.	Links	TLS	APY	Cluster
leadership	311	330	2046	2019.17	5
transformational leadership	116	237	894	**2020.67**	1
ethical leadership	34	113	250	**2021.15**	1
sustainable leadership	26	90	181	2019.69	7
responsible leadership	23	101	177	2019.57	5
authentic leadership	19	88	155	**2021.74**	1
transactional leadership	15	68	105	2019.87	1
servant leadership	14	71	114	**2021.36**	1

End of Table 4

Keyword	Occ.	Links	TLS	APY	Cluster
leader-member exchange	11	53	78	**2021.18**	1
leadership styles	11	51	73	**2020.78**	5
sustainability leadership	10	56	78	**2020.80**	4
entrepreneurial leadership	10	54	40	**2020.50**	8
charismatic leadership	9	57	80	2017.78	1
shared leadership	8	54	70	2018.62	5
digital leadership	7	48	61	**2022.71**	4
green transformational leadership	6	35	46	**2021.83**	1
strategic leadership	6	27	30	2018.67	5
empowering leadership	5	40	48	**2021.00**	1
spiritual leadership	5	31	38	2019.60	1
distributed leadership	5	23	25	2017.00	4
environmental leadership	5	26	35	2019.00	5

Besides the leadership styles presented in Table 4, from the research, there are also others with occurrence below five that occur: *ambidextrous leadership* (Occ.: 4), *agile leadership* (Occ.: 3), *environmental transformational leadership* (Occ.: 2), *green leadership* (Occ.: 2), *humble leadership* (Occ.: 2), *inclusive leadership* (Occ.: 2), *paradoxical leadership* (Occ.: 2), and *self-leadership* (Occ.: 2). Other concepts with the root leader are: *leadership development* (Occ.: 4), *complexity leadership* (Occ.: 3), *supply chain leadership* (Occ.: 4), *school leadership* (Occ.: 3), *cost leadership* (Occ.: 2), *leader humility* (Occ.: 2), *leadership factors* (Occ.: 2), *leadership skills* (Occ.: 2), *leadership structure* (Occ.: 2), *leadership support* (Occ.: 2).

A review of the APY reveals that the earliest leadership styles addressed are *distributed leadership* and *charismatic leadership* (APY: 2017.00 and APY: 2017.78), followed by *shared leadership* and *strategic leadership* (APY: 2018.62 and APY: 2018.67). For the years 2019 are *environmental leadership* (2019.00), *leadership* (2019.17), *responsible leadership* (2019.57), *spiritual leadership* (2019.60), *sustainable leadership* (2019.69), *transactional leadership* (2019.87). Subsequently, it is possible to identify the specific styles that are characteristic of the 2020s.: *entrepreneurial leadership* (2020.50), *transformational leadership* (2020.67), *sustainability leadership* (2020.80). As can see the most recent approach is *digital leadership* (2022.71). Furthermore, the leadership styles with APY in 2021 represent also a novel approach. These are: *empowering leadership* (2021.00), *ethical leadership* (2021.15), *servant leadership* (2021.36), *authentic leadership* (2021.74), *green transformational leadership* (2021.83).

A decision was taken to further analyse some of the highlighted leadership styles with an APY after 2020. In this context, a focus was placed on those in the top three in terms of occurrence and links to other concepts on the map. These are: *transformational leadership*, *ethical leadership*, and *authentic leadership*. They are all represented in the Overlay Visualization Maps.

A. Transformational leadership

Links to concepts from different areas of interest, were respectively (Figure 13):

- Sustainability area: *corporate sustainability*, *csr*, *green organizational sustainability*, *sustainability*, *social-responsibility*;

- Leadership area: *authentical leadership*, *charismatic leadership*, *ethical leadership*, *leadership*;
- Management area: *management*, *model*, *system*;
- Culture area: *climate*, *culture*, *organizational culture*;
- Human resource area: *attitudes*, *behavior*, *commitment*, *empowerment*, *engagement*, *hrm*, *job*, *job-satisfaction*, *member exchange*, *motivation*, *pro-environmental behavior*, *psychological empowerment*, *satisfaction*, *support*, *work*, *work engagement*;
- Innovation area: *capabilities*, *creativity*, *employee creativity*, *innovation*, *knowledge management*;
- Results-outcomes area: *competitive advantage*, *firm performance*, *impact*, *job performance*, *outcomes*, *performance*, *resource-based view*;
- Entity type area: *business*, *firm*, *organization*, *sme*;
- Role: *mediating role*, *moderating role*.

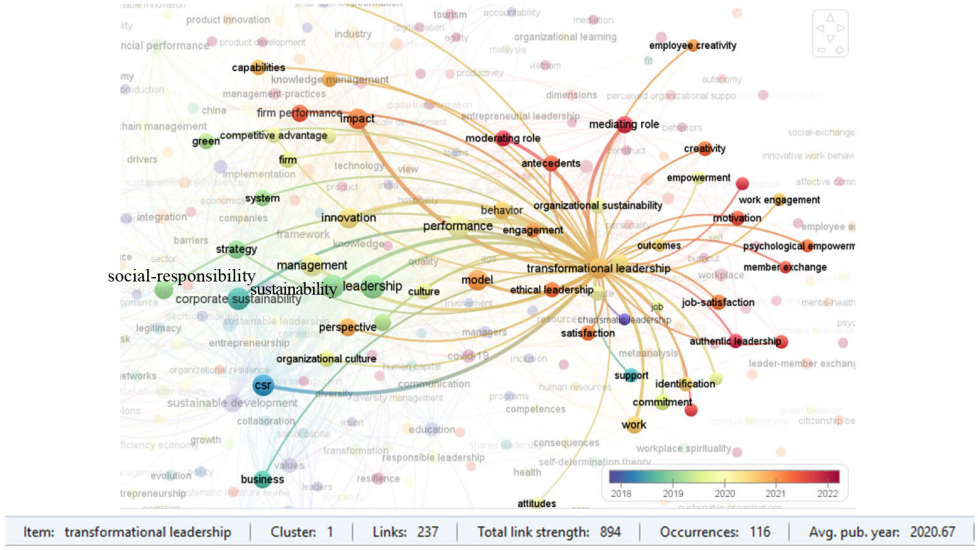

Figure 13. *Transformational leadership* – overlay visualization network (source: authors)

In a challenging and complex landscape, organizations competitiveness and long-term success heavily relies on extensive exploration of innovative avenues. Transformational leadership, characterized by visionary thinking, inspiration, and empowerment, has emerged as an essential factor in driving innovation and sustainable performance. Empirical evidence underscores that transformational leadership and trust in leaders, are pivotal in fostering a culture of engagement and innovation within a sustainable organization (Li et al., 2019).

B. Ethical leadership

Using Figure 14 the most important links to concepts from different areas of interest are highlighted, namely: *sustainability* (273), *performance* (255), *corporate sustainability* (212), *csr* (195), *innovation* (153), *impact* (148), *model* (137), *transformational leadership* (116), *moderating role* (60), *work* (55), *job satisfaction* (33), *authentical leadership* (19).

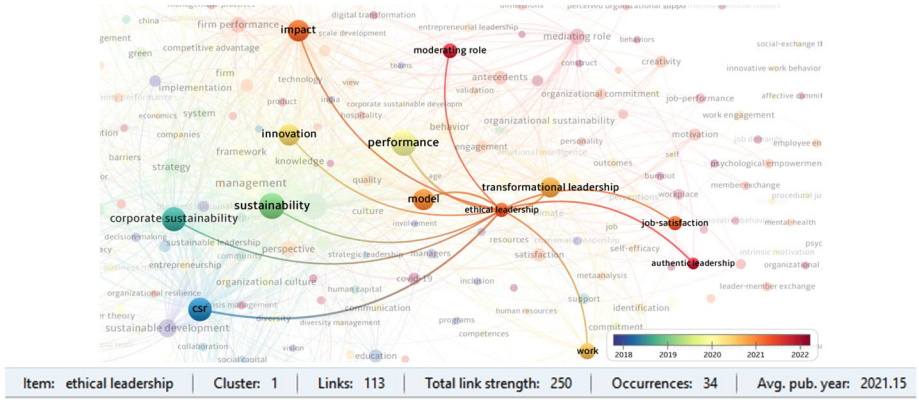

Figure 14. *Ethical leadership* – overlay visualization network(source: authors)

C. Authentic leadership

Concerning authentic leadership, as is noticed in Figure 15, the most relevant links in the framework of the proposed topic of the article are with *management* and *performance*, the link between the concepts is also confirmed by the literature (Aboramadan et al., 2021).

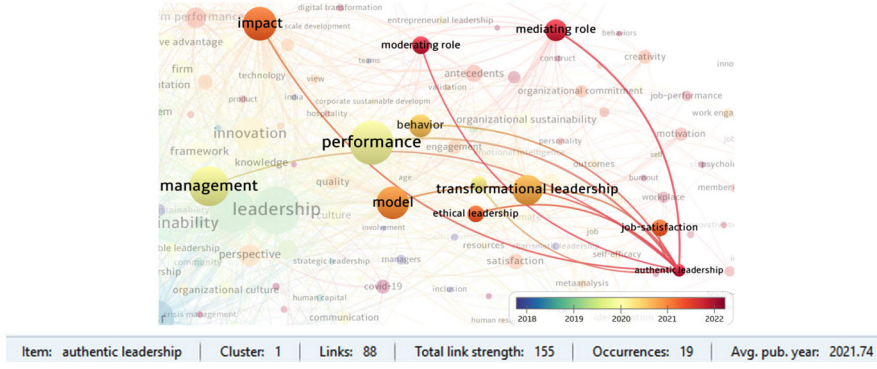

Figure 15. *Authentic leadership* – overlay visualization network (source: authors)

D. Moderating and mediating roles

Another important aspect to emphasize is linked with the *moderator role* and/or *mediator role*.

As can be observed in Figure 16, leadership and different leaderships styles – *transformational leadership*, *ethical leadership* and *authentic leadership* appears in *moderating role* network. These leadership styles can act as moderator for: *innovation*, *performance*, and *csr* implementation.

Figure 17 illustrates the interconnectivity between the *mediating role* and the concepts of *leadership*, *transformational leadership*, and *authentic leadership*. It also highlights that keywords from the human resource domain, such as *employees*, *creativity*, *job performance*, *behavior*, *hrm*, *trust*, *workplace*, *job satisfaction*, *work*, and *commitment*, are present in the *mediating role* network. Furthermore, in the same networks, *mediating role* is linked to *culture*,

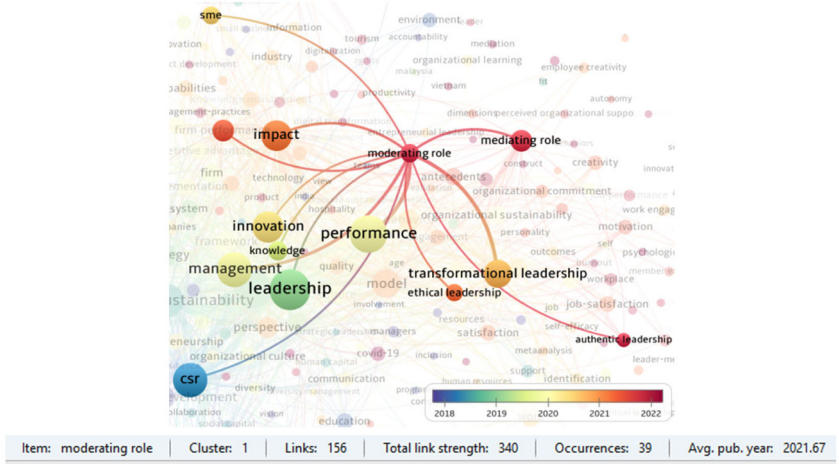

Figure 16. *Moderating role* – overlay visualization network (source: authors)

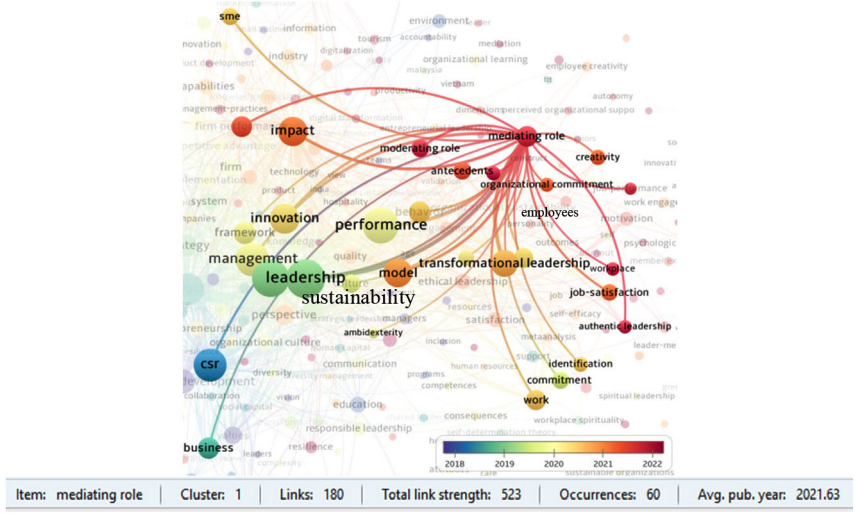

Figure 17. *Mediating role* – overlay visualization network (source: authors)

which is also a soft organizational factor, in addition to those in the area of human resources and leadership. Additionally, as can be notices, other keywords emerge, with *performance*, *innovation*, *management*, *model*, *sustainability* and *csr* being the most representative.

5. Conclusions and directions for future

The authenticity of the article stems from the introduction into the *sustainability-leadership* equation of a number of new terms such as *performance*, *corporate sustainability*, *ethics*, *corporate social responsibility* and very importantly, *mediating role*. It thus highlights the mediating role of the leader between employees and performance by stimulating organizational commitment.

Lozano, one of the most prominent authors on leadership in the context of sustainability – asserts that leadership is the primary internal driver for advancing sustainability efforts within organisations. In this path of building sustainability, the importance of the leader's ethics should be mentioned as a motivating factor for the team to get involved in social responsibility activities. The practice of responsible leadership, in addition to the change projected at the organizational level, has the role of creating a significant impact on society at large.

In a complex and rapid changing world, talent development has emerged as an essential process to foster organization towards competitive advantages and sustainable success. Long-term success is based on continuous improvement and innovation in accordance with external and internal pressures. This requires cutting-edge skills, knowledge, capabilities, abilities and moreover, a sustainability mindset. In this regard, to face the challenges and profit from opportunities, talent development became a strategic imperative. It is also crucial to underline that talent development is significantly influenced by leadership styles and furthermore talents influence the leadership styles. The two approaches are in a symbiotic relationship.

In the realm of sustainability performance management, it is imperative for leaders to attend to a comprehensive range of actions, encompassing the establishment, evaluation, monitoring, measurement, and management of corporate sustainability performance indicators, outputs, and outcomes.

To be trustworthy and trustful, and to motivate employees, leaders should act as role model, congruent with the exposed values. Integrity leadership, that implies a consistently alignment of behavior and actions with the core values, is essential to build a sustainability culture that support the organizational member in their journey to sustainability.

This research illustrates also the necessity of adopting an appropriate leadership style – transformational and authentic – in order to achieve trust, commitment, creativity, job satisfaction and other positive behavioural outcomes. These are all essential for the promotion of innovative practices and high performance in the sustainability transition context. Consequently, a new performance management model is required that considers indicators and metrics derived from the challenges outlined above.

In the case of the USA there is a significant quantity of literature related to leadership, fact that could be explained based on the experience and expertise of organizations in search of performance. In fact, the assumption that if the corporate activity is intense, there are conditions for increased concerns to leadership could be inferred.

Also, based on Biblioshiny research applied for our proposed topic, there is a good evidence of the fact that leadership concept is a catalyst in relation to sustainability concepts (organizational sustainability, sustainability business, corporate sustainability, etc.). More than that, as it was maybe predictable, strong links are noticed between the pairs: leadership – performance, leadership – management and leadership – sustainability, that are pillars of corporate sustainability (in theory and practice also).

As limitations of the paper, we highlight the limitation of the study to the analysis of the Web of Science (WoS) database and the possibility of losing sight of some results obtained by researchers, but indexed in other databases.

A future direction of research that we would like to develop is to have a validation from practice for the concepts specific to leadership in relation to corporate sustainability. Our intention is to explore at national regional level (we could choose central development region of our country), based on survey research, if the values of leadership determined through bibliometric research, could be founded in practice (based on respondents perception) and subsequently, the statistical measure of consistency between resulting relations.

Funding

This research received no external funding.

Author contributions

People who contributed to the work: Andra-Teodora Gorski: conceived the study and responsible for the design and development of the data analysis, wrote the first draft of the article, responsible for data interpretation; Diana Elena Ranf: abstract, responsible for data collection and analysis, responsible for data interpretation; Dorel Badea: responsible for data collection and analysis, wrote the first draft of the article; Elisabeta-Emilia Halmaghi: responsible for data collection and analysis; Hortensia Gorski: responsible for literature review, responsible for data interpretation.

Disclosure statement

The authors inform that they have no competing financial, professional or personal interests from other parties.

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