Exploring hybrid telework: A bibliometric analysis

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A B S T R A C T

Purpose: the aim of this paper is to analyze the evolution of understanding of hybrid telework, especially after the boom experienced in the global pandemic of COVID-19, which has given rise to new ways of working.

*Design: /*methodology/approach: in this study, bibliometrics and scientific mapping were used to analyze the conceptual structure of hybrid telework based on 104 documents extracted from the Web of Science (WoS) database. Thanks to the co-word analysis performed with SciMAT, the main themes were mapped, and the evolution, importance and relevance of terms related to hybrid telework were identified.

Findings: the body of research literature about hybrid telework is underdeveloped even though it is the most valued option of telework, both by organizations and employees. There is a lack of published studies in the public sphere and in such relevant fields as occupational health.

Practical implications: this study is the first bibliometric analysis conducted for hybrid telework and demonstrates how hybrid telework is key for organizations to manage the emerging challenges in this field: new preferences from employment candidates, occupational health, etc, and how important it is to have a proper management of hybrid telework in organizations.

Originality/value: this study explores in detail the evolution of hybrid telework, an underexplored telework modality, given its growth as a mode of work as a consequence of the COVID-19 pandemic. It reveals critical points, dilemmas, paradoxes, and research gaps.

1. Introduction

Hybrid teleworking is a combination of working remotely and working from the office [1,2].

Telework, on the other hand, is a modality of work in which work is only performed from a location outside of the office [3]. That is, if we speak only of telework, we are referring to the general term that designates the performance of work outside of the office. Hybrid telework is the combination of working from the office and working from a different location, which is usually the employee's home [4]. In this sense, hybrid telework is a modality within telework that grants greater flexibility in terms of schedules and locations, with respect to full telework [5].

Numerous reports have shown the two terms differentiated [6,7]. Prior to the COVID-19 pandemic, hybrid telework already existed, but its implementation was more often *ad hoc* [8]. For example, in the USA, according to Gilson et al. [9], this practice was

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performed by 15 % of workers. As a second example, in Australia a survey was conducted from April 2022 with a total of 2094 participants and a response rate of 88 %, which established that 24 % of people teleworked one or two days per week in March 2020, compared to 46 % who did so in April 2022 [6], i.e. the number of people working under a hybrid telework modality doubled in two years. In Spain, a survey conducted from May 25, 2021 to August 23, 2021 [10], asked respondents how many days a week they would like to telework after COVID-19. A total of 24.7 % answered that their preference was to telework every day while occasionally coming to the office, and 16.4 % chose as their preference to work at the office 3 days a week and telework the other 2 working days per week.

COVID-19 caused nearly all companies and employees to perform full and forced teleworking, something that is reflected in the surveys. This was mainly due to legal restrictions imposed by governments on grounds of public health, and in most cases there were significant limits on leaving the house [11]. The 'new normal' was full telework, but as restrictions were relaxed and especially home confinements were removed, hybrid telework became the preferred option [12], both because of the benefits it ensured and the mitigation of some of the disadvantages of full telework [9,13], and due to the preferences shown by workers [10].

Existing evidence highlights several advantages of teleworking: flexibility, which allows more effective time management, balance of family and personal life, and autonomy [14,15]. But teleworking also presents disadvantages: lack of interaction with co-workers, which can lead to social and professional isolation, poor health and safety assurance in the workplace, lack of digital disconnection and excessive autonomy that does not allow task dependency [16]. Undoubtedly the most repeated disadvantage in the literature, and already anticipated, is social and professional isolation, something that is identified as one of the biggest challenges of teleworking [17].

From the organization perspective, there are two primary concerns: the loss of organizational roots that influences the culture previously created by the company [18] and the problem of the sector and the tasks to be performed, since not all jobs can be performed under the modality of telework [19,20]. In general, the disadvantages and concerns felt by organizations regarding the implementation of telework can be reduced and even eliminated if we direct them to hybrid telework implementation, which also maintains all the advantages mentioned [12]. With hybrid teleworking, social and professional isolation could be avoided as workers would come to the office some days. The task dependency could also be maintained, as those days of work in the office could be used to perform tasks that require closer interaction between employees. Organizations can benefit from having greater ability to measure productivity of employees [21,22], maintain organizational culture [18] and effectively plan tasks that allow teleworking on days that workers do not come to the office and tasks that need to be done in-situ on the other working days.

The existing literature base focuses mostly on telework in general, but few papers focus on hybrid telework. However, this modality of telework has been found to be more beneficial than other teleworking alternatives on both workers and organizations [12,23]. Given the great repercussion that this modality of telework has obtained and the benefits of applying it, it is considered especially relevant to study the emerging evidence base on the specific modality of hybrid telework that, thanks to the methodology of traditional literature review together with that of bibliometric analysis of co-words, would cover in a complete way all the aspects concerning this emerging field.

The main objective of this research is to perform a systematic review on hybrid telework to answer the following research questions.

RQ1. How much have we seen an increase in publications indexed in the Web of Science (WoS) database between 2005 and 2023 on hybrid telework?

RQ2. Which authors, countries, journals, and publications have contributed the most to the development of the hybrid telework concept?

RQ3. What specific research topics are related to hybrid telework and how are they evolving?

RQ4. What are the main emerging research topics and subtopics on hybrid telework?

This research specifically analyzes: (1) the research conducted on the modality of hybrid telework showing evolutionist evolution and development; (2) how COVID-19 influenced the implementation of hybrid telework, and; (3) the thematic lines that guide these studies to deepen the need to study hybrid telework. Consequently, this article contributes to the literature in several ways. First, the first descriptive analysis to be conducted regarding hybrid telework, highlighting indicators of publication activity in this field, which will help scholars to choose the most relevant literature on the topic and identify potential gaps in the research base. Second, it provides a schematic visualization of the evolution of this specific area of research, indicating the topics that have contributed to its development. Thus, it specifies the emerging and less developed areas, leading to a detailed research agenda.

This article is structured as follows: after this introduction, in section 2: methods, the research protocol, the software used, the data examination and the co-word and co-citation analysis techniques are described. Subsequently, in section 3: results, we delve into the activity that has taken place in the publications in this field and identify patterns, performance of authors, countries, and publications regarding hybrid telework. Next, the topics related to the area of study and associated issues are identified, and potential future research is presented. Finally, in section 4 conclusions, unresolved issues, implications/contributions, and limitations of this study are discussed.

2. Method

The systematic review of the literature is carried out in this study using bibliometric methods. A scientific mapping system to show the architecture and structure of a given academic field through co-word analysis [24,25], in this case hybrid telework, is provided.

Scientific mapping is a graphical representation that shows the interrelationship between areas of knowledge, documents, or

authors [24], by connecting keywords when they appear in the same title, abstract or keyword list, using the actual content of each of the selected documents. The result of the co-word analysis is a network of themes and their relationships, that represent the conceptual space of a field. Therefore, the unit of analysis is the concept. After this the documents of the analysis will be examined in depth with the aim of arriving at concrete conclusions [26]. Within bibliometric scientific mapping articles, there are several approaches. This research focuses on a structure approach where the objective is to analyze the relationships between structural elements such as concepts, authors and publications, analyzing how they relate and influence each other [26].

There are numerous software techniques to obtain this bibliometric mapping analysis. In this study, SciMAT, software that combines scientific mapping techniques and performance analysis to study a field of research and to visualize and identify general and more specific topics, as well as their evolution through co-word analysis [27], is used. The methodological process is described step by step. Specifically, a scientific mapping analysis follows these stages: data search, data refinement, standardization and network creation, map creation, analysis and visualization, and performance analysis [24].

2.1. Database selection and research protocol

In the first phase, corresponding to the data search, a search of documents is performed in the Web of Science (WoS) database (https://www.webofscience.com/). There are numerous databases with scientific support [28], but the simultaneous use of other databases would have posed future drawbacks in the methodology of our research, because some metrics such as impact indexes are different depending on the database, which can generate a serious problem with interpretation [29].

Regarding the keywords that form the focus of the data search, it is important to note that hybrid telework is a relatively new term [30]. Some authors may speak of it as telework or remote work, without taking into account that it is a specific mode of telework [30]. The contribution of this article is in focusing on research that has been conducted into a specific type of teleworking that engages with the use of the term hybrid work (and derivatives), a specific mode of telework that combines telecommuting and working from the office, as described by authors Yang [2] and Zamani [1] in their articles. Authors such as Hopkins & Bardoel [31], detail in their article the different concepts of telework and the different positions occupied by each of these terms. Therefore, and based on the figure that these authors have represented in their article, we can say that the object of our study represented graphically would be the area of overlap represented in orange in Fig. 1.

Thus, the following keywords were used for the search: "hybrid work*" or "hybrid telework*" or "hybrid job" and "hybrid teaching" all articles and reviews published with these keywords in WoS were included [31]. Let us consider that hybrid telework is a topic that is covered from different disciplines, so, to avoid bias errors [32], and not to lose relevant articles for this research, the filtering will be manual and under the PRISMA2020 protocol (see Fig. 1). This search generated 1069 documents, including journal articles, books, book chapters and conference papers, in the period from 1969 to 2023.

2.2. Data pre-processing

PRISMA analysis was applied, with the aim of ensuring transparency within the inclusion and exclusion criteria used [24,33], to obtain the final sample of documents subsequently within the mapping of SciMAT software. Concretely, the PRISMA2020 model [34], the most updated version of the PRISMA 2009 flowchart that has been widely used in numerous studies [24,35], was applied.

This new version solves a problem that was not represented in the PRISMA 2009 model [36]. It allows researchers to start from the
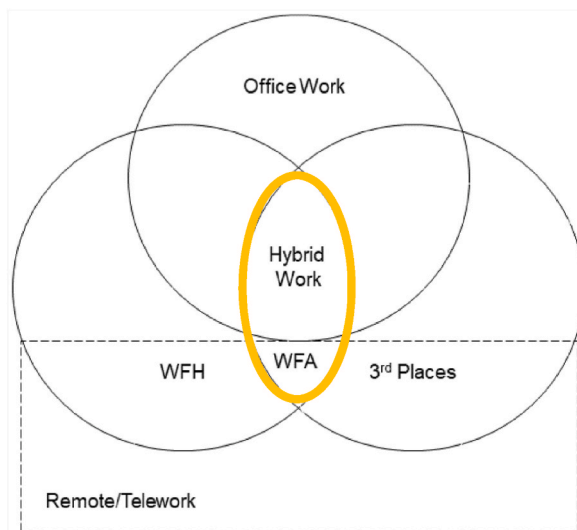

Fig. 1. Field covered in this research using only keywords referring to hybrid work [31].

Search key: "hybrid telework*" or "hybrid work*" or "hybrid job"

Identification

Records identified from Web of Science(n=1069) Registers (n=0)

Records removed before screening:

1. Duplicate records (n=3)
2. Records marked as ineligible by automation tools (n=0)
3. Records removed for other reasons (n=0)

Screening

Articles screened (n=1066)

Records excluded (n=222)

Reports sought for retrieval (n=844)

Reports not retrieved (n=0)

Reports assessed for eligibility (n=844)

Reports excluded:

- Articles where "hybrid work*" is used in reference to work performed between human and robots. (n= 34)

- Articles where "hybrid work*" is used in a computational sense including cloud computing, algorithms or data architecture. (n= 162)

- Articles where "hybrid work*" is used in an industrial or chemical sense, including hybrid components, machines, materials and different workpieces in the work with machines (n= 134)

- Articles where "hybrid teaching" it is used with a different approach to telework or its perspective is that of the student, so they are outside the scope of this research as they are not employed of the educational administration (n=410).

Included

Studies included in review
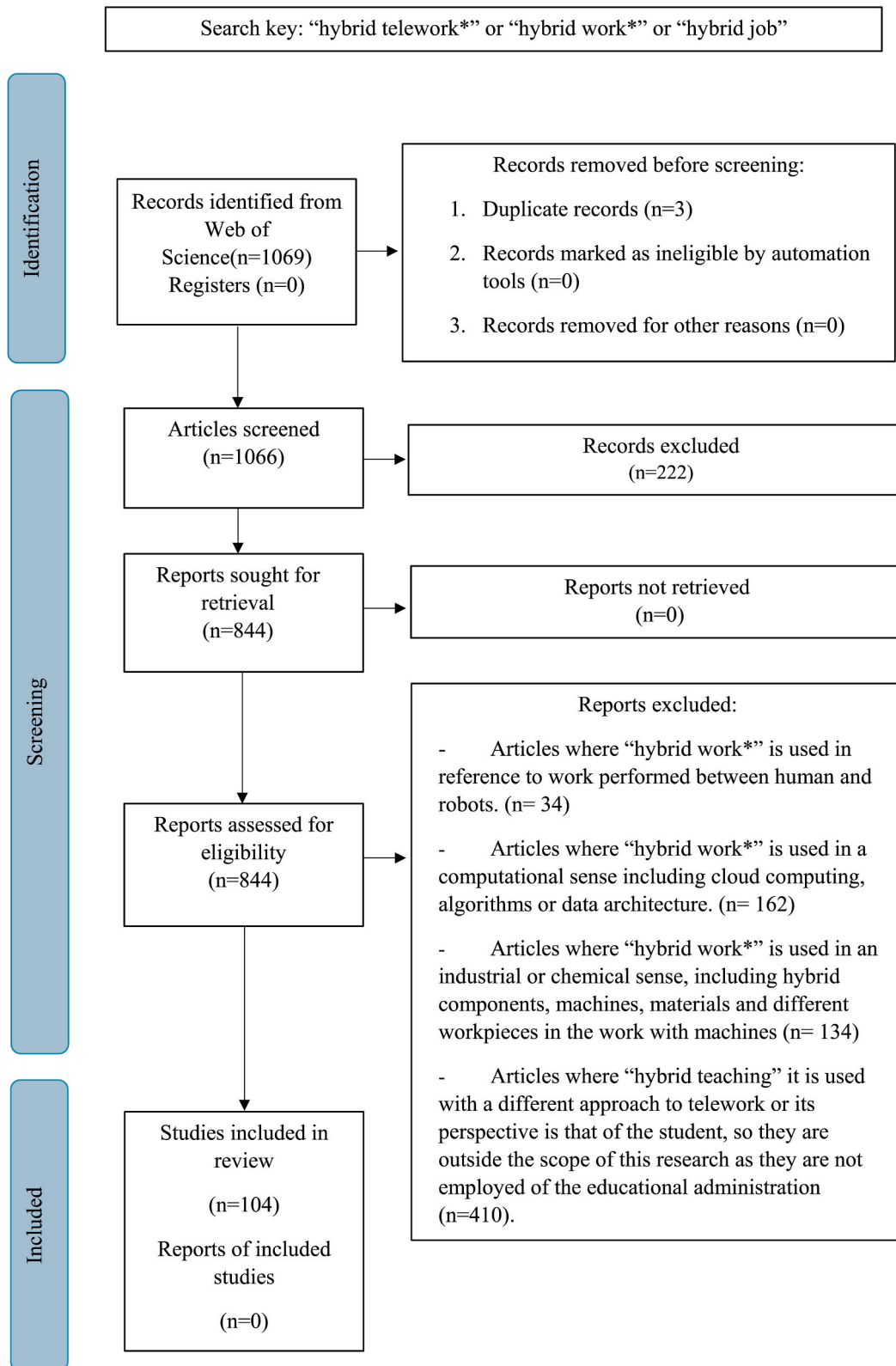
(n=104)

Reports of included studies

(n=0)

Fig. 2. PRISMA 2020 flow diagram.

"identification of new studies through databases and registries", incorporating new sources that in turn broaden the time horizon of the research, within the section "identification of new studies through other methods" [32]. This is a more precise model, which promotes future lines of research in the article, since many of the additional sections presented should only be filled in if they are applicable, otherwise they will be eliminated from the flowchart.

The entire process can be seen in Fig. 1. Research was conducted with the key words "hybrid work*" or "hybrid telework*" or "hybrid job" or "hybrid teaching" in the database: Web of Science. The database search yielded 1069 articles strictly reviewed. After reviewing the results of the search, three duplicates are detected and removed from the sample. Subsequently, by reading the titles and abstracts, a total of 222 documents are excluded from the sample, a very high number. This is due to the use of two of the key words: "hybrid work" and "hybrid teaching" where numerous investigations of different fields are obtained.

- Articles where "Hybrid work*" is used in a medical sense, including genetic, hybrid metamorphosis, biomedical and biology. Specifically, a total of 48 articles are found.
- Articles where "Hybrid work*" is used related to literary aspects: artistic, poetic and historical topics related to different hybrid texts. A total of 54 articles are found.
- Articles where "Hybrid teaching" is used to address the use of different platforms in education and learning. A total of 25 articles are found.
- Articles where "Hybrid teaching" is used in a computational sense within the engineering fields. A total of 95 articles are found.

After this initial title and abstract analysis, a total of <u>222</u> articles are excluded, bringing the number of reports sought for retrieval to a total of 844 papers. Fig. 2 shows the inclusion and exclusion phases used to obtain the final bibliographic sample. After full-text screening, 760 articles were excluded for the reasons shown in Fig. 2. PRISMA 2020 that illustrates the study selection process. Eventually, 104 studies were included in this systematic review.

The SciMAT bibliometric software is a suitable tool for exploring theoretical background at a given topic [25], and it also has the ability to process a large number of documents, which will allow researchers to correctly refine the bibliographic data without the need for processing, thus minimizing the possible errors that may be introduced by human data processing. Hence, this tool allows the replicability of the study thanks to the accuracy and robustness of the method [32,36]. The year of publication of the document did not appear in some manuscripts, in which cases it was entered manually. The keyword dataset was filtered following Cobo et al. [37].

2.3. Co- word analysis

Co-word analysis helps to analyze conceptual aspects of a particular discipline [27]. It establishes associations between what are called nodes, keywords that appear at the same time in the analyzed documents. This forms thematic networks or clusters. To perform these filters, the following criteria were used: (1) grouping synonyms (e.g., "pandemic COVID-19″, "COVID-19"; "work from home WFH"; "work from home"); (2) standardizing plural and singular terms into singulars (e.g., "organization", "organizations"). After these filters, a total of 478 keywords were obtained.

Considering the obtained result (see Fig. 2), the SciMAT software, on the one hand, sorted the 104 articles by publication date, citations, and journal titles, and on the other hand, implemented a co-word search to evidence the most relevant topics regarding hybrid telework.

Co-word analysis constitutes a content analysis tool using co-occurrence patterns of several items with respect to a set of articles, with the aim of recognizing the links that exist between the different topics in the corpora, these items are terms/concepts that the literature is relating for a specific reason [25], which is described in this analysis in section 3.3 Connections and evolution of the research topic, content analysis (RQ3).

The co-word phase uses data mining tools for titles, abstracts, and keywords, which is finally represented in a strategic diagram in which the main themes are highlighted according to their density (measure of theme development) and centrality (measure of theme relevance). This leads to establishing 4 quadrants among which the following dimensions can be identified: driving themes (strong centrality and high density), highly developed themes (low centrality and high density), emerging/decreasing issues (low centrality and density) and cross-cutting themes (high centrality and low density) [25,27].

In this research, it was decided not to differentiate between periods for several reasons: (1) after detailed filtering, the number of documents obtained can be correctly handled and analyzed in a single period, (2) the years in which the publications have been produced and reviewed, and the vast majority are concentrated during COVID-19 and post COVID-19, (3) hybrid telework is a relatively new topic that has emerged as a result of the COVID-19 pandemic, as already mentioned, and it should not be confused with telework, as it is a modality within it [38].

3. Results

3.1. Publication activity (RQ1)

The results of the bibliometric analysis extracted by SciMAT revealed a corpus of 104 peer-reviewed publications exploring hybrid telework.

In this article, periods have not been performed for the abovementioned reasons that are reflected in Fig. 2, where the publications appear practically in 2021 and 2022, so the COVID-19 pandemic is considered a relevant milestone, since it makes the modality of

Table 1
Most cited authors.

Autor	H-index (WoS)	Publica-tions	Paper about hybrid telework	Citations	Publica-tion date	Open access in WoS	DOI
Hosseini, M. Reza	35	102	Communications in Hybrid Arrangements: Case of Australian Construction Project Teams	10	2017	Yes	10.5755/j01.ee.28.3.13791
Bentley, Tim	25	58	The role of organisational support in teleworker wellbeing: A socio-technical systems approach	197	2016	No	10.1016/j.apergo.2015.07.019
Beck, Matthew J	25	118	Working from home in Australia in 2020: Positives, negatives and the potential for future benefits to transport and society	9	2022	Yes	10.1016/j.tra.2022.03.016
Xie, Jialin	20	69	Charting New Terrain in Work Design: A Study of Hybrid Work Characteristics	6	2019	No	10.1111/apps.12169
Halford, Susan	19	45	Hybrid workspace: re-spatialisations of work, organisation and management	137	2005	No	10.1111/j.1468-005X.2005.00141.x
Doherty, Bob	16	69	Sustainability in social enterprise: hybrid organizing in public services	53	2019	Yes	10.1080/14719037.2018.1438504
Millan, Jose Maria	14	39	Disclosing 'masked employees' in Europe: job control, job demands and job outcomes of 'dependent self-employed workers'	14	2020	Yes	10.1007/s11187-019-00245-7
Empson, Laura	12	19	Researching the Post-Pandemic Professional Service Firm: Challenging our Assumptions	7	2021	Yes	10.1111/joms.12697
Kuzior, Aleksandra	10	36	Digitalization of Work and Human Resources Processes as a Way to Create a Sustainable and Ethical Organization	14	2022	Yes	10.3390/en15010172
Gillett, Alex	8	14	Factors influencing home-based telework in Hanoi (Vietnam) during and after the COVID-19 era	52	2021	Yes	10.1007/s11116-021-10169-5

hybrid telework emerge. Specifically, it is because during 2020, when the pandemic started, there were home confinements that forced companies that had jobs that allowed teleworking to carry out this modality completely. In 2021, certain restrictions were maintained, especially in terms of office capacity, which made it impossible for the entire workforce to go to the office to respect the safe distances and thus avoid a higher percentage of contagions, so hybrid teleworking was the best way to perform the work, combining home and office.

In 2022, the ′new normal' occurs when, after the forced application of telework, workers and employers seek application of hybrid telework to take advantage of its benefits. Hence, a growing trend can be seen in the literature in this field of activity, where hybrid telework papers have been appearing in the literature since 2005, but it was not until 2021, coinciding with the COVID-19 pandemic, that there was a significant increase in the number of publications, which continues to this day.

3.1.1. Authors, countries, and journals (RQ2)

Table 1 shows the main authors within this line of research, sorted by their associated H-index, with their total publications, the title of the paper on hybrid telework, the citations, the year of publication and whether the article is open access. Articles that are not open access are accessible either for a fee or through some institutions that have paid to access them.

Regarding the origin of the articles by country: they come from a total of 32 countries. Among these countries, those with more than 10 publications stand out: Great Britain (UK) (19), USA (17) and Australia (14). The case of the three countries: USA [9,39], Australia [6,39] and UK is explained by the significant increase of hybrid telework in organizations. Regarding the UK area, a survey conducted by Eurostat [7]shows how before the pandemic, in 2019, the percentage of occasional teleworking was 20.5 %, boasting the sixth place within the EU, well above the EU-28 average which was at 9.6 %. In the period from March to July 2020, when home confinements

Table 2
Publishers with articles on hybrid telework.

Publisher	Number of articles
MDPI	18
EMERALD GROUP PUBLISHING LTD	13
WILEY	8
SAGE PUBLICATIONS INC	6
ROUTLEDGE JOURNALS, TAYLOR & FRANCIS LTD	4
SPRINGER	4
FRONTIERS MEDIA SA	3
HARVARD BUSINESS SCHOOL PUBLISHING CORPORATION	3
OXFORD UNIV PRESS	3
SAGE PUBLICATIONS LTD	3
ASSOC COMPUTING MACHINERY	2
ELSEVIER	2
ELSEVIER SCI LTD	2
IEEE COMPUTER SOC	2
IOS PRESS	2
SPRINGER INTERNATIONAL PUBLISHING AG	2
ACAD CONFERENCES LTD	1
ACADEMIC PRESS LTD- ELSEVIER SCIENCE LTD	1
AMER ACCOUNTING ASSOC	1
BMC	1
BRITISH PSYCHOLOGICAL SOC	1
CENTER SOCIOLOGICAL RESEARCH	1
DE GRUYTER ACADEMIC PUBLISHING	1
EDITURA ASE	1
ELSEVIER SCIENCE INC	1
ICE PUBLISHING	1
IEEE	1
INT JOURNAL CONTEMPORARY ECONOMICS & ADMINISTRATIVE SCIENCES	1
ISTANBUL UNIV	1
KAUNAS UNIV TECHNOL	1
LAWBOOK CO LTD	1
NATURE PORTFOLIO	1
ORGANIZACIÓN DE ESTADOS IBEROAMERICANOS (OEI)	1
PERGAMON-ELSEVIER SCIENCE LTD	1
RESEARCHTRENTZ ACAD PUBL EDUCATION SERVICES	1
ROUTLEDGE	1
SCIENDO	1
SLOAN MANAGEMENT REVIEW ASSOC, MIT SLOAN SCHOOL MANAGEMENT	1
SPRINGER VIEWEG-SPRINGER FACHMEDIEN WIESBADEN GMBH	1
SPRINGERNATURE	1
THOMSON REUTERS AUSTRALIA LTD	1
WILEY PERIODICALS, INC	1
WILEY-HINDAWI	1
TOTAL	**104**

occurred in the UK, full teleworking was higher than 40 % and above Australia levels [39], indicating that many jobs could be performed remotely [19,20].

In a survey conducted during 2021 by the Office for National Statistics [40], it turned out that 85 % of employees who were then working from home wanted a "hybrid" approach to work. In fact, the proportion of people with hybrid telework increased in 2022, when there was a much freer choice without the previously imposed restrictions. Specifically, in the period from April 27th to May 8th, 2022, 14 % fully teleworked, while 24 % performed hybrid telework by performing their work some days from home and others from the office [40].

Finally, publications were analyzed. All articles have been reviewed and it has been identified that the publications correspond to different journals. There is no journal that has two or more publications on hybrid telework, indicating great variety of publication sources in the sample. The articles grouped by publisher are set out below in Table 2. In this table, it can be seen how MDPI and Emerald Group Publishing LTD are predominant in this emerging field of study, where the number of publications exceeds ten. It also shows the diversity of publishers that publish articles on hybrid teleworking, a total of 43 that are presented in Table 2 together with the number of articles published.

3.2. Connections and evolution of the research topic, content analysis (RQ3)

For the reasons explained in the previous section, it was decided not to group the documents into various periods. The SciMAT tool identified through co-word analysis the different thematic areas and the degree of development of the topic, or density, and centrality (the importance of a specific topic in the development of the entire research area) were calculated. Fig. 3 below shows the strategic diagram establishing the linkage of low and high intensities of density and centrality, that facilitates the establishment of four quadrants: (1) the driving themes (strong centrality and high density). These are externally linked to notions applied to other fields with close conceptual connection. (2) Highly developed and isolated themes (low centrality and high density), making them marginally important for the scientific field as their topics are too specific and of a peripheral nature. (3) Transversal and basic themes (high centrality and low density), indicating importance in the research field and, in turn, a need for further development. Finally, (4) underdeveloped or peripheral topics (low centrality and density), are emerging or declining problems [27].
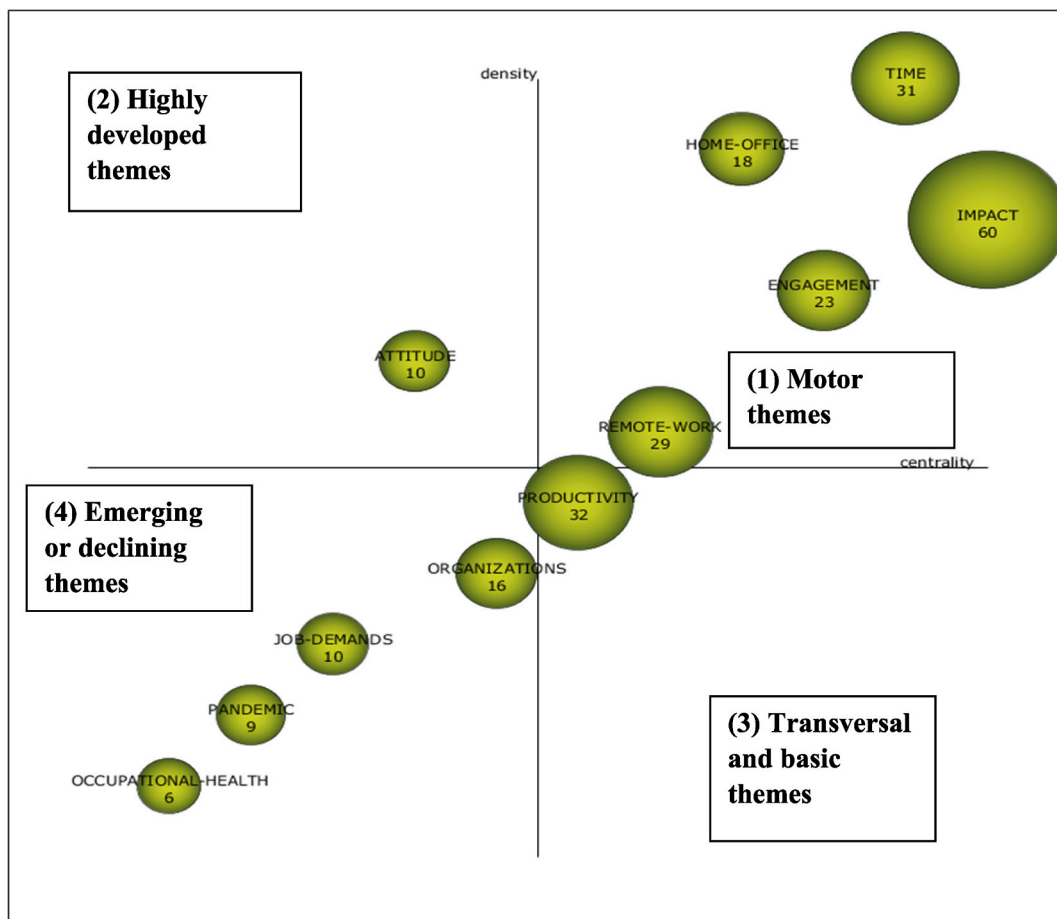

Fig. 3. Strategic diagram for 2015–2023.

In the strategic diagram presented in Fig. 3, the number of articles including each word is proportional to the volume of each balloon. In turn, through the thematic networks, the links between keywords and the most recurrent subtopics are established (see Figs. 4–6). Specifically, the size of the balloon for a thematic network is proportional to the number of articles corresponding to each keyword.

To adequately analyze all the terms that appear in the strategic diagram in Fig. 3, we will follow the same approach presented by Cobo et al. [27].

(1) Driving themes: time, impact, engagement, home-office, and remote-work, are the five driving themes established in the hybrid telework strategic diagram.

(1.1) Time is established as a driving theme and is related to various terms reflected in Fig. 4.

An important point that relates time with hybrid telework is the influence that the type of part-time or full-time employment has on the practice of hybrid telework, being more common in part-time employees [38]. Although the most relevant point that links time with hybrid telework is the greater flexibility, freedom of work and personal time management [8,41] that telework in general, and hybrid telework provide. Hybrid telework helps teleworkers to perform their work from the location they choose [2], as long as they have the necessary technology to perform their work [1] and the available space at home is adapted to avoid distractions [38], as home is the most recurrent place to perform remote work [2].

The connection between time and autonomy occurs because employee self-management implies trust and support from leaders [8]. And in turn, leaders need to adapt to remote management [42]. The words forms and power are united by a very marked line. Within the organizations we find imbalances concerning the employee-employer market power, the bargaining power of the employer being greater. These imbalances in power determine different forms of teleworking [43].

The forms of telework vary in terms of the level of power within the organization, and this is directly related to the autonomy of tasks and positions [44]. The study conducted by Allen et al. [16], is an example of this. The authors analyze the relationship of teleworking with the variables of autonomy, schedule control and task interdependence. The triangle linking commitment, leaders and meta-analysis, reinforces the data collected in the qualitative study by Delany [45] on the key role that leaders play in supporting remote work. Leaders must not only support and follow up with their teams, but also strengthen productivity and organizational
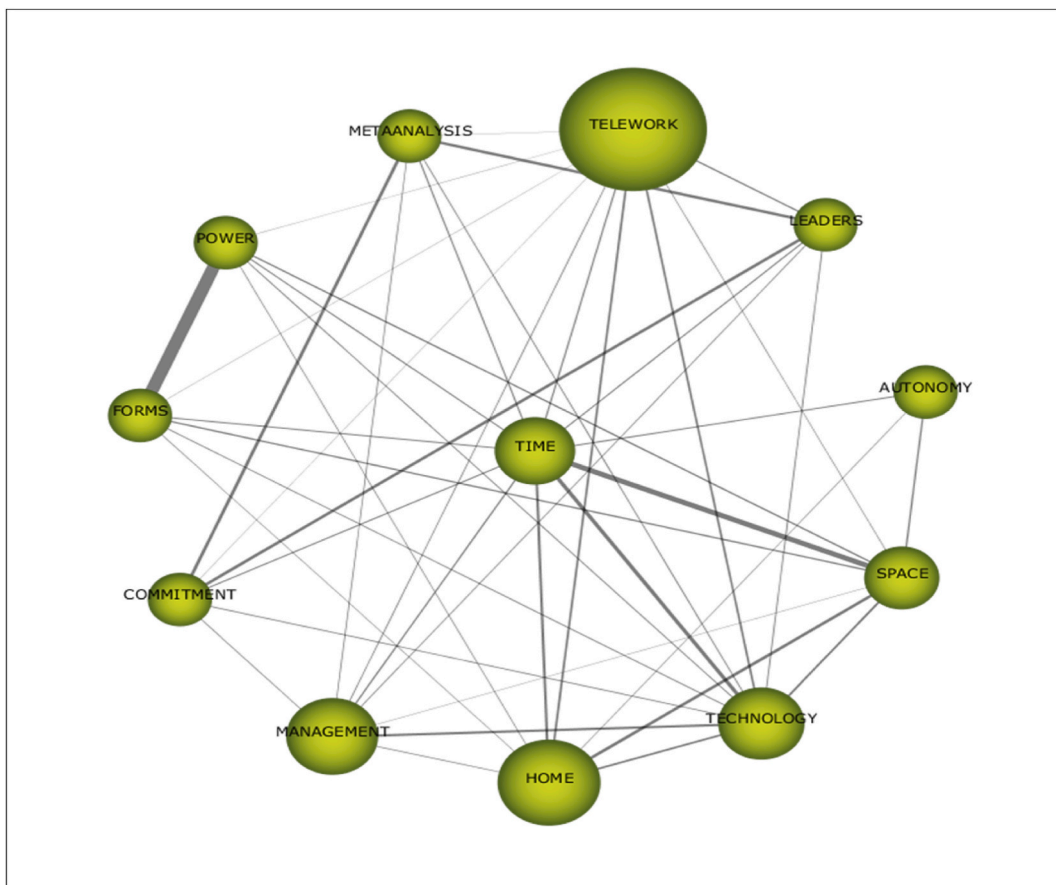

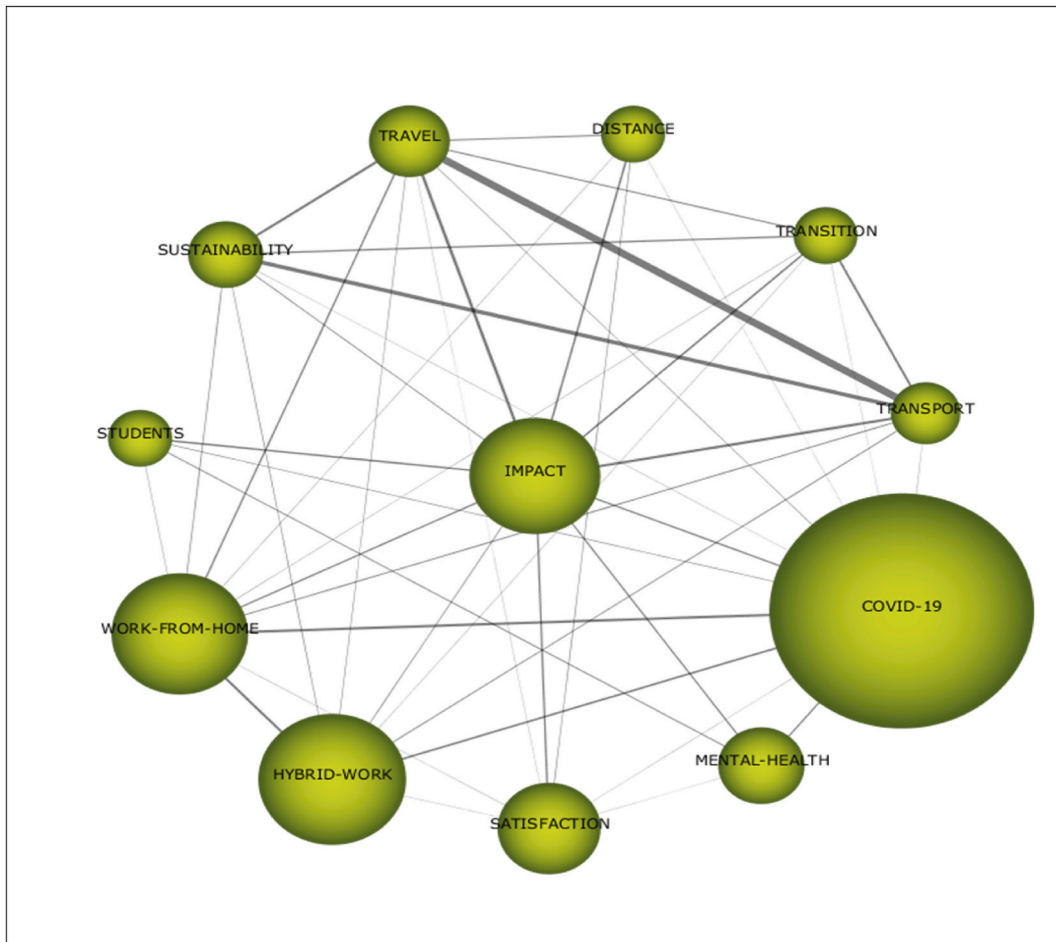**Fig. 4.** Cluster's network of time.

Fig. 5. Cluster's network of impact.

performance in a hybrid telework context [46].

(1.2) Impact: another of the driving topics reflected in Fig. 3. This in turn relates to the terms reflected in Fig. 5.

The most repeated word in the articles, as shown in Fig. 5, is COVID-19. The impact of the pandemic suffered in early 2020 marked a milestone in the ′new birth′ of telework [8,47], and this has led to growth in research into hybrid telework [23,38]. Regarding the triangle formed by work from home, COVID-19, and hybrid work, with the implementation of total teleworking due to the lockdowns, the advantages and disadvantages of its application became visible for the companies. As a result, hybrid telework emerged as a telework modality that allows us to take advantage of the benefits of remote working and avoid or minimize the disadvantages. Among the disadvantages, the main one is social and professional isolation [14]. This disadvantage is directly related to mental health, which is very necessary to avoid burnout, absenteeism, and dissatisfaction [48].

Another triangle especially relevant in the cluster is: sustainability, transport, and travel [49], something that telework's father, Jack Nilles, coined in 1973 with the term telecommuting, which related work to telecommunications, seeking to replace commuting to the physical workplace [50]. There are numerous reports that support telework as a measure to reduce air pollution [51] and reduce oil use [52], and sustainability in organizations is a particularly important issue in the society we live in, which is something that can drive hybrid telework [53].

(1.3) Engagement (see Fig. 6). Engagement in hybrid telework is basic: organizations must measure the performance and behavior of their employees to maintain a productive and satisfied organization [38]. This requires communication in organizations, which is a basic need [38]. But this engagement cannot exceed established limits that in most cases, as pointed out by Zamani & Spanaki [1], are often exceeded in telework and hybrid telework because of the numerous distractions suffered at home [38], the limited digital disconnection and ICT tools. This produces burnout in employees [1] and affects their mental health [47], a particularly important point that will be discussed later.

Another key point is the organizational culture within the engagement. Hybrid telework establishes a renewal of the organizational culture as we knew it so far with the face-to-face work [46]. It seeks to maintain the employee's commitment, permanence, and loyalty to the organization, but with this new perspective that hybrid telework brings. Maintaining adequate and effective communication between teams and leaders will be key for the employee to feel committed to the company [46].
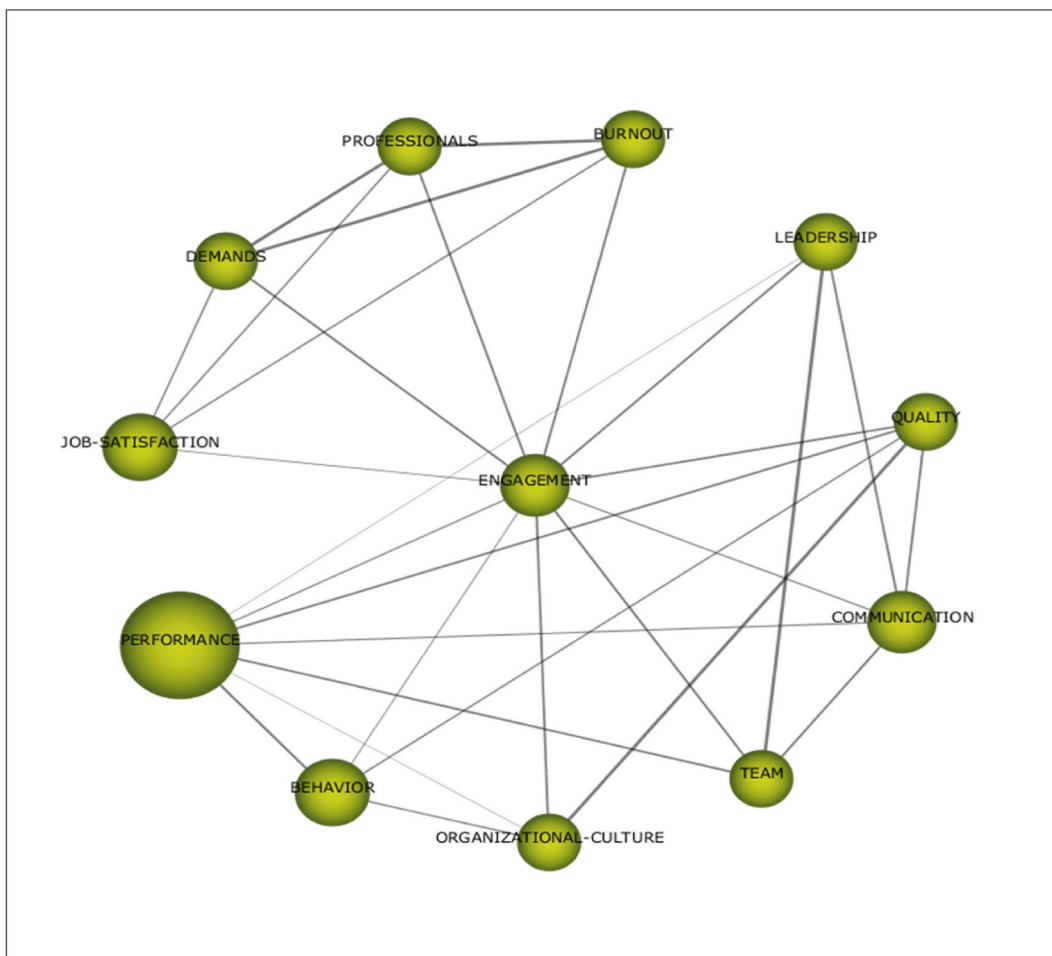
Fig. 6. Cluster's network of engagement.

(1.4) Home-office and (1.5) remote-work are the last two driving themes of hybrid telework, both of which are linked to the various themes that have already been explained, being a complete network surrounding hybrid telework. Finally, a summary of the motor themes identified thanks to SciMAT is presented in Table 3. The topics are divided/classified into sizes, considering their volume, which depends on the number of articles that include each word.

3.2.1. Future research agenda (RQ4)

We examine here emerging, cross-cutting and basic themes of the diagram shown in Fig. 3. An examination of the emerging themes of Fig. 3 shows topics that require special attention when creating future lines of research. We identified in this group of emerging or declining themes, from greater to lesser centrality: organizations, job-demands, pandemic, and occupational-health. This means that the first topics are more important in the development of hybrid telework and therefore should be given more attention in future research.

Table 3
Summary of clusters in the main motor themes.

Main motor themes	Large size	Medium size	Small size	Emphasizes (internal connections)
Time	Telework	Technology, management, and home	Space, autonomy, commitment, forms, power and meta-analysis	Triangle between time, space, and home Line between forms and power
Impact	COVID-19	Hybrid-work, work-from-home	Satisfaction, mental-health, transport, transition, distance, travel, sustainability and students	Triangle between travel, transport, and sustainability
Engagement	Performance	Not applicable	Behavior, organizational-culture, team, communication, quality, leadership, burnout, professionals, demands, job-satisfaction	Triangle between professionals, burnout and demands

(1) Organizations: this is a very generic term, but in the study of hybrid telework it has special relevance. Knowing how to properly establish a hybrid telework model in organizations is not an easy task and requires numerous organizational and group skills, as well as those of everyone in the organization [54]. A future line of work in this sense could be how to concretely establish hybrid telework in an organization from the beginning. This is especially relevant for organizations that have very different profiles among their workers depending on the tasks they perform, since the exact number of days of work from the office and from home will have to be determined depending on the established profile. Another future line of research in this sense, already advanced by authors such as Williamson et al. [41], is to carry out a study that relates hybrid telework with public organizations.

(2) Job-demands: the demand for employment has changed since organizations and especially employees adopted telework [8]. The flexibility of being able to work from anywhere is a benefit that employees are not willing to give up [38]. On the side of organizations, they can maintain specific profiles without being limited by the space in which they are located [55]. Therefore, it is proposed, as a future line of research, a study that analyzes the evolution of labor demands since hybrid telework began to be implemented in organizations, until today.

(3) Pandemic. The pandemic started in 2020 and maintained its restrictions until the end of 2021. Today there are few measures left imposed because of it, especially in organizations, where to work without having to maintain specific distances is already allowed [11]. Hence, it is likely to be a declining term. As a consequence, we propose as a future line of research, the effect of events on organizational innovation towards hybrid telework models. Another future line of research is a study to determine the specific sectors that after the pandemic have maintained the hybrid telework and which have returned to total in-person work, including in the study only those that do allow telework in any of its modalities.

(4) Occupational health. This is the last term and the one about which most gaps have been found in the literature. There are many articles that comment on the importance of occupational health at work and the fact that hybrid telework hinders this point [8, 47], but none of them offer a concrete study on how the type of hybrid telework, when the teleworker's office and home are combined, impacts on his or her occupational health.

Some studies [56] have conducted analyses on mental health at work during the pandemic, something that indirectly included telework in the total modality. The articles that talk about occupational health in terms of mental health, refer mainly to the isolation suffered by workers [57], something that varies depending on the type of telework, full or hybrid. Other authors such as Bosma et al. [58], discuss occupational health in reference to physical health in the workplace, addressing how teleworkers during the pandemic reported musculoskeletal pain due to not being optimally equipped at home. In fact, the EU addresses this issue with a report published in 2021, following the COVID-19 pandemic [59] in which it addresses, among other issues the prevention of occupational risks when the workplace is, for example, the home. These gaps within occupational health could be filled by conducting studies on mental and physical health in relation to telework and its different modalities: hybrid telework and full telework. It could even be further concretized by looking for the ideal frequency to avoid the inconveniences that teleworking can produce in terms of mental health.

We identify productivity within quadrant (3) Transversal and basic themes. We consider that it is essential to talk about this within the research agenda, due to its importance within organizations. The relationship between productivity and telework is evident [20, 22]. The productivity balloon appears within the quadrant of transversal and basic themes, although very close to quadrants 1 (motor themes) and 4 (emerging or declining themes). That is, it is a very relevant field in hybrid telework research and needs further development.

There is no unanimity in the studies that relate productivity and telework. Huamani [60], considers that the worker is more productive because he feels more satisfied thanks to the flexibility and conciliation that is presented with telework, however, Jimenez-Gomez et al. [61], consider that employees do not disconnect, they feel isolated and exhausted and this affects productivity, and Sarnosky et al. [62], conclude that the same level of production is maintained. What is certain is that the impact of teleworking remains uncertain [63].

Following our research, we reinforce the idea of Maghlaperidze et al. [64], the frequency of remote work influences productivity. If employees are happier with a combined frequency of face-to-face and remote work, i.e., hybrid telecommuting, why wouldn't they be more productive under hybrid telecommuting? This is one more argument for preferring and implementing this type of teleworking in organizations. We propose as a future line of research, a literature review of all studies that relate productivity and telework, both hybrid and total. The objective is to give clear and unified results to companies and generate useful tools to get the most out of telework.

4. Conclusions

Given the emergence of hybrid telework as a central mode of flexible working since the COVID-19 pandemic, this study aims to provide a more detailed and extensive understanding of this telework modality. Numerous studies have been conducted on telework but this is not the case with hybrid telework, which is also the telework modality that is arguably most appropriate for both organizations and workers.

Organizations want to produce the maximum at the minimum cost. If they cannot maintain the production levels with telework that they maintain with face-to-face work, they will not implement telework. To maintain adequate production levels, enhancing the advantages of teleworking is key: satisfaction, flexibility, and work-life balance. Avoiding the disadvantages of full teleworking takes a more relevant role, these are avoided when the type of teleworking is a hybrid: social isolation, lack of digital disconnection, lack of organizational culture. So hybrid telework is presented as the best option.

The bibliometric analysis helps to establish the evolution of hybrid telework, revealing the increase in academic production in this field, where most of the research has been written by more than two or three authors, which seems to indicate the existence of research groups interested in this topic. It has been possible to establish that the countries with the highest production regarding hybrid telework coincide with a larger use of this employment modality, these are: UK, Australia, and USA. When analyzing the journals that publish the most in this field, a multidisciplinary approach is evident, as each of the 104 papers are published in different journals.

The approach of this research has been able to reveal some shortcomings. Particularly surprising is the fact that hybrid telework is not fully developed in the literature as a preference among the types of telework. Another particularly important point is the little relevance given to public organizations. This review also yields several particularly valuable implications. Thanks to the emerging topics, it has been possible to establish a research agenda for the study, which generates the main theoretical contribution. This helps the discipline and researchers to find possible gaps to fill, establishing new directions in the field.

Finally, on a more practical level, this study helps to identify practical contributions that help leaders and practitioners in various organizations to understand the most relevant issues in hybrid telework. A good example is the union of telework and productivity, a relationship already explored without conclusive results. It is essential to put these terms into practice and to unify results in order to guide companies towards the best practices.

Despite all these contributions, this study also has its limitations. First, it only includes papers published in Web of Science (WoS), which limits the results. For future research, it is advisable to contrast these findings with other databases. Taking advantage of the PRISMA2020 model, it could be used as a starting point for further research with new databases. The second is similar, since the open-source scientific mapping software SciMAT was used to compare the main areas of research and related topics. Consequently, for future research, other bibliometric techniques could be used, such as co-authorship analysis, thus exploring the mapping of cooperation and collaboration networks between authors who share ownership of the publication.

Data availability statement

Data included in article/supp. material/referenced in article.

CRediT authorship contribution statement

Cristina Carrasco-Garrido: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **Carmen De-Pablos-Heredero:** Conceptualization, Investigation, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **José-Luis Rodríguez-Sánchez:** Software, Supervision, Visualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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