

# The Evolution of Project-Based Organizations: A Bibliometric Analysis and Literature Review

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## Abstract

This study explores the evolution of research within project-based organizations, uncovering new trends and identifying promising directions for future inquiries. Employing a comprehensive six-step methodology that combines bibliometric and content analyses, this research assessed term frequency, conceptual interconnections, influential contributors, geographic clusters, and dominant themes shaping the field. The dual-tool strategy using VosViewer and SciMAT enhanced the reliability and depth of our bibliometric analysis, allowing for a nuanced understanding of the interlinks between concepts and the chronological progression of terms. Data from 1,066 papers published between 2000 and 2022, extracted from the Scopus database, were analyzed to visualize six clusters based on 180 frequently used keywords. This analysis not only highlighted the multidisciplinary nature of project-based organization studies, focusing on “project management,” “knowledge management,” and “project-based learning,” but also revealed 28 key terms associated with the project-based organization cluster, emphasizing robust connections to knowledge transfer and management. Additionally, Google Trends analysis showed a growing interest in the topic among non-scholars, mirroring the academic attention it receives. Content analysis of seminal papers, selected based on citations, aligned with the term chronology from the broader sample, pinpointing several vital research directions. This research stands out for its innovative approach, combining dual-tool bibliometric analysis with content analysis to address a significant gap in the literature. It offers reliable and robust results, bridging the disconnect between quantitative data synthesis and qualitative insights to provide a more comprehensive understanding of the field.

**Keywords:** project-based organizations; bibliometrics, bibliometric analysis; content analysis, project management; knowledge transfer; knowledge management; innovation

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## Introduction

Over the past decades, there have been significant growth and evolution in studies devoted to project-based management and project organizations. Research on project-based organizations is crucial for several reasons. Firstly, project-based organizations are becoming increasingly common across a variety of sectors, including construction, software development, and healthcare. The orientation towards project management and project-based processes is associated with the high performance of firms (Gann & Salter, 2000), innovation, knowledge sharing (Bhatti *et al.*, 2021), and high outcomes of teamwork (Gemünden *et al.*, 2018). Understanding how these organizations function, how they manage teams, and how they develop and implement projects is crucial for the success of many industries. Research in this area can help identify best practices for project management, improve project outcomes, and form policy decisions related to project-based organizations.

Over the recent years, many studies using bibliometric approaches to find the links between concepts and to reveal the trends in the flow of academic thought, as well as the evolution of a field, were conducted and proved their operability and usefulness. A bright example of the work (Fahimnia *et al.*, 2015), in which scholars proved green supply chain management is a separate direction in research and offe-

red numerous paths for further development of the field. The recent findings showed that bibliometrics could be beneficial in many different fields, such as strategic management and security (Shvindina, 2019), affective computing (Guo *et al.*, 2020), tourism (Soliman *et al.*, 2021; Soliman *et al.*, 2023), artificial intelligence (Liu & Duffy, 2023) and many others.

The experts (Paul *et al.*, 2023) offered insights on framework-based systematic reviews articles, and this study can be classified as the following framework: the WWHW (What data? Where were data collected? How were data processed? Why is that important?) in bibliometric research+ TCM (Theory, Context, and Methodology) in part of content analysis.

The studies on project-based organizations can be considered an ongoing and evolving field of research. However, there has been significant attention and growth in research on project-based organizations in recent decades, especially as project-based work has become more prevalent in various industries. The surge in studies related to project-based organizations gained momentum in the 1990s and early 2000s with the rise of project management as a recognized discipline. During this period, researchers began exploring various

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aspects of project-based organizations, including project success factors, project team dynamics, project governance, and the impact of project-based work on organizational structures and strategies. Since then, the field of project-based organizations has continued to evolve, incorporating advancements in project management theories, practices, and methodologies. Additionally, with the increasing importance of topics such as agile project management, digitalization, and organizational agility, and many other, bibliometric research may give significant results, such as (Machado & Martes, 2015; Tomomitsu *et al.*, 2017; Atencio *et al.*, 2022), however, this is the first study on evolution of project-based organization as a key object of research through bibliometric lens.

The research aims to provide clear insights into the evolution of the field and main research trends related to project-based organizations and to reveal the most significant contributors and most-cited papers using reliable data extraction, and data processing methods. In addition, the comprehensive content analysis is to develop a roadmap for further investigations based on the findings of the most influential contributors.

The rest of this paper will be structured as follows. In Section 2, we provide methodology of research, whereas Section 3 includes the results of bibliometric research and their visualization, Section 4 presents changes of interest in particular topics over time by regions, and scholars, and Section 5 illustrates the main findings and results of content analysis of the most seminal papers. Concluding remarks, discussion, as well as limitations of the research are given in Section 6.

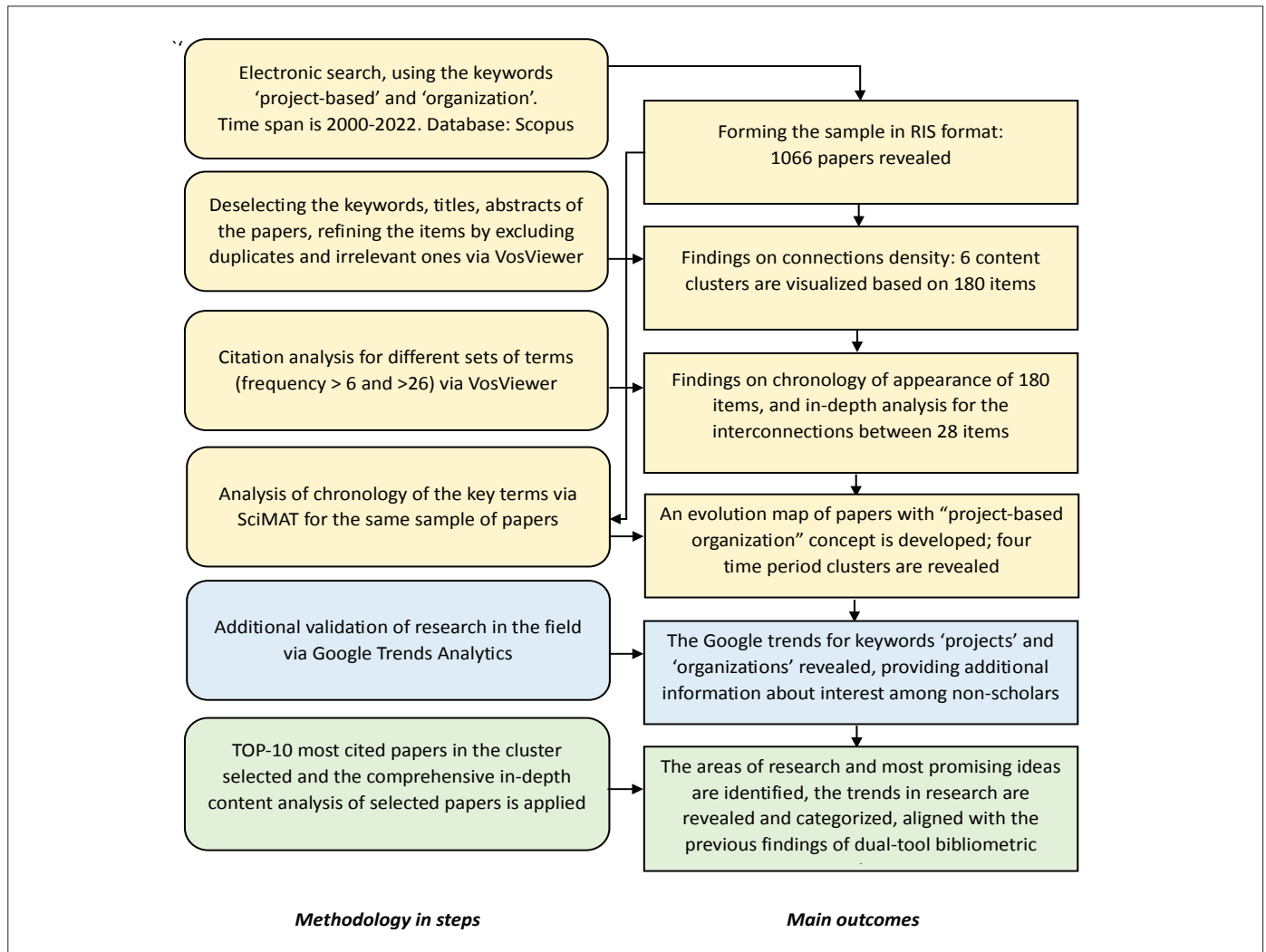
## Methodology

**Research methods:** A literature analysis was employed using a six-step methodology to collect data and comprehensively evaluate: the term clusters, and the interlinks between concepts in the field, the evolution of the key terms (in the field, and in particular area), the most influential contributors, the most cited papers, the most prominent areas of research (see Fig.1). In this study three dimensions combined: dual-tool strategy of bibliometric analysis, web-based trend analysis tools and in-depth content analysis.

**Data:** The initial data search was refined to the papers in the period of 2000-2022 and limited to the papers, conference materials, and books, excluding editors' notes, etc. The total number of papers was 1066. Chosen keywords for analysis: "project-based" and "organization", applied to titles and abstracts to ensure comprehensive coverage of relevant literature. Filters used for selecting papers: time period, language, type of documents. No geographical restrictions were applied in the search. These search results were stored in RIS format that includes all information needed for further bibliometric analysis (including title, authors' names, affiliations, abstracts, keywords, references, and so on).

**Methods of research:** The bibliometric data was analysed via Vos-Viewer and SciMAT software and visualizing citation analysis, network analysis, a chronology of terms occurrence, etc. A qualitative content analysis was provided to verify the interconnections between areas for the most cited papers in the field. The schematic description of the methods, sequence, and outcomes of the research is illustrated in Figure 1. Notably, the combination of dual-tool strategy of bibliometric analysis was used in the area of project management investigations for the first time, and combined with in-depth content analysis created a syntheses of the main findings that may serve as a reliable validation of the research topics in the particular academic field.

**Figure 1:** Methodology of research, presented in steps, where the light orange colors stands for dual-tool strategy of bibliometric analysis; light blue color shows supplementary web-based trend analysis tool usage, and green is for content analysis.



**The main results of bibliometric analysis: the development of the field**

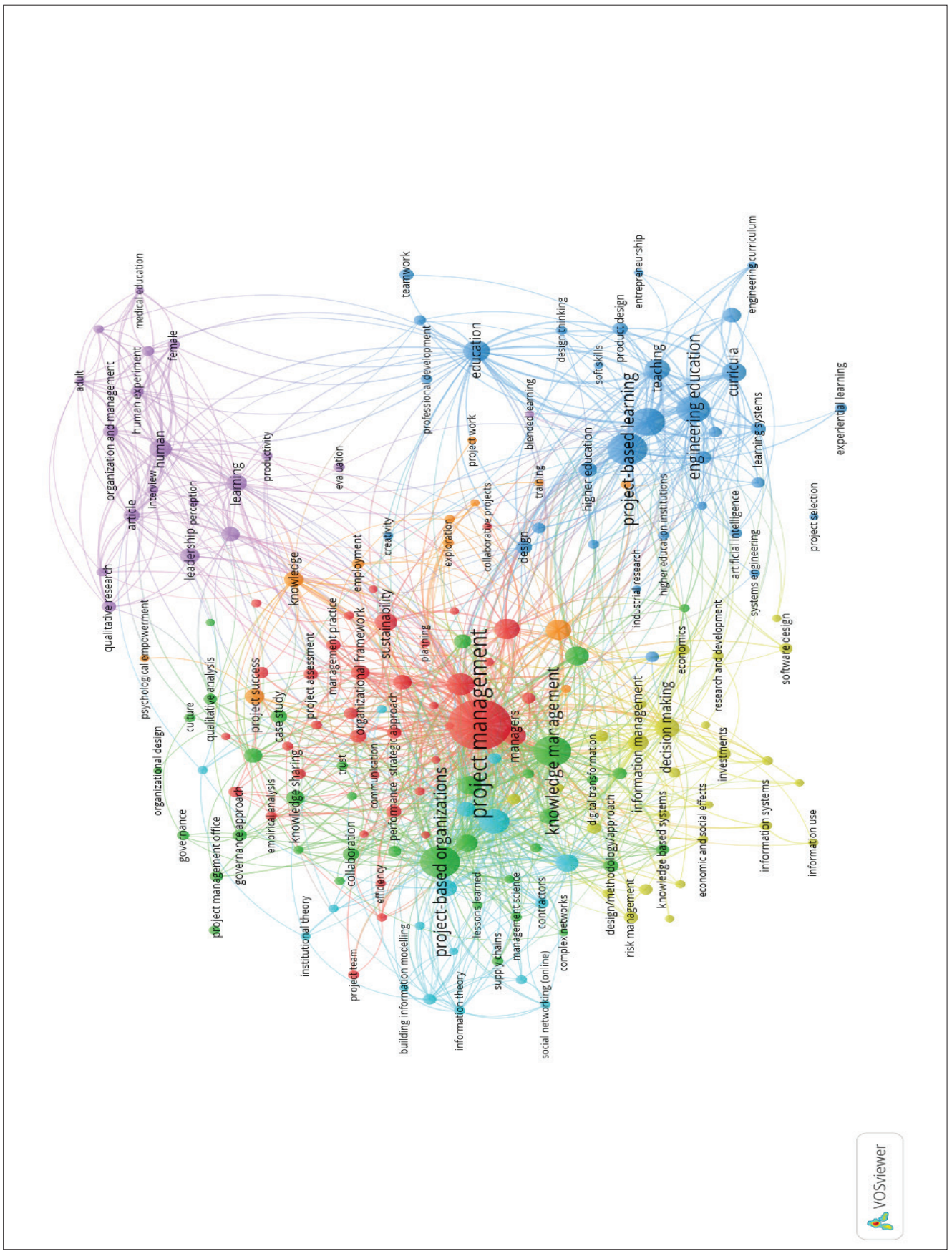
The initial data for bibliometric research was 1066 papers revealed in the Scopus database. The main parameters of the electronic search were the time period 2000–2022 and the keywords “project-based” and “organization” (that includes titles and abstracts of the papers, not editors reviews; the other filters were not used). The relevant publications were found in such fields of knowledge as “Business, Management and Accounting”, “Social Science”, “Decision Sciences”, and “Economics, Econometrics and Finance”.

To reveal new trends and tendencies and, most importantly, further promising directions of the research in the field, it is necessary to construct cluster analysis for the keywords using the abstracts of papers extracted from the Scopus database. VOSviewer is proven to be an effective tool for providing keyword network visualization (Shvindina, 2019; Soliman et al., 2023), which gives the analyst an

understanding of interconnections between main terms in a field of research. Using the abstracts of the chosen papers, VosViewer software enabled generating clusters based on 180 items (terms) refined by excluding duplicates and irrelevant ones. The analysis incorporated all keywords as units, employing a full counting method for assessment. As a result, six clusters were generated (see Fig. 2), which are marked in the figure with red, yellow, green, blue, purple, and blue colors, where the circle diameter means the frequency of mention of the term as a keyword in the selected paper, and the bigger diameter means the most frequently used terms.

The findings from the bibliometric analysis reveal key areas of scientific research focused on project-based organizations. The analysis delineates multiple research clusters, illustrating the connections between “project-based organizations” and related themes such as “project management,” “project-based learning,” “construction industry,” “learning,” “knowledge management,” and broader management concepts.”

Figure 2: Identification of relationships between the concept of “project-based organization” and other terms in the time period of 2002–2022 (Developed by authors via VosViewer v.1.6.10, N=1066 papers, 180 items, frequency>6)



The interconnections and intersections between these clusters highlight the multidisciplinary nature of studying project-based organizations. As project-based organizations have gained prominence, researchers in the field of project management have explored their dynamics and practices. Simultaneously, the education sector recognizes the value of incorporating project management principles into its curriculum to develop the competencies needed by future employees.

The construction industry, in particular, heavily relies on project management practices due to the non-linear nature of construction projects. Consequently, research in this area has been extensive, focusing on effective project management in construction projects.

Additionally, the yellow and green clusters encompass general concepts commonly used in social sciences and management studies, indicating the broader applicability and relevance of project-based organizations beyond specific domains.

The diameter of the circles representing the significance of these research areas indicates the prominence of certain categories in the study. Key concepts such as “project management,” “knowledge management,” “project-based education,” and “design industry” emerge as central themes in the examination of project-based organizations. These findings underscore the multifaceted nature of project-based organizations and highlight the importance of studying various dimensions, including the abovementioned concepts and industry-specific contexts. Understanding these aspects contributes to a deeper comprehension of project-based organizations and facilitates the development of effective strategies and practices in managing projects within these organizational structures.

Similar conclusions can also be drawn from the density of connections between the concepts (See Fig. 3)

**Figure 3:** The visualization of connections density between concepts for “project-based organization” and other terms in the time period of 2002–2022 (Developed by authors via VosViewer v.1.6.10, N=1066 papers, 180 items, frequency>6)

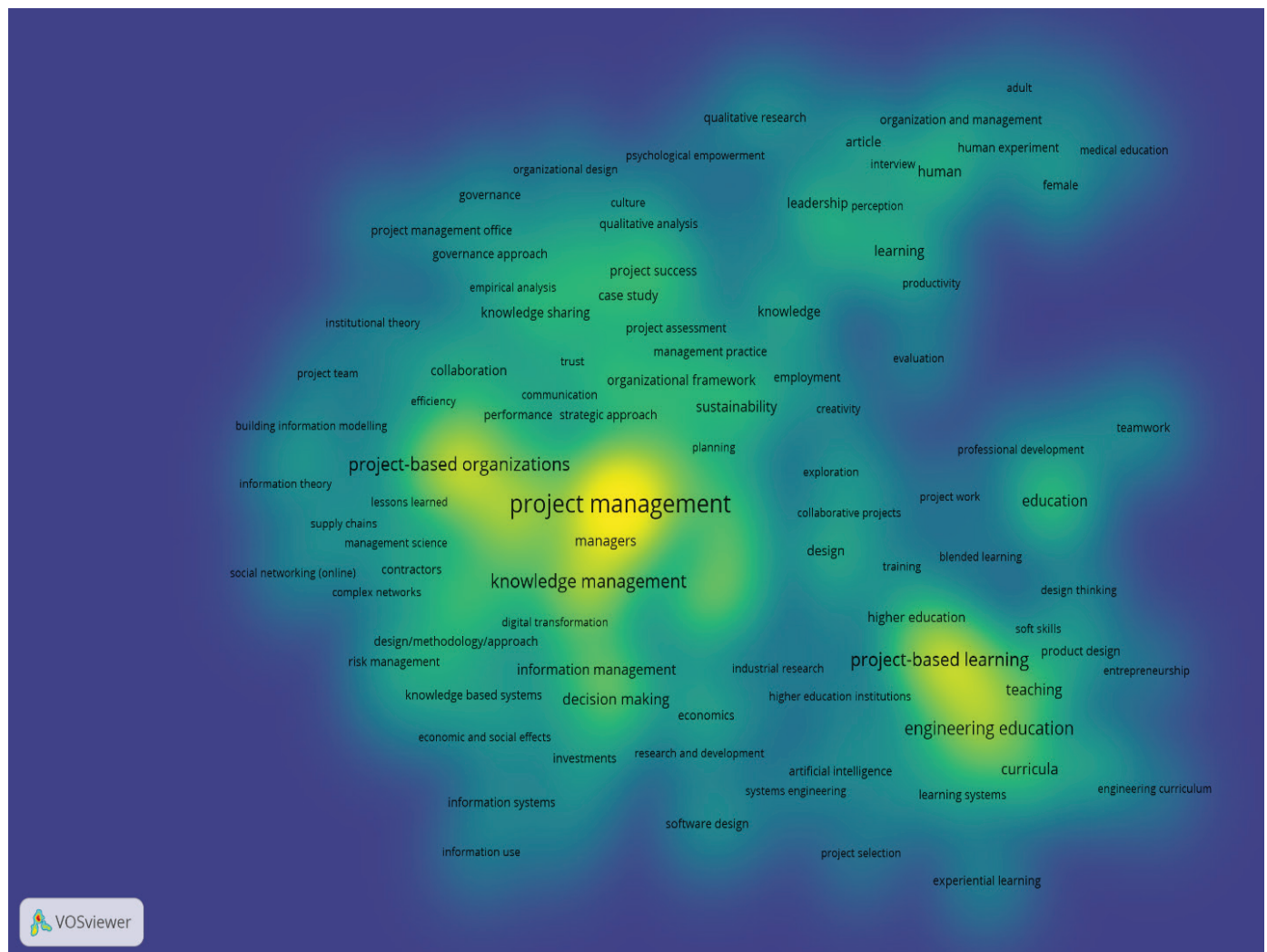


Figure 3 provides valuable insights into the connections between concepts related to project-based organizations. The gradient from blue to pale yellow represents an increasing density of connections. By examining the high density of relationships between project-based organizations and other areas of study, it becomes evident that certain economic categories frequently appear in research relevant to this topic and have strong connections with other concepts. Despite the

diversity of research vectors in the field of project-based organizations, there are specific keywords that stand out due to their extensive links with other concepts. These keywords, which represent crucial aspects of project-based organizations, are summarized in Table 1 (please see Table 1). The presence of significant connections underscores the importance of these keywords in the study of project-based organizations and their interrelatedness with other related concepts.

**Table 1:** The list of concepts in the cluster of project-based organizations (green cluster) (Developed by authors).

No	Keyword	Occurrence	No	Keyword	Occurrences
1	project-based organizations	101	19	governance	10
2	knowledge management	90	20	digital transformation	9
3	project-based	35	21	management science	9
4	surveys	35	22	organizational structures	9
5	societies and institutions	30	23	critical success factor	8
6	conceptual framework	23	24	culture	8
7	knowledge sharing	23	25	supply chains	8
8	organizational learning	21	26	temporary organization	8
9	knowledge transfer	19	27	trust	8
10	case study	18	28	construction sectors	7
11	collaboration	17	29	engineering research	7
12	design/methodology/approach	15	30	integration	7
13	governance approach	13	31	lessons learned	7
14	industrial management	13	32	networks	7
15	knowledge based systems	12	33	organizational cultures	7
16	project management office	12	34	complex networks	6
17	project performance	12	35	organizational design	6
18	qualitative analysis	11	36	project-based work	6

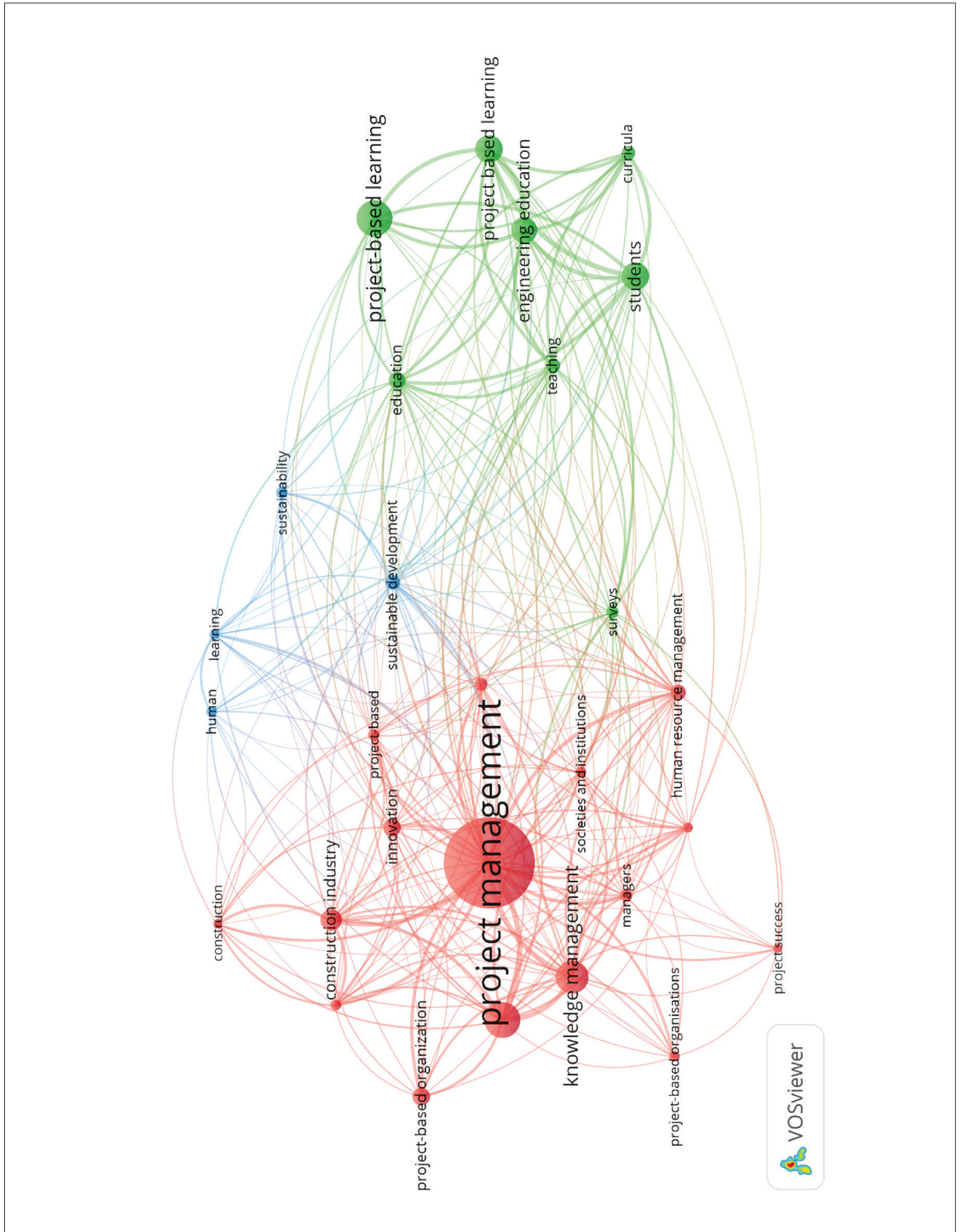
This analysis reveals that the economic categories associated with project-based organizations play a central role in the research landscape, fostering connections with various spheres of study. The density of these connections indicates the depth and breadth of research conducted in these areas, providing valuable insights for researchers, practitioners, and policymakers engaged in the study and management of project-based organizations.

Table 1 provides significant findings on the most frequently mentioned concepts in the context of project-based organizations. Notably, concepts related to projects, such as “project management,” “project-based learning,” and “project-based organization,” emerge as prominent themes. Furthermore, education-related concepts hidden within the terms “students,” “engineering education,” and “teaching” also feature prominently. However, it is worth highlighting that “knowledge management” is among the top five most cited concepts, indicating

the strong association between project-based organizations and knowledge transfer, as well as the implementation of innovations resulting from these endeavors.

This association between project-oriented organizations and knowledge management is further underscored by the interconnectedness of these concepts depicted in Figure 4. By increasing the frequency of terms used to >26, we received the most common keywords used in the study of project-based organizations. This suggests that researchers recognize the importance of **knowledge management** within project-based organizations, emphasizing its role in facilitating effective project implementation and driving innovation. The interconnections and the emphasis on these areas not only underscore the urgency but also serve as compelling evidence for selecting knowledge management as a focus for further research. The close connection between project-based organizations and

Figure 4: Identification of the most common keywords related to the "project-based organization" in the period of 2002–2022 (Developed by authors via VosViewer v.1.6.10, N=30 papers, 28 items, frequency>26)



*knowledge transfer* signifies the dynamic nature of these organizations, where the successful execution of projects relies on the exchange and application of knowledge. By acknowledging and exploring this relationship, researchers and practitioners can develop strategies and practices that enhance knowledge sharing, collaboration, and learning within project-based organizations, ultimately leading to improved project outcomes and organizational performance.

Overall, the findings from Table 1 and Figure 4 highlight the multidimensional nature of project-based organizations, encompassing project management, education, and knowledge management. By examining these interconnections, researchers can delve deeper into the intricacies of project-based organizations, fostering a comprehensive understanding of their dynamics and paving the way for informed decision-making and innovative approaches within these organizational contexts.

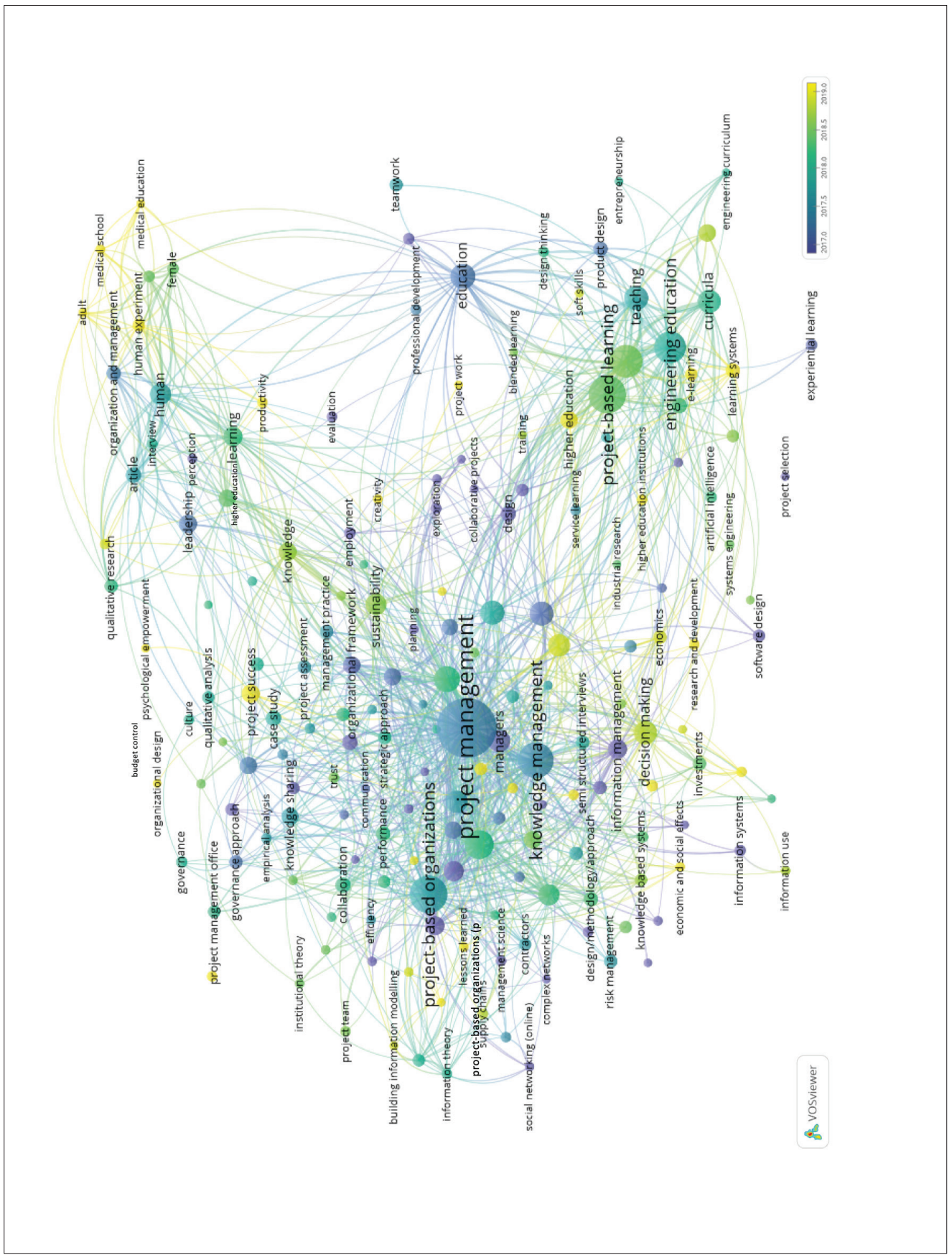
“Knowledge management” is part of the largest red cluster. The process of knowledge management can be described as the management and exchange of knowledge circulating in the organizational environment. This knowledge can be collective or individual, belong to the organization’s personnel, and be obtained externally from related companies and institutes (Mohammed, 2015). Therefore, the connection between the concepts of “project-based organizations” and “knowledge management” indicates the intention of such organizations to foster new knowledge exchange toward innovations.

The overlay visualization was made to reveal the tendencies in time and chronology of the key terms’ appearance (see Fig. 5), as it verifies the latest trends in the academic field and classifies the items in timescale. As shown in Figure 5, more recent terms are more yellow, and the scores of the items are determined by the time since publication. The density of the appearance of the term in publications determines the average period of publications which is 2017-2019. Notably, the term “project-based organization” was heavily used in the latter half of 2017, coinciding with the appearance of “knowledge management.” This temporal association suggests that researchers in the field recognize the close connection between project-based organizations and trending concepts in the domains of management and education. Recent years have witnessed a surge in the mention of keywords such as “learning systems” and “e-learning.” This trend reflects the growing adoption of project-based approaches in education, which aims to integrate innovation into educational practices and equip students with skills relevant to real-world working environments. The emphasis on these keywords underscores the recognition of project-based education as a contemporary trend in the educational sphere.

Furthermore, the presence of terms such as “project success,” “critical success factor,” and “digital transformation” in the analyzed literature highlights the imperative for project-based organizations to leverage technologies and implement effective strategies that optimize outcomes, to evaluate the team performance, as well. These associations indicate a focus on utilizing technological advancements and team dynamics to enhance project success rates and achieve optimal results within project-based organizations.



Figure 5: Overlay visualization of relationships between the concept "project-based organization" and others in the period of 2000–2022 (Developed by authors via VosViewer v.1.6.10, N= 1066 papers, 180 items, frequency>6)





The oldest terms, such as “managers,” “project portfolio management,” “information management,” “human resource management,” “organizational framework,” “management science,” “industrial management,” “project managers,” “societies and institutions,” “industry,” “social networking,” and “competition,” represent foundational concepts that have long been integral to the academic discourse. These terms reflect the early exploration of managerial practices, organizational structures, and the broader socio-economic context within which projects and organizations operate. The methods employed during this period primarily revolved around conceptual frameworks and exploratory approaches, seeking to establish a theoretical foundation for further research.

Moving to the middle age terms, we observe the emergence of concepts such as “organizational learning,” “organizational cultures,” “decision making,” “economics,” “knowledge transfer,” “knowledge management,” “knowledge sharing,” “sustainable development,” “innovations,” “project management office,” “efficiency,” and “construction.” These terms indicate the maturation of the field and the recognition of critical factors influencing project-based organizations. The research methods employed during this period shifted towards more empirical approaches, including literature reviews, surveys, case studies, semi-structured interviews, and empirical analysis. These methods aimed to gather empirical evidence, explore real-world contexts, and provide practical insights into organizational dynamics, knowledge management, and project management practices.

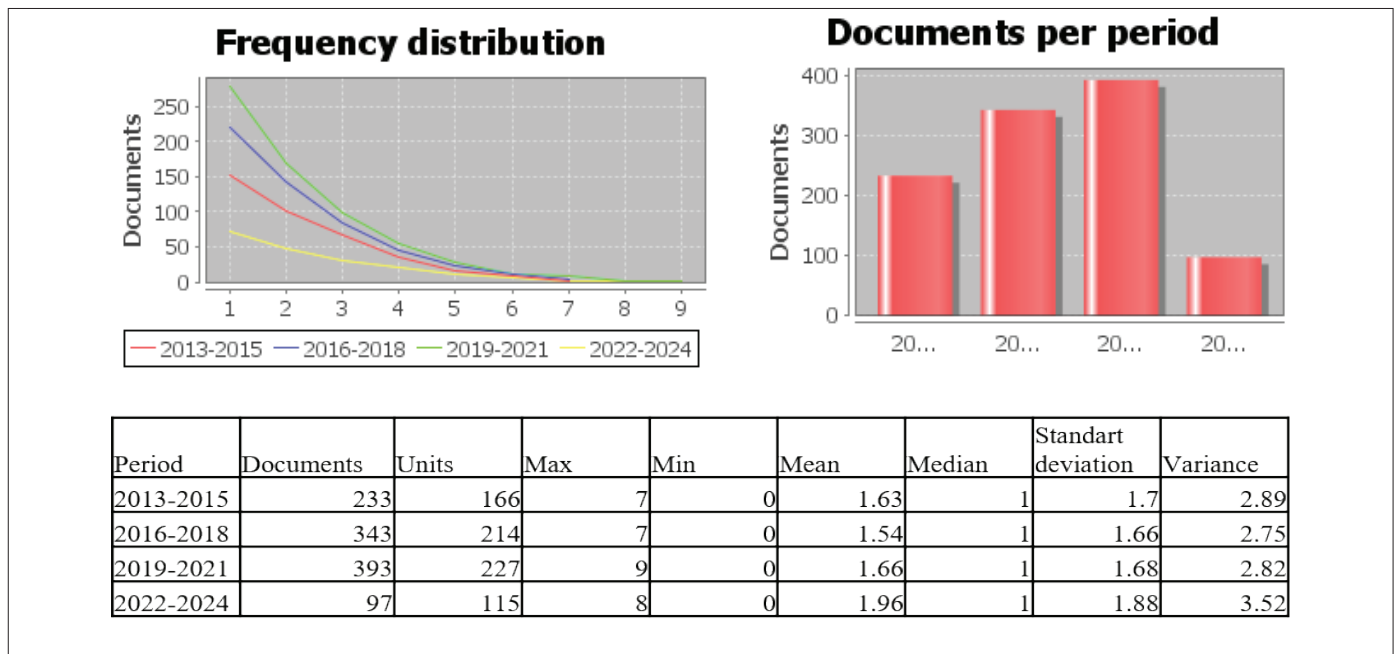
Finally, the youngest terms in the field encompass “critical success factor,” “project success,” and “digital transformation.” These terms reflect the contemporary focus on outcomes, performance, and

the evolving digital landscape. The methods employed in this phase involve a search for methodological approaches that can effectively measure and assess project success, critical success factors, and the implications of digital transformation. This indicates a growing emphasis on rigorous methodologies that contribute to the advancement of the field through robust measurement frameworks, validation studies, and innovative research designs.

We conducted a chronology analysis using VosViewer and supplemented it with SciMAT to enhance the reliability of our results. In addition to the capabilities of VosViewer, SciMAT offers advanced deduplication and visualization features that are crucial for this research. It provides comprehensive modules for configuring scientific maps, which aid in monitoring, intervention, and selection throughout the map production process. SciMAT automates tasks such as merging thematic words and filtering out common terms, proving invaluable for interpreting thematic principles (Cobo et al., 2012). The integration of SciMAT and VosViewer tools creates a robust suite of quantitative analyses, effectively blending statistical and graphical outcomes to study the topic of global cities (Bagheri et al., 2023). This dual-tool strategy not only ensures a more flexible approach but also substantiates the reliability of our findings by leveraging the strengths of both software applications.

For the SciMAT analysis, the dataset should be divided into periods. The data being analyzed includes documents published between 2013 and 2024. Consequently, we opted to segment this timeframe into four equal periods. Specifically, the study divided sample into the following research periods: 2013–2015, 2016–2018, 2019–2021, and 2022–2024. The details of data analysis are illustrated in Figure 7.

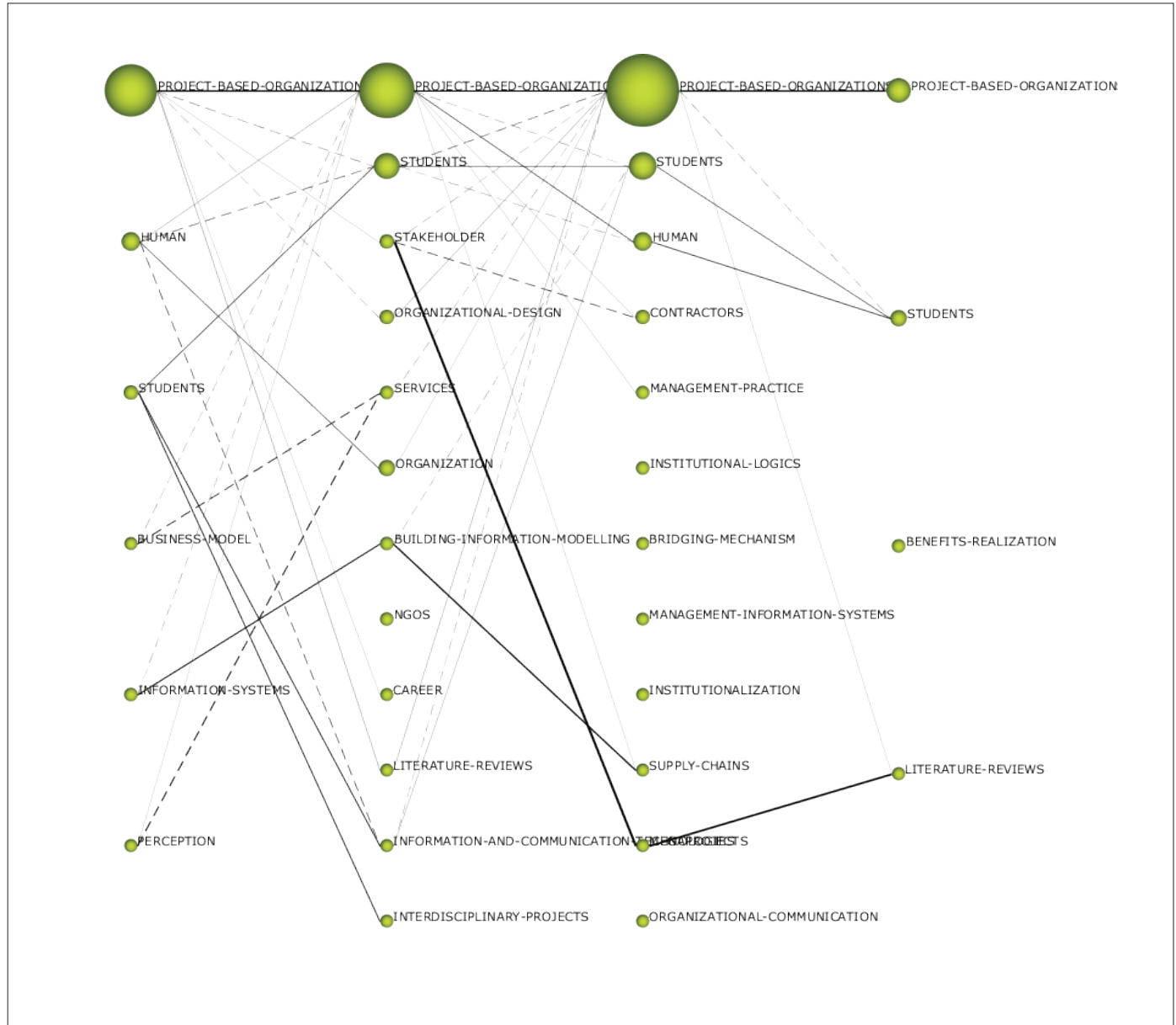
Figure 7: A distribution of the papers which used the concept “project-based organization” for 4 time periods (Developed by authors via SciMAT v1.1.06, N=1066 papers)



In this study, the words of the analysis unit include “author words”, “source words” and “added words.” The data reduction thresholds of the four time periods were 2, 2, 2, and 2, and the selection matrix was the Co-occurrence matrix. The reduction in the network threshold was 1,1,1,1. The standard network similarity index, equivalence index and algorithm of the cluster were simple center algorithms. The maximum selection of the network was 50 and the minimum value was 0, which chose the Jacquard index for its evolution map similarity index and Inclusion Index for the overlap diagram. According to the

bibliometric methodology used by SciMAT, evolution maps graphically display the development patterns within the field across different periods, showcasing the interactions between various graphical elements. The size of the spheres corresponds to the publication count linked with each theme. Solid lines depict thematic connections across areas, while dotted lines signify shared keywords among related thematic areas. Additionally, line thickness reflects the rate of inclusion (Cobo et al., 2012). Figure 8 illustrates the conceptual evolution of the “project-based organization” concept.

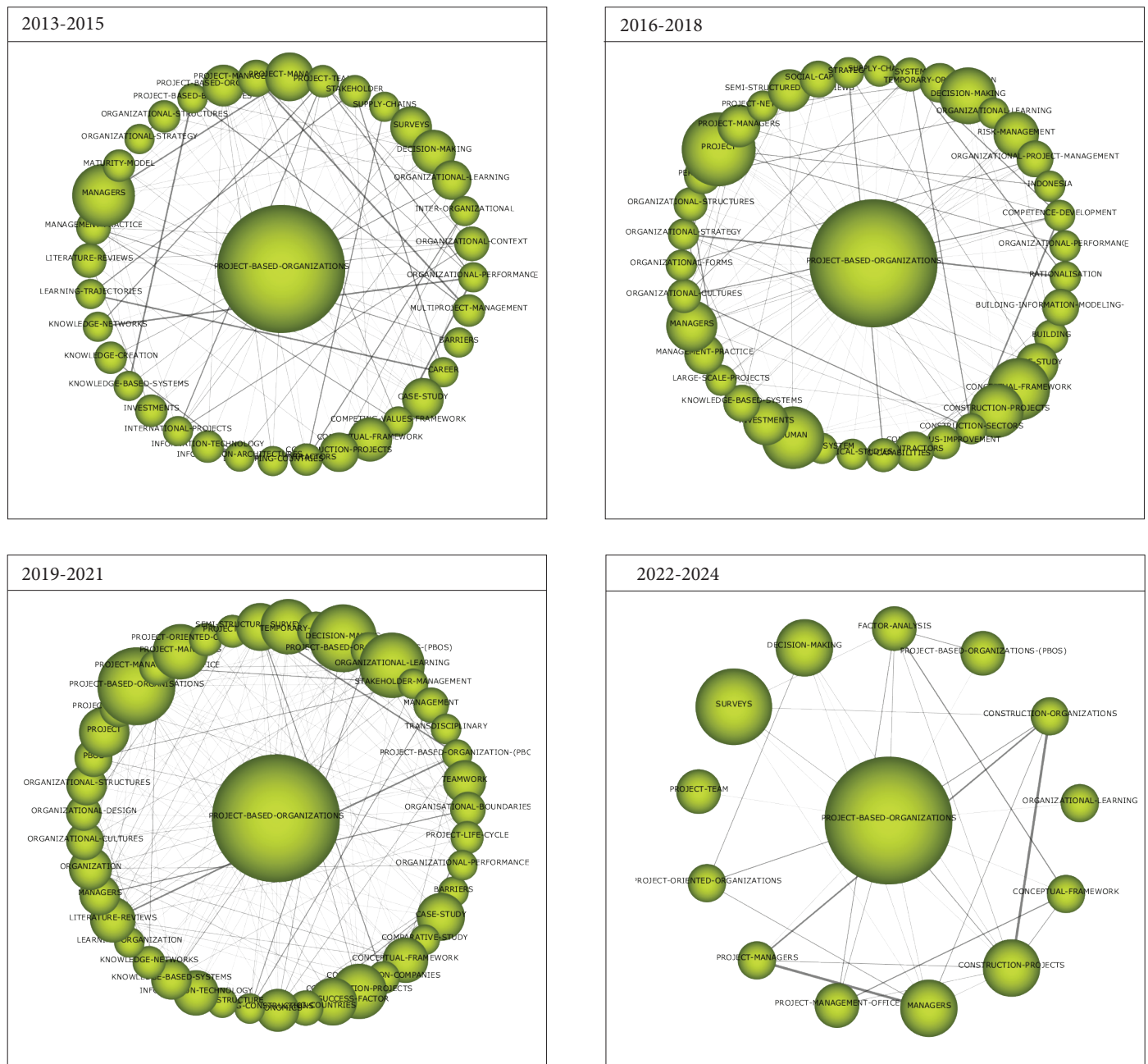
**Figure 8:** An Evolution map of papers with “project-based organization” concept for the time period 2013-2024 (Developed by authors via *SciMAT v1.1.06*, N=1066 papers, kind of network: co-occurrence, normalization measure: Equivalence index, cluster algorithm: centers simples, max cluster size: 50, min cluster size: 1, evolution measure: Jaccard index )



As observed on the Evolution map (Fig. 9), there is a strong thematic connection within the “Project-based Organization” cluster, notably with terms such as “students,” “human,” “organization,” “information-and-communication-technologies,” and “interdisciplinary-projects.” While the first two periods displayed numerous thematic and keyword connections among clusters, the third period showed these clusters becoming more distinct from each other. The “Project-Based Organization” theme consistently appears in Quadrant 1, where all motor themes are situated, and it dominates over other themes in the field. This prominence is reflected in the interlinks within the “Project-based Organization” cluster and its evolution across the

time periods (Figure 9), revealing the most popular keywords associated with this theme. Our dataset includes a comprehensive corpus of 1,066 scholarly papers on project-based organizations, each meeting the threshold of a minimum frequency of 2 and a minimum co-occurrence of 1 in terms of keyword usage (Figure 9). Through this analysis, we have identified dynamic shifts and emerging trends within the field by delineating the key thematic concentrations and their interconnections over time. This method enables us to visualize how dominant themes have evolved, emphasizing both enduring concepts and emerging ideas as they gain prominence.

**Figure 9:** Cluster network: Project-based organization in different periods (Developed by authors via SciMAT v1.1.06, N=1066 papers, min frequency=2, min co-occurrence=1)



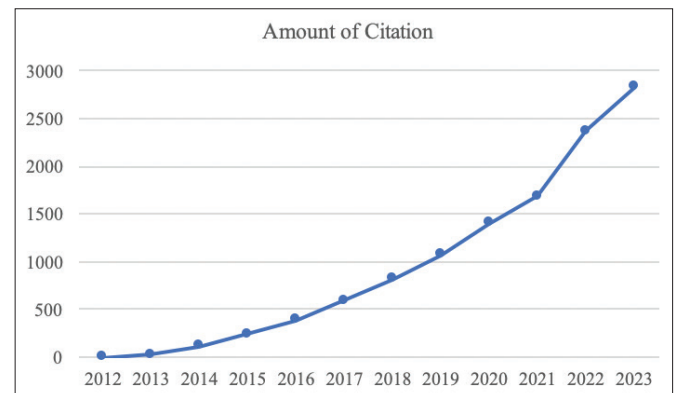
In the initial period, the “Project-Based Organization” cluster shows a centrality of 39.79 and a density of 20.89. The strongest internal links include “developing countries” with “information-technology” (0.67), “project-management-office” with “multiproject-management” (0.27), and “career and learning-trajectories”, “competing-values-framework” with “organizational performance”, “knowledge-based systems” with “project-based business”, “knowledge-networks” with “organizational performance”, and “supply chains” with “inter-organizational” (all at 0.25). In the second period, this cluster exhibits a centrality of 79.96 and a density of 17.36, with the most robust links between “Indonesia” and “organizational performance” (1.0), “construction sectors” and “competence-development” (0.25), “organizational strategy” and “rationalization” (0.25), and “construction-projects” and “building-information-modeling (BIM)” (0.23). During the third period, centrality increases to 87.38 with a density of 16.25. The strongest connections are between “literature-reviews” and “Project-Based Organization (PBO)” (0.25), “stakeholder-management” and “project-based organization (PBO)” (0.25), and “semi-structured-interviews” and “project-based organization (PBO)” (0.22). In the fourth period, the cluster’s centrality falls to 13.87 while density increases to 23.65. The most notable links are between “construction-projects” and “construction-organizations” (0.4), “managers” and “project-managers” (0.4), and “project-managers” and “construction-organizations” (0.25).

These patterns provide valuable insights into the evolution of research themes and their impact on both theoretical and practical aspects of project-based organizations. This analysis not only maps the thematic landscape of the field but also traces its scholarly progression, offering a strategic view of the development and intersections of core ideas. These findings from the VosViewer analysis are complemented by the use of SciMAT, which provided additional granularity in detecting thematic changes and key connections over time. By employing both tools, we ensured a robust analysis, capturing a comprehensive picture of the evolving landscape within project-based organizations. Significantly, keywords related to **knowledge-based management** appear consistently across all three periods of the chronological data.

## The interest over time by regions

A noteworthy observation is the sustained research interest in the investigation of project-based organizations, as depicted in Figure 10. The graph reveals a consistent upward trend in the number of citations received by relevant publications, particularly since 2012. Notably, the graph demonstrates a significant surge in citations in 2023, surpassing the growth observed in previous years. Utilizing the “Cited by” metric for selected papers provides compelling evidence of the increasing interest and attention directed toward project-based organizations over time (see Fig. 10). The continuous growth in citations indicates the enduring significance and relevance of the study of project-based organizations within the research community. This upward trajectory suggests a growing recognition of the unique characteristics, challenges, and opportunities associated with project-based organizational structures.

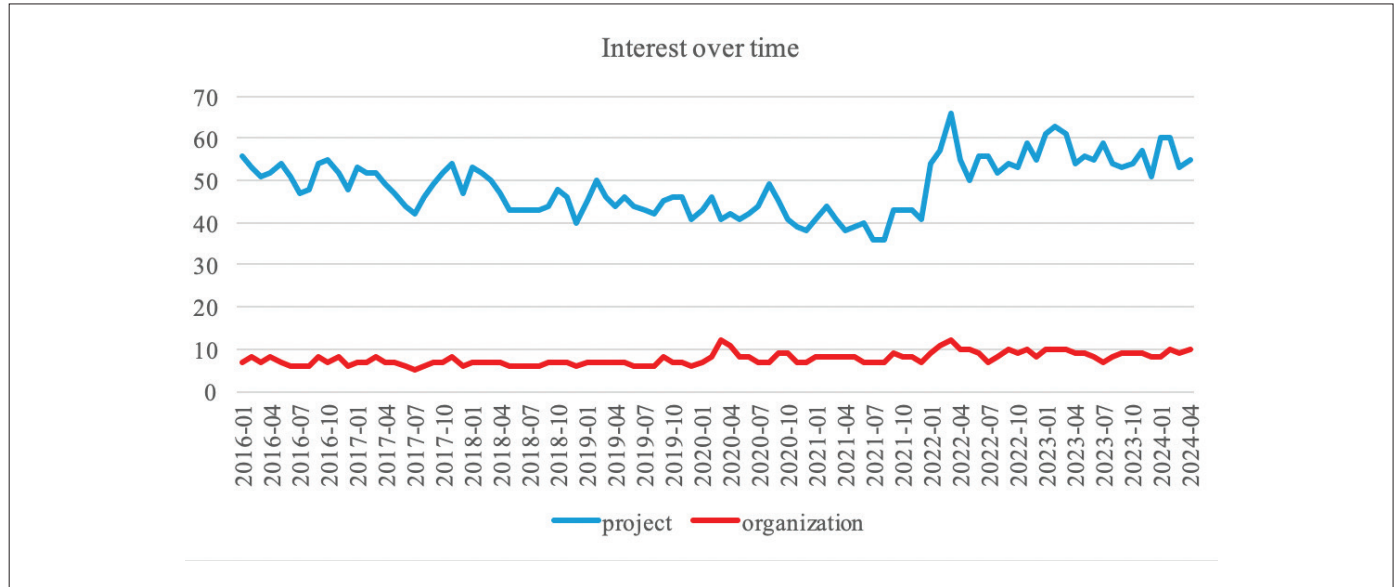
**Figure 10:** Number of citations of selected papers (Developed by authors via Scopus database with “Cited by”, N=1066 papers, n=12282 citations)



Using Google Trends can provide additional validation of the increased interest in a topic over time by analyzing the relative search volume and regional interest, offering insights into the popularity and public engagement with the subject. The comparison of the frequency of mentions (not in absolute, but relative values – as a ratio to the maximum number of mentions per period) of the terms “project” and “organization” showed the bigger interest in the project (see Fig. 11). However, in recent years interest in these concepts is decreasing, and the frequency of mentions of these concepts has somewhat synchronized. The maximum value appeared in March 2022, and the minimum value was observed in July 2021.

As for the distribution of requests by country, according to Google Trends, the search term for “project” is most prevalent in Ireland, Brazil, Poland, Australia, and New Zealand. In turn, the search term “organization” is most searched by users of the Philippines, Kenya, Nepal, Ethiopia, and Nigeria.

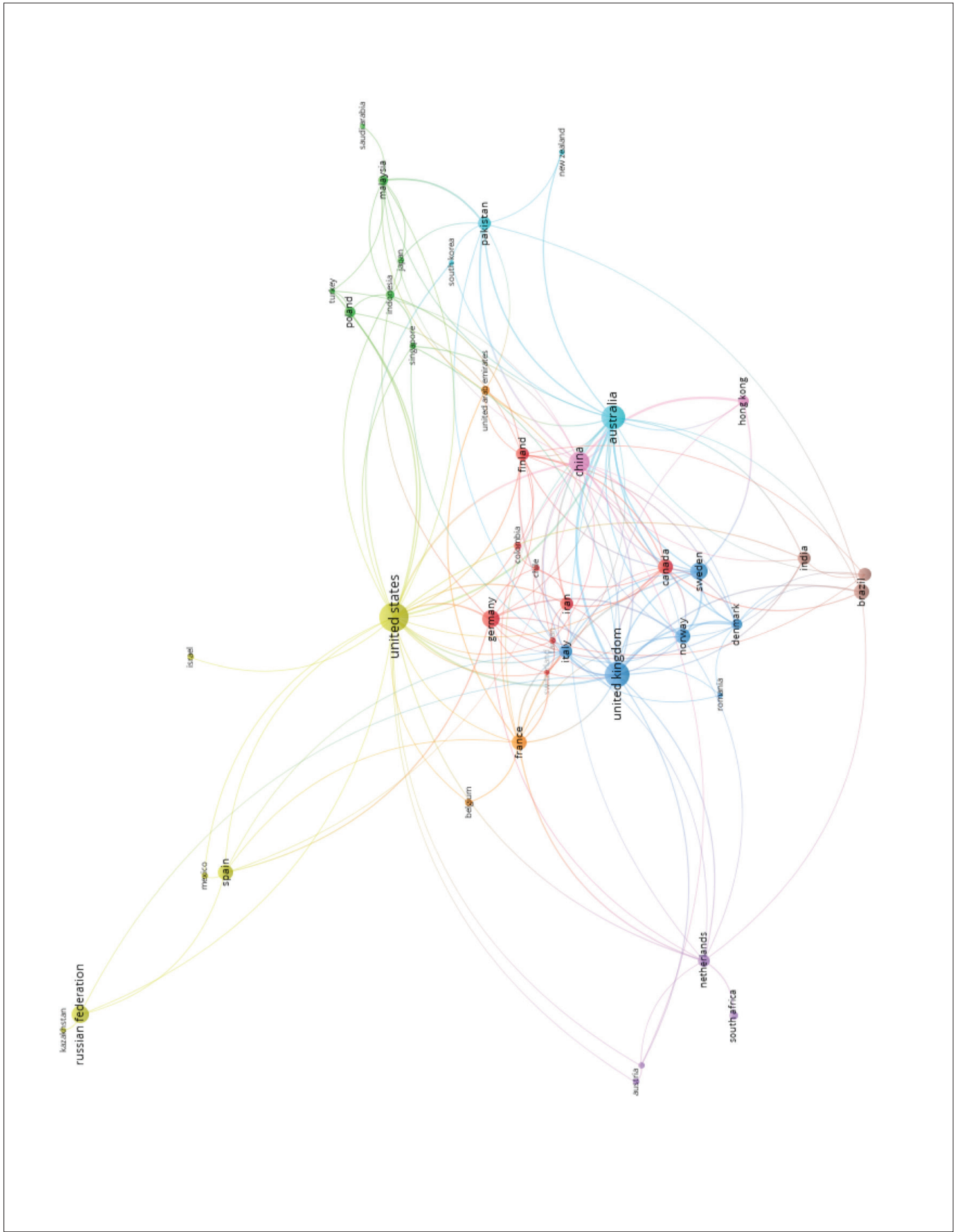
**Figure 11:** Results of trends analysis for the terms “project” (blue) and “organization” (red) around the world in 2016-2024 (Developed by authors via Google Trends, retrieved on April 4, 2024)



The regional aspect can be investigated deeper, with evaluating the most influential authors in the field by country. Coming back to the selected papers via the Scopus database, the geographic clusters developed via VOSviewer can indicate the countries that are the most significant contributors in a specific field based on factors such as co-authorship or co-citation patterns (see Fig.12). The data processing reveals nine clusters, indicating a high degree of collaboration,

knowledge exchange, and research synergy among the countries involved. This interconnectedness not only signifies shared research interests and joint projects but also underscores the global nature of scientific collaboration within the field. For instance, one notable cluster includes leading papers from the UK, featuring collaboration with researchers from Denmark, Italy, Norway, Romania, and Sweden (see Fig. 12).

Figure 12: The visualization of relationships between the most influential contributors by country (Developed by authors via VosViewer v.1.6.10, N=1066 papers, period 2000-2022)





This distribution highlights the diverse perspectives and global engagement that scholars from different geographical regions bring to advancing the discourse surrounding project-based organizations. In this realm, Rafael Ernesto Landaeta stands out as the most prolific author, having contributed five papers (for an analyzed period of time). Additionally, the field boasts strong representation from researchers affiliated with esteemed institutions in China, the United States, and Canada, including Old Dominion University, the University of Central Florida, and the University of Pretoria.

### The results of content analysis of the most seminal papers

Bibliometric analysis is valuable as it provides quantitative insights into scholarly publications, authors, journals, and their interrelationships by analyzing citation patterns, publication trends, and collaboration

networks. It aids in assessing the impact and visibility of research, evaluating the productivity of authors and institutions, emerging research areas, and key contributors. However, to identify and understand the knowledge gap, content analysis might be instrumental applied to papers published by key contributors. By examining the content, themes, and methodologies employed in these papers, researchers can discern the prevailing trends, topics, and areas of focus within the field. By comparing and contrasting the existing literature with the identified knowledge gaps, researchers can pinpoint areas that have received limited attention or require further exploration. To do so, the most cited papers from the sample (1066) were selected by the number of citations and analyzed by their content, and ten of the most cited papers were analyzed in-depth. The main outcomes of content analysis and comparison of the ideas are presented in Table 2.

**Table 2:** The outcomes of content analysis of the most seminal papers in the field (cluster “project-based” and “organizations”), timeline 2002-2022, where FWCI – field-weighted citation impact, NoC – number of citations in Scopus database, PM – Project Management (Developed by authors)

FWCI	NoC	Authors, reference	Title	Industry/ Field	Future directions of research
14.5	343	(Mir & Pinnington, 2014)	Exploring the value of project management: Linking Project Management Performance and Project Success	Construction Industry; Project-based Organizations; Office Management	Detection of the influence of national culture on the relationship between PM Performance and Project Success; data collecting from relevant projects stakeholders, particularly project owners, executive directors, and project steering groups
8.36	187	(Bakker <i>et al.</i> , 2016).	Temporary Organizing: Promises, Processes, Problems	Construction Industry; Project-based Organizations; Office Management	PM as a temporary organizing phenomenon should be explored further empirically
8.04	162	(Wiek <i>et al.</i> , 2014).	Integrating problem and project-based learning into sustainability programs: A case study on the school of sustainability at Arizona state university	Education For Sustainability; Higher Education Institutions; Sustainable Development	Further development of problem- and project-based learning, namely developing greater program cohesion and coordination in the field of sustainability, synthesizing past products, and lessons learned to build new insights, etc.
8.4	158	(Winch, 2014)	Three domains of project organising	Construction Industry; Project-based Organizations; Office Management	More detailed research on interfaces between the three domains, particularly governance and resourcing in PM; research on project organizing to the interfaces between the temporary organization and the types of permanent organization that configure any project.
6.74	149	(Eriksson, 2013)	Exploration and exploitation in project-based organizations: Development and diffusion of knowledge at different organizational levels in construction companies	Project Delivery; Contractors; Construction Industry	Research on organizational ambidexterity in PBOs; the impact of cultural aspects on exploration/exploitation paradox; the tensions between short-term efficiency and long-term innovation, based on empirical data
5.12	137	(Brundiers, & Wiek, 2013)	Do we teach what we preach? An international comparison of problem- and project-based learning courses in sustainability	Education For Sustainability; Higher Education Institutions; Sustainable Development	Evaluation of how far problem- and project-based learning courses in sustainability support the acquisition of key competencies in sustainability and lead to real-world impacts, as envisioned initially (empirical research)
5.23	129	(Wiewiora <i>et al.</i> , 2013)	Organizational culture and willingness to share knowledge: A competing values perspective in Australian context	Actor-Network Theory; Cameron & Quinn Matrix of Culture types; Case study	Further investigation of how different organizational culture types impact knowledge sharing in PM; scale-up cross-cultural surveys are needed to eliminate the possible contradictories caused by small sample research; another direction is research on inter-project knowledge sharing
6.19	129	(Bartsch <i>et al.</i> , 2013)	Learning in project-based organizations: The role of project teams' social capital for overcoming barriers to learning	Innovation; Trade Fair Participation; Book Fair	An empirical study in multiple project-based industries to examine other possible elements of project members' social capital with their colleagues outside the project and to discover the factors that support outcomes of intra-organizational social capital formation; future research within knowledge-based view and link of knowledge transfer to PM performance
8.02	122	(Pemsel, & Wiewiora, 2013).	Project management office a knowledge broker in project-based organisations	Construction Industry; Project-based Organizations; Office Management	Identification of capabilities for managing active knowledge-sharing and relationship-building activities in project-based organizations
9.51	113	(Cao <i>et al.</i> , 2016)	Identifying and contextualising the motivations for BIM implementation in construction projects An empirical study in China	Information Modeling; Facilities Management; Construction Industry	Scale-up cross-cultural and cross-national research, validation of the applicability of the analysis results in different cultural and market contexts

The analyzed TOP-10 papers are quite different in terms of their scale and scope, and methodology; for instance, the paper by Winch (Winch, 2014) presents the theoretical concept of how three domains of project management overlap and interfere, while (Brundiens & Wiek, 2013) published the outcomes of empirical research. Nevertheless, the content analysis gave us several categories and directions for further research that if united with the previous findings using bibliometric tools, allowed formulate the following:

- Influence of national culture on project management performance and project success, cross-cultural studies in project management (Brundiens & Wiek, 2013; Wiewiora *et al.*, 2013; Cao *et al.*, 2016).
  - SciMAT and VosViewer: The bibliometric analysis highlighted the global engagement in clusters involving various countries (e.g., UK, Denmark, Italy), suggesting an underlying cross-cultural component in project management research.
- Further empirical research is needed to explore project management as a phenomenon, examining its dynamics, challenges, and best practices in different contexts (Bartsch *et al.*, 2013; Bakker *et al.*, 2016), as well as interfaces between different aspects of this multifaced phenomenon (i.e., governance, resourcing, and project organizing (Winch, 2014).
  - SciMAT and VosViewer: The analyses identified evolving themes across periods, reflecting dynamics and challenges in project management. For instance, different periods showed changing centrality and density in clusters, suggesting shifts in focus and exploration of various facets of project management, such as governance and organizing.
- Organizational ambidexterity in project-based organizations (Eriksson, 2013), the link between organizational culture, knowledge sharing, and project success (Wiewiora *et al.*, 2013).
  - SciMAT and VosViewer: Mention of keywords related to “knowledge management” and “organizational performance” across different periods aligns with exploring the impact of organizational culture on project success. The presence of these themes over time indicates continuous interest and relevance in researching how knowledge sharing impacts project outcomes.
- Linking knowledge transfer to project management performance aimed at investigating the deeper knowledge-based view on project management, examining capabilities for managing knowledge-sharing and relationship-building activities in project-based organizations (Bartsch *et al.*, 2013).
  - SciMAT and VosViewer: Strong thematic connections were seen in terms like “knowledge-based systems” and “project-based business”, which suggest ongoing research into how knowledge management practices influence project management performance. Knowledge sharing and knowledge transfer as components of knowledge management have emerged consistently in a period since 2013 and continue to be urgent topics for research due to the persistence of numerous unresolved questions.
- Collecting qualitative and quantitative data on social capital formation in project-based organizations in multiple project-based industries (Bartsch *et al.*, 2013).
  - VosViewer & SciMAT: The specific term “social capital” was highlighted in publications 2016-2018 (Fig.9), the robust linkages between different organizations and sectors (like construction and organizational strategy) may imply an underlying focus on network-building and social capital in diverse project-based environments. Moreover, semi-structured interviews aimed at collecting and processing qualitative data and surveys (quantitative data) were mentioned as the most frequent terms (Table 1).
- Development and evaluation of problem- and project-based learning towards sustainability (Brundiens, & Wiek, 2013; Wiek *et al.*, 2014) that embraces the assessing of key competencies and real-world outcomes through empirical research, with a focus on developing greater program cohesion and coordination in problem- and project-based learning related to sustainability.
  - VosViewer: Analysis using VosViewer revealed strong thematic links between “project management” and “sustainable development” as well as “sustainability”. This indicates a significant and growing interest in integrating sustainability principles into project management practices..

These research categories address various aspects of project-based organizations, including cultural influences, learning methodologies, organizational dynamics, knowledge sharing, and performance outcomes, providing opportunities for further exploration and advancing knowledge in the field. The most mentioned subject of future research is empirical studies of PBOs with different cultural and individual backgrounds. Also, in the educational field, researchers expect further development of problem- and project-based learning courses in sustainability support.

### Concluding remarks and discussion

In conclusion, this study has shed light on several key aspects within the field of project-based organizations. Through analyzing publication patterns, authors' contributions, and research trends, this study presents valuable insights into the dominant themes, influential authors, and conceptual and geographic clusters that shape the scholarly discourse in this academic field. The findings have highlighted the significance of topics such as project management, knowledge transfer, organizational culture, and learning methodologies.

The chronological analysis of terms and methods demonstrates the progression of research interests and methodologies in the academic field of project-based organizations. From foundational concepts to exploratory frameworks, empirical analyses, and methodological advancements, the field has evolved to encompass a broader range of topics and employ diverse methodologies. This evolution signifies the ongoing quest for a comprehensive understanding of project-based organizations, their underlying mechanisms, and the factors that contribute to their success.

The dual-tool strategy (VosViewer & SciMAT) not only reinforced the reliability of our findings but also enhanced our ability to interpret subtle shifts in the thematic structure of the field. This approach revealed significant connections between project-based organizations and sectors like construction, as well as themes within organizational and social sciences. Keywords related to knowledge-based management were consistently prominent, demonstrating their enduring relevance across the studied periods. The combination of VosViewer and SciMAT illustrates the power of a multi-tool approach in bibliometric analysis. By integrating these tools, we could leverage their unique strengths: VosViewer for its efficient data processing and broad thematic mapping, and SciMAT for its detailed visualizations and deep analytical capabilities. This strategic use of technology-facilitated a more nuanced understanding of complex interrelationships and trends, guiding us through the rich thematic terrain that defines the scholarly discourse on project-based organizations.

The deeper content analysis of the most cited papers not only identifies knowledge gaps and suggests areas for further research but also provides a reliable roadmap for future investigations. This reliability stems from the strong alignment between the identified research categories from the content analysis and the results derived from bibliometric tools like VosViewer and SciMAT. These categories include: a) Influence of National Culture and Cross-Cultural Studies; b) Exploring Project Management as a Phenomenon; c) Organizational Ambidexterity and Culture in Project-Based Organizations; d) Knowledge Transfer and Management Performance; e) Social Capital Formation in Multiple Industries; f) Sustainability in Problem- and Project-Based Learning.

These areas have been consistently echoed in the bibliometric analyses, underscoring the significance of these themes in the current and future landscape of project management research. Each category represents a critical vector for further investigations.

In conclusion, this study introduces a novel approach by integrating bibliometric tools with content analysis to explore the realm of project-oriented organizations—a field that continues to command significant scholarly attention globally, intersecting with disciplines such as project management, education, design, and engineering business. The unique methodology of this research has uncovered a clear synergy between knowledge transfer and innovation, evidenced by persistent themes across scholarly works that delve into the integration of innovations within project-oriented organizations. Our findings from a rigorous examination using VosViewer and SciMAT, in conjunction

with content analysis, have unveiled contemporary research themes centered on success factors in project management, critical transformations, problem-based learning, and the development of innovative methodologies. These emerging trends not only illustrate the dynamic and evolving nature of the field but also emphasize the ongoing importance and impact of these research domains. This study sets a precedent in the scholarly exploration of project-based organizations, providing a comprehensive and nuanced understanding of their complexities and contributions to various sectors.

In our discussion, it's important to note that this systematic review aligns with the WWHW framework (What data? Where were data collected? How were data processed? Why is that important?) for bibliometric research, and incorporates TCM (Theory, Context, and Methodology) for the content analysis portion. This integration represents a novel combination not commonly explored in existing literature, even among frameworks offered by recognized experts like Paul et al. (2023), who are well-known for their work on framework-based systematic reviews. Our approach, therefore, contributes a unique perspective to the field, blending established methodologies to yield new insights.

We need to mention that this study has its limitations, such as only one database was analyzed (Scopus), and the timeline for analysis was 22 years, while project-based organizations emerged much earlier. However, these limitations do not diminish the value of the research, and the findings not only form a comprehensive framework for understanding the key concepts in the field and their evolution, but they also allow for the identification of the knowledge gaps and areas for further research, which provides a roadmap for future investigations.

#### The CRediT roles are as follows:

1. Conceptualization: Hanna Shvindina, Daryna Piven
2. Data Curation: Hanna Shvindina
3. Formal Analysis: Daryna Piven
4. Funding Acquisition: Hanna Shvindina
5. Investigation: Daryna Piven, Hanna Shvindina
6. Methodology: Hanna Shvindina
7. Project Administration: Hanna Shvindina
8. Resources: Hanna Shvindina
9. Software: Daryna Piven
10. Supervision: Hanna Shvindina
11. Validation: Hanna Shvindina
12. Visualization: Daryna Piven
13. Writing – Original Draft: Daryna Piven
14. Writing – Review & Editing: Hanna Shvindina

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## Software and e-tools used in the research

VosViewer v.1.6.10. Available at <https://www.vosviewer.com/>  
 SciMAT v1.1.06. Available at <https://sci2s.ugr.es/scimat/download.html>  
 Google trends. Retrieved April 5, 2023, from <https://trends.google.com/home>

