

Engaging the Distributed Workforce: A Bibliometric Mapping of Engagement, Organisational Support and Autonomy in Remote and Hybrid Work Research (2000–2026)

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Abstract

Purpose – Remote, telework and hybrid arrangements have moved from a peripheral benefit to a mainstream mode of organising, yet knowledge on how such arrangements sustain employee engagement remains fragmented across psychology, human resource management, public administration and occupational health. This study maps the growth, intellectual foundations and thematic structure of research linking remote and hybrid work with employee engagement and its enabling resources, namely perceived organisational support, e-work self-efficacy, inclusive leadership, workplace belonging, social connectedness, meaningful work, job autonomy and flexibility.

Design/methodology/approach – A bibliometric review of 4,310 Scopus-indexed documents published between 2000 and 2026 was conducted using the bibliometrix R package and its Biblioshiny interface. Performance analysis (publication, citation, source, author, institutional and country indicators) was combined with science mapping (keyword co-occurrence, Callon-based thematic mapping, trend-topic analysis, author co-citation and bibliographic coupling).

Findings – Output grew at a compound annual rate of 13.19%, with 82.6% of the corpus published from 2020 onwards. The United States, China, India and the United Kingdom lead production, while only 22.0% of corresponding-author documents involve international collaboration. Author co-citation reveals three intellectual bases: a job demands–resources (JD-R) engagement tradition with strong survey-methods anchors, a telework and work–family boundary tradition, and a pandemic-era future-of-work and productivity tradition. Science mapping identifies a pandemic-driven, health-oriented motor theme and a transversal remote-work and employment theme; engagement itself is split between a psychological "work engagement" vocabulary and a managerial "employee engagement" vocabulary. Relational and personal resources, including inclusive leadership, belonging and e-work self-efficacy, remain peripheral, whereas hybrid work, employee engagement, artificial intelligence and organisational culture form the current research front.

Research limitations/implications – The analysis relies on a single database and on lexical retrieval; polysemous search terms (e.g. "virtual work" and "flexib*") imported a distinct engineering stream that is transparently reported. The study proposes an integrative resource-based framework and a Theory–Context–Characteristics–Methodology (TCCM) agenda to guide future research.

Practical implications – Organisations designing hybrid policies should treat engagement as the outcome of a bundle of organisational, job-design and personal–relational resources rather than of location flexibility alone.

Originality/value – The study extends prior reviews that concentrate on productivity, well-being or work–life balance by positioning the full set of engagement-enabling resources within a single bibliometric map, and by exposing the conceptual fragmentation and resource gaps that condition the field's next stage of development.

Keywords: remote work; hybrid work; telework; work engagement; perceived organisational support; job autonomy; e-work self-efficacy; bibliometric analysis; Biblioshiny

1. Introduction

The spatial and temporal organisation of work has undergone one of its most rapid transformations in modern history. Arrangements that were once framed as a niche accommodation, such as telecommuting, home-based telework or "virtual office" work (Bailey & Kurland, 2002; Hill et al., 2003), were rolled out at scale during the COVID-19 pandemic and have since settled into persistent hybrid configurations across economies (Aksoy et al., 2025). For organisations, the question is no longer whether distributed work is feasible, but how the motivational core of employment, namely employees' energy, dedication and absorption in their work, can be sustained when the workplace is partly or wholly virtual.

Work engagement, defined as a positive, fulfilling, work-related state of mind characterised by vigour, dedication and absorption (Schaufeli et al., 2002), and grounded in the notion of the personal investment of the self in work roles (Kahn, 1990), offers a natural lens for this question. The job demands–resources (JD-R) model holds that engagement is fuelled by job and personal resources and eroded by demands (Bakker & Demerouti, 2007; Demerouti et al., 2001). Remote and hybrid work alter both sides of this equation: they can expand autonomy and flexibility, yet they can also intensify work, blur boundaries and weaken the social fabric through which support, belonging and meaning are transmitted (Gajendran et al., 2024; Kelliher & Anderson, 2010; Wang et al., 2021). Early meta-analytic and review evidence already signalled such mixed effects (Allen et al., 2015; Gajendran & Harrison, 2007), and the pandemic triggered a surge of studies on productivity, engagement and stress under enforced home-working (Galanti et al., 2021).

This surge has produced a voluminous but dispersed literature. Existing reviews typically focus on a single outcome domain, such as health and well-being (Beckel & Fisher, 2022; Oakman et al., 2020), work–life balance (Shirmohammadi et al., 2022) or new ways of working more broadly (Renard et al., 2021). What remains missing is a systematic, quantitative mapping of how research connects distributed work arrangements with engagement and with the full spectrum of resources that theory identifies as its antecedents: organisational resources (perceived organisational support, inclusive leadership), job-design resources (autonomy, flexibility, meaningful work) and personal–relational resources (e-work self-efficacy, workplace belonging, social connectedness). Without such a map, it is difficult to judge which resources have been studied intensively, which remain peripheral, how the intellectual base of the field is structured, and where the research front is moving.

Bibliometric analysis is well suited to this purpose because it allows the objective, reproducible examination of large bodies of literature through performance analysis and science mapping (Donthu et al., 2021; Zupic & Čater, 2015). Accordingly, this study analyses 4,310 Scopus-indexed documents published between 2000 and 2026 and addresses four research questions:

RQ1. What are the publication and citation trajectories of research on remote and hybrid work and engagement-related resources, and which sources, authors, institutions and countries drive it?

RQ2. Which documents are most influential, and what intellectual foundations underpin the field?

RQ3. What is the conceptual and thematic structure of the field, how has it evolved, and where are engagement and its enabling resources positioned within it?

RQ4. What gaps emerge, and what agenda should guide future research?

The study makes three contributions. First, it provides a quantitative account of the field's growth, spanning the pre-pandemic telework era and the post-2020 hybrid era, and identifies its most influential actors and works. Second, by combining co-citation, co-word, thematic and coupling analyses, it reveals that the field rests on three distinct intellectual bases and that engagement is conceptually split between psychological and managerial vocabularies, while several theoretically important resources remain marginal. Third, it synthesises these insights into an integrative resource-based framework and a TCCM agenda (Paul & Rosado-Serrano, 2019) for future

research. The remainder of the paper presents the conceptual background, the methodology, the results, the discussion and agenda, the implications and the limitations.

2. Conceptual background

2.1 From telework to hybrid work

Research on working away from the employer's premises has evolved through successive labels, including telecommuting, telework, virtual work, e-work, working from home, remote work and, most recently, hybrid work. Early studies compared work venues and examined the implications of home-based work for work–family relations and job control (Golden et al., 2006; Hill et al., 2003; Kossek et al., 2006). A second generation linked flexible working to effort, well-being and work intensification (Felstead & Henseke, 2017; Kelliher & Anderson, 2010) and questioned whether spatial flexibility reconfigured rather than relaxed managerial control (Sewell & Taskin, 2015). Economic studies meanwhile documented employees' valuation of flexible arrangements (Mas & Pallais, 2017) and the productivity effects of geographic flexibility (Choudhury et al., 2021). Since 2020, the enforced and then negotiated diffusion of remote work has shifted attention towards hybrid arrangements, in which employees alternate between home and office, and towards the managerial and design choices that make these arrangements effective (Toscano et al., 2025; Wiatr, 2026).

2.2 Work engagement and the resource-based lens

Three complementary theories dominate explanations of engagement in distributed work. The JD-R model distinguishes a motivational process, in which resources foster engagement and positive outcomes, from a health-impairment process, in which demands lead to exhaustion (Bakker & Demerouti, 2007; Schaufeli & Bakker, 2004). Conservation of resources (COR) theory explains why the loss of social and structural resources in remote settings is particularly consequential (Hobfoll, 1989), and self-determination theory (SDT) links engagement to the satisfaction of needs for autonomy, competence and relatedness (Ryan & Deci, 2000). Applied to telework, the JD-R model shows that the arrangement can simultaneously reduce exhaustion and dampen engagement through its effects on demands and resources (Sardeshmukh et al., 2012), while a work-design perspective identifies social support, job autonomy, monitoring and workload as the levers of effective remote working (Wang et al., 2021).

2.3 Engagement-enabling resources in distributed work

The search strategy of this study was designed around resources that theory and prior evidence associate with engagement in remote and hybrid contexts. Perceived organisational support (POS), employees' belief that the organisation values their contributions and cares about their well-being (Eisenberger et al., 1986; Rhoades & Eisenberger, 2002), becomes more salient when face-to-face signals of support are scarce (Chong et al., 2020). Job autonomy and flexibility are core job characteristics (Hackman & Oldham, 1976) and the defining promise of remote work, although flexibility may coexist with work intensification (Kelliher & Anderson, 2010). E-work self-efficacy, grounded in self-efficacy theory (Bandura, 1977), captures the digital competence required to work remotely and has recently been operationalised through a dedicated scale (Tramontano et al., 2021). Inclusive leadership and workplace belonging address the relational side of engagement; inclusive leadership fosters both belongingness and the valuing of uniqueness (Randel et al., 2018), which rests on a fundamental human need to belong (Baumeister & Leary, 1995) and has been linked to meaningful work in remote environments (Byrd, 2022). Finally, social connectedness and meaningful work may be threatened by professional isolation and loneliness (Bollestad et al., 2022; de Vries et al., 2019), and changes in belongingness and meaningfulness have been observed among new high-intensity telecommuters (Afota et al., 2024). Whether these resources have received proportionate research attention is an empirical question that the present bibliometric mapping addresses.

3. Methodology

3.1 Research design

A bibliometric design was adopted because it enables the objective analysis of a large and heterogeneous corpus, the identification of influential actors and works, and the mapping of intellectual and conceptual structures that are difficult to detect through narrative review alone (Donthu et al., 2021; Mukherjee et al., 2022; Zupic & Čater, 2015). The study followed a four-stage workflow comprising research design, data collection, data analysis, and interpretation and reporting (Figure 1).

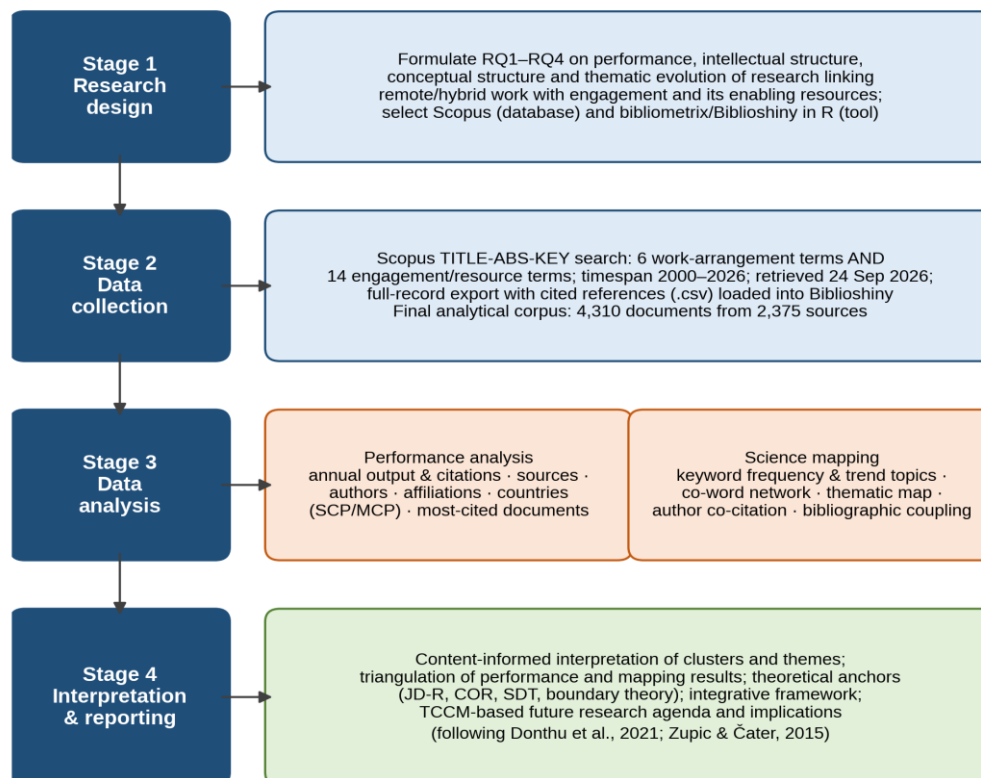


Figure 1. Research workflow of the bibliometric review

3.2 Data source and search strategy

Scopus was selected because of its broad coverage of peer-reviewed management, psychology and social science literature and its curated, structured metadata suitable for bibliometric research (Baas et al., 2020). The search was executed in the title, abstract and keyword fields and combined six terms describing distributed work arrangements with fourteen terms describing engagement and its enabling resources (Table 1). The search window covered 2000–2026, and the data were retrieved on 24 September 2026; publications for 2026 therefore represent a partial year. To capture the field as comprehensively as possible, no restrictions on document type or language were applied at the retrieval stage. Full records, including cited references, were exported in CSV format and imported into Biblioshiny, which produced the final analytical corpus of 4,310 documents.

Table 1 Data retrieval protocol

Criterion	Specification
Database	Scopus (Elsevier)
Search fields	TITLE-ABS-KEY (title, abstract, author keywords and indexed keywords)
Search string	("remote work*" OR "telework*" OR "work from home" OR "hybrid work*" OR "virtual work*" OR "new normal") AND ("employee engagement" OR "work engagement" OR "job engagement" OR "perceived organizational support" OR "e-work self-efficacy" OR "digital self-efficacy" OR "e-work capability" OR "inclusive leadership" OR "workplace belonging*" OR "social connectedness" OR "meaningful work" OR "job autonomy" OR "work autonomy" OR "flexib*")
Timespan	2000–2026 (2026 partial)
Date of retrieval	24 September 2026
Document type / language	No restriction applied (all document types and languages retained)
Export format	CSV; full records including cited references
Analytical software	R, bibliometrix package / Biblioshiny web interface (Aria & Cuccurullo, 2017)
Final corpus	4,310 documents; 2,375 sources; 11,735 authors

Note. The wildcard "?" in "organizational" retrieves both British and American spellings; "flexib*" retrieves flexible, flexibility and related forms.

3.3 Analytical techniques

The analysis combined performance analysis and science mapping (Donthu et al., 2021). Performance analysis covered annual scientific production and citations, the most relevant sources, authors and affiliations, the scientific production and collaboration of countries (single-country publications, SCP, versus multiple-country publications, MCP) and the most globally cited documents. Science mapping comprised five complementary techniques. First, keyword frequency and trend-topic analysis traced the temporal evolution of terms by their first-quartile, median and third-quartile year of occurrence. Second, a keyword co-occurrence (co-word) network of the 49 most frequent terms was clustered to reveal the conceptual structure. Third, a thematic map was generated from the 250 most frequent merged keywords (author and indexed keywords; minimum cluster frequency = 21), clustered with the Louvain algorithm (Blondel et al., 2008) and positioned by Callon centrality and density (Callon et al., 1991; Cobo et al., 2011). Fourth, author co-citation analysis of the 50 most co-cited authors identified the intellectual base (Small, 1973). Fifth, bibliographic coupling of documents, based on shared cited references (Kessler, 1963) and clustered with the walktrap algorithm (Pons & Latapy, 2006) on 250 units (minimum frequency = 21), identified the research fronts, with cluster impact measured by the normalised local citation score.

3.4 Data quality considerations

Two data-quality features were considered explicitly. First, several search terms are polysemous: "virtual work" also denotes the principle of virtual work in structural mechanics, "flexib*" retrieves engineering terms such as flexible multibody systems, and "new normal" retrieves post-pandemic education studies. Rather than silently removing these records, which would compromise reproducibility, they were retained and their footprint was identified in the science maps, where they form a clearly separable cluster. Second, author names in Scopus are not fully disambiguated, which particularly affects common East Asian surnames; author rankings are therefore reported with fractionalised counts and interpreted cautiously.

4. Results**4.1 Descriptive overview of the corpus**

Table 2 summarises the main characteristics of the corpus. The 4,310 documents were published in 2,375 sources by 11,735 authors affiliated with institutions in 110 countries. The collection is young, with an average document age of 4.48 years, and it has accumulated 69,930 citations, equivalent to 16.23 citations per document. The citation distribution is highly skewed: the median document has received three citations, and 29.1% of documents have not yet been cited, which reflects the recency of much of the literature.

Table 2 Main information about the corpus

Indicator	Value
Timespan	2000–2026
Documents	4,310
Sources (journals, books, proceedings)	2,375
Annual growth rate, 2000–2026 (Biblioshiny formula)	13.19%
Annual growth rate, 2000–2025 (complete years)	14.85%
Documents published 2000–2019 / 2020–2026	748 (17.4%) / 3,562 (82.6%)
Average document age (years)	4.48
Total citations	69,930
Average citations per document	16.23
Median citations per document	3
Uncited documents	29.1%
Authors	11,735
Distinct keywords (author and indexed, merged)	19,219
Distinct institutional affiliations	3,567
Countries (all author affiliations)	110
Countries (corresponding authors)	95
Documents with identified corresponding-author country	2,994
International co-authorship (MCP share)	660 (22.0%)
Distinct country collaboration pairs	716

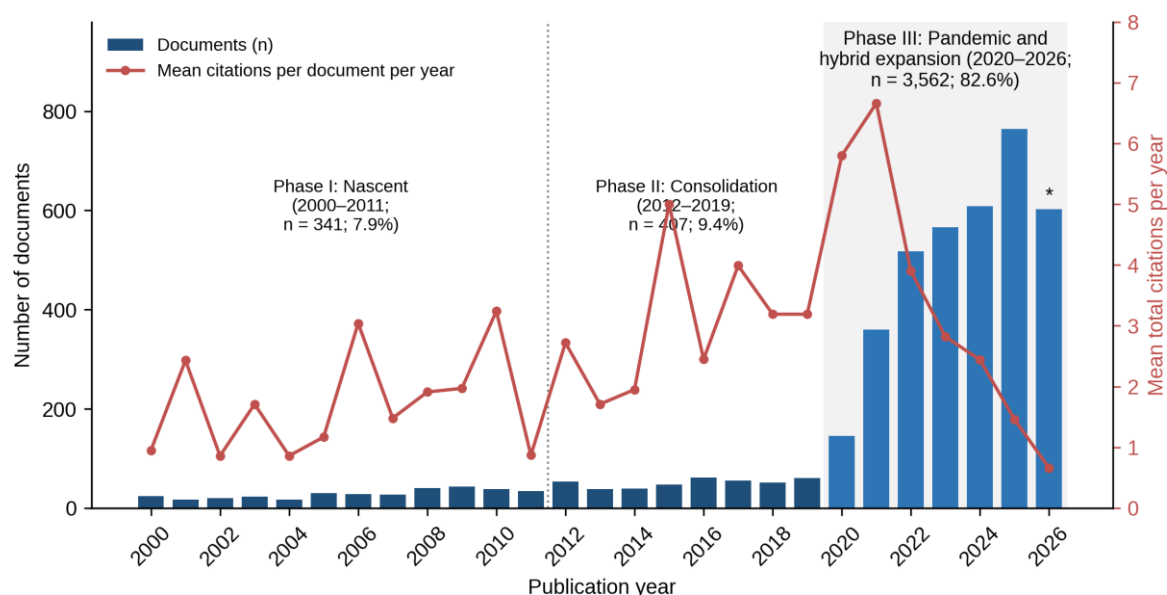
Note. Citation counts are Scopus "cited by" values at the date of retrieval. MCP = multiple-country publications.

4.2 Publication and citation dynamics

Figure 2 shows the annual scientific production together with the mean number of citations per document per year. Three phases can be distinguished. In the nascent phase (2000–2011), output was modest and stable, ranging

from 17 to 43 documents per year (341 documents, 7.9% of the corpus). In the consolidation phase (2012–2019), output rose gradually to between 38 and 62 documents per year (407 documents, 9.4%), with a compound growth rate of about 5% per year across 2000–2019. The pandemic and hybrid expansion phase (2020–2026) marks a structural break: production more than doubled from 61 documents in 2019 to 145 in 2020, reached 360 in 2021 and peaked at 764 in 2025, corresponding to a compound growth rate of 39.4% per year between 2020 and 2025. With 602 documents recorded by late September, 2026 is on course to match or exceed the 2025 level.

The citation profile complements this picture. The mean number of citations per document per year peaked for the 2021 (6.66) and 2020 (5.80) cohorts, which include the pandemic studies that became reference works for the field. Among earlier cohorts, 2015 stands out (5.00), owing largely to the influential review by Allen et al. (2015). The declining values for 2022–2026 reflect the shorter citation window of recent documents rather than lower quality.



* 2026 is a partial year (data retrieved 24 September 2026).

Figure 2. Annual scientific production and mean citations per document per year (2000–2026)

4.3 Most relevant sources

The literature is highly dispersed. Of the 2,375 sources, 1,733 (73.0%) contributed a single document, and the ten most productive sources together account for only 318 documents (7.4%). Table 3 lists the fifteen most relevant sources. Multidisciplinary open-access journals lead, namely Sustainability (52 documents), the International Journal of Environmental Research and Public Health (49) and Frontiers in Psychology (44), reflecting the strong occupational-health and psychological orientation of pandemic-era research. Specialised human resource and work journals, including Personnel Review (22), Human Resource Management International Digest (20), New Technology, Work and Employment (20) and Administrative Sciences (19), form the managerial core. Several conference and book series (e.g. Lecture Notes in Networks and Systems, Lecture Notes in Computer Science and the ACM International Conference Proceeding Series) also appear, reflecting the information-systems strand of the field and, in part, the technical records retrieved by polysemous terms.

Table 3 Fifteen most relevant sources

Rank	Source	Type	Documents
1	Sustainability (Switzerland)	Journal	52

Rank	Source	Type	Documents
2	International Journal of Environmental Research and Public Health	Journal	49
3	Frontiers in Psychology	Journal	44
4	Lecture Notes in Networks and Systems	Book series (proceedings)	37
5	Work	Journal	25
6	Lecture Notes in Computer Science	Book series (proceedings)	24
7	Personnel Review	Journal	22
8	PLOS ONE	Journal	22
9	Springer Proceedings in Business and Economics	Book series (proceedings)	22
10	ACM International Conference Proceeding Series	Proceedings	21
11	Studies in Systems, Decision and Control	Book series	21
12	The Cambridge Handbook of Technological Disruption in Labour and Employment Law	Book	21
13	Human Resource Management International Digest	Journal	20
14	New Technology, Work and Employment	Journal	20
15	Administrative Sciences	Journal	19

4.4 Most productive authors and institutions

Table 4 reports the most productive authors and affiliations. The author ranking is led by names such as Wang Y. (27 documents), Li Y. (21), Chen Y. and Zhang Y. (18 each). Because these common surnames aggregate several distinct researchers, their fractionalised counts (4.2–6.5) provide a more realistic indication of individual contribution. A notable exception is Sneppen C., whose 14 single-authored contributions (fractionalised count = 14.0), all book chapters published in 2025 on the hybrid office workplace model, make him the most productive author in fractionalised terms. The institutional ranking is geographically diverse and is led by the University of Occupational and Environmental Health in Japan (29 documents), the University of Toronto (28), the University of California (27) and Tsinghua University (24), followed by the Universidade de Lisboa (20) and the National University of Singapore (19). The prominence of an occupational-health university again underlines the health orientation of a substantial part of the field.

Table 4 Most productive authors and affiliations

Author	Docs	Frac.	Affiliation	Docs
Wang Y.	27	6.27	University of Occupational and Environmental Health (Japan)	29

Author	Docs	Frac.	Affiliation	Docs
Li Y.	21	6.47	University of Toronto (Canada)	28
Chen Y.	18	4.54	University of California (USA)	27
Zhang Y.	18	4.18	Tsinghua University (China)	24
Wang X.	17	4.05	Universidade de Lisboa (Portugal)	20
Liu Y.	16	4.17	National University of Singapore	19
Liu J.	14	4.91	The University of Sydney (Australia)	18
Sneppen C.	14	14.00	University of British Columbia (Canada)	17
Wang J.	14	5.77	University of Manchester (UK)	17
Wang H.	13	3.13	The Hong Kong Polytechnic University	16

Note. Docs = number of documents; Frac. = fractionalised count (each co-authored document divided by its number of authors). Author names are reported as indexed by Scopus and are not fully disambiguated. 32 documents had no reported affiliation.

4.5 Country production and international collaboration

Figure 3 maps country scientific production and collaboration links, and Table 5 reports the leading countries by corresponding author. The United States leads with 392 documents (9.1% of documents with an identified corresponding author), followed by China (345; 8.0%), India (223; 5.2%), the United Kingdom (203; 4.7%) and Germany (153; 3.5%). When all author affiliations are counted, the same four countries dominate (USA 1,389; China 808; India 761; UK 752 affiliation mentions). The strongest bilateral links connect the USA with the UK (41 co-authored documents), China (27), Canada (23) and Australia (22), followed by the UK–Australia (19) and USA–India (19) dyads.

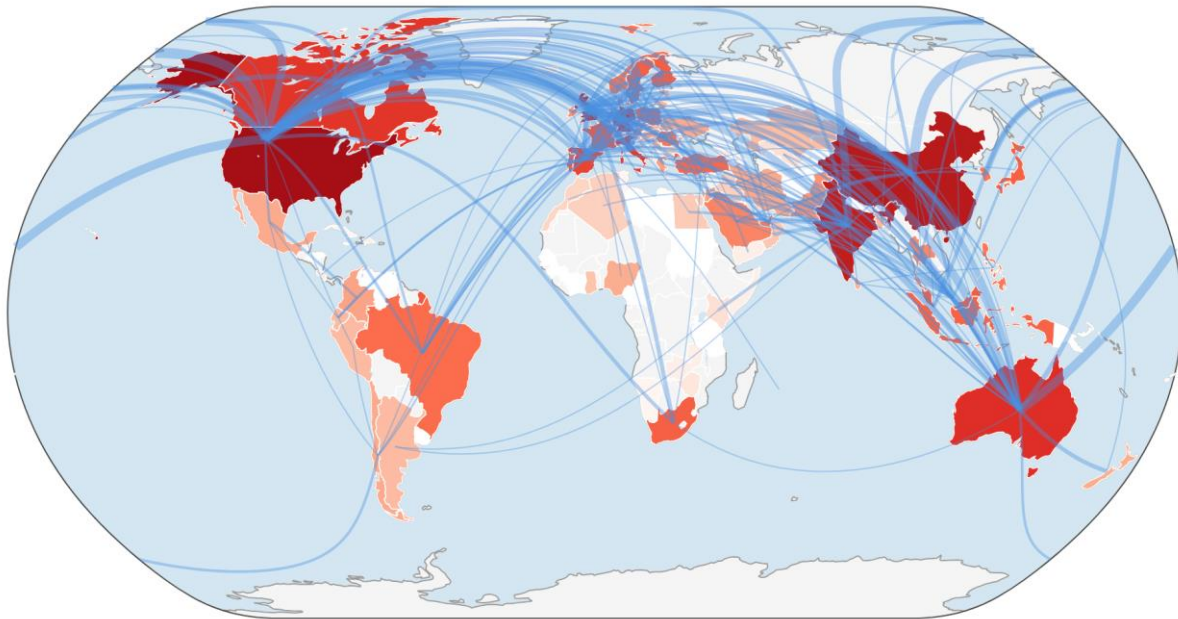


Figure 3. Country scientific production and international collaboration network

Note. Darker shading indicates higher production; lines represent co-authorship links between countries. Source: Biblioshiny output.

Collaboration intensity, however, varies markedly (Figure 4). Only 22.0% of corresponding-author documents involve co-authors from more than one country. Among the leading producers, Sweden (35.8%) and Australia (35.2%) show the highest MCP shares, followed by Spain (28.0%) and the Netherlands (27.4%), whereas the USA (13.0%) and Germany (11.1%) publish predominantly within national teams. The relatively low international collaboration of the largest producers is noteworthy because remote and hybrid work is shaped by institutional, cultural and regulatory contexts that single-country studies cannot compare.

Table 5 Ten most productive countries by corresponding author

Country	Docs	% of docs	SCP	MCP	MCP %
USA	392	9.10	341	51	13.0
China	345	8.00	283	62	18.0
India	223	5.17	184	39	17.5
United Kingdom	203	4.71	155	48	23.6
Germany	153	3.55	136	17	11.1
Australia	122	2.83	79	43	35.2
Italy	113	2.62	86	27	23.9
Canada	101	2.34	77	24	23.8
Spain	75	1.74	54	21	28.0
Netherlands	62	1.44	45	17	27.4

Note. SCP = single-country publications; MCP = multiple-country publications. Percentages are based on 2,994 documents with an identified corresponding-author country.

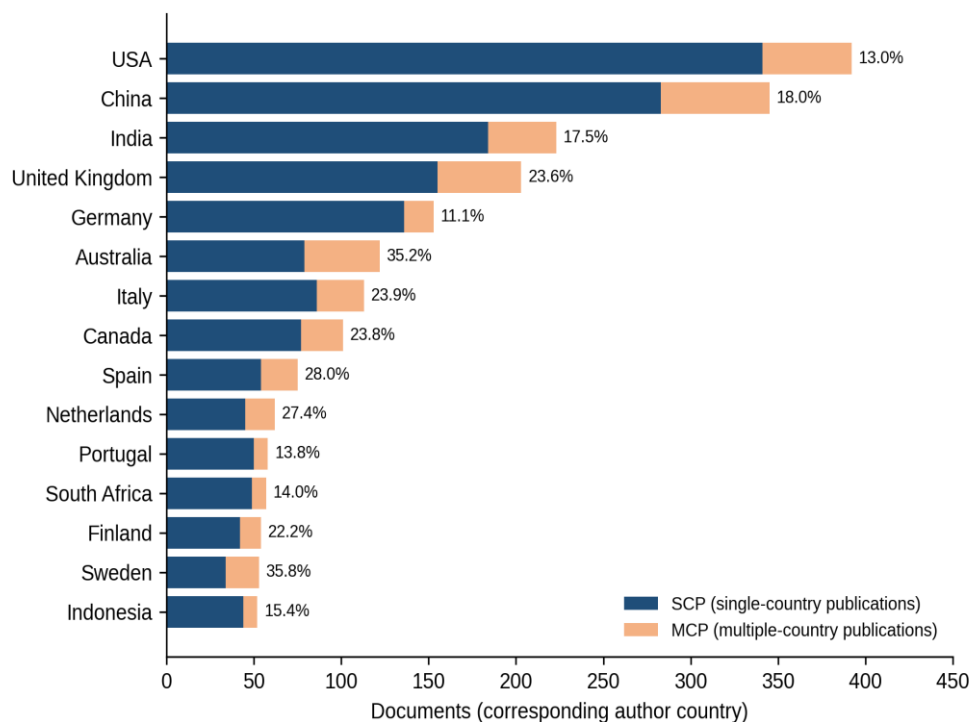


Figure 4. Corresponding-author countries by single- and multiple-country publications (top 15)

4.6 Most globally cited documents

Table 6 lists the fifteen most globally cited documents. The review by Allen et al. (2015), which assessed the state of scientific knowledge on telecommuting, is the most cited (1,365 citations), closely followed by the work-design study of Wang et al. (2021) on effective remote working during the pandemic (1,300 citations), which has the highest annual citation rate (216.7 per year) and the highest normalised citation score (32.5). Three groups of highly cited works can be discerned. The first comprises pre-pandemic foundations on telework, boundary management and flexible working, including Kossek et al. (2006), Golden et al. (2006), Kelliher and Anderson (2010), Grant et al. (2013) and Felstead and Henseke (2017), together with the venue comparison of Hill et al. (2003). The second comprises pandemic-era studies on productivity, engagement and health, such as Galanti et al. (2021) and Oakman et al. (2020). The third comprises economic and strategic analyses of the value and productivity of flexibility (Choudhury et al., 2021; Mas & Pallais, 2017) and of its link with satisfaction and performance (Davidescu et al., 2020). Two highly cited education studies retrieved through the term "new normal" (Muthuprasad et al., 2021; Rapanta et al., 2021) illustrate the lexical breadth of the search and are not interpreted as part of the organisational core.

Table 6 Fifteen most globally cited documents

Rank	Document	Source	TC	TC/yr	NTC
1	Allen et al. (2015)	Psychological Science in the Public Interest	1,365	113.8	22.7
2	Wang et al. (2021)	Applied Psychology	1,300	216.7	32.5

Rank	Document	Source	TC	TC/yr	NTC
3	Kelliher & Anderson (2010)	Human Relations	847	49.8	15.4
4	Kossek et al. (2006)	Journal of Vocational Behavior	835	39.8	13.1
5	Galanti et al. (2021)	Journal of Occupational and Environmental Medicine	729	121.5	18.2
6	Felstead & Henseke (2017)	New Technology, Work and Employment	702	70.2	17.6
7	Muthuprasad et al. (2021)	Social Sciences & Humanities Open	667	111.2	16.7
8	Mas & Pallais (2017)	American Economic Review	494	49.4	12.4
9	Hill et al. (2003)	Journal of Vocational Behavior	474	19.8	11.5
10	Choudhury et al. (2021)	Strategic Management Journal	464	77.3	11.6
11	Oakman et al. (2020)	BMC Public Health	456	65.1	11.2
12	Davidescu et al. (2020)	Sustainability	431	61.6	10.6
13	Rapanta et al. (2021)	Postdigital Science and Education	427	71.2	10.7
14	Grant et al. (2013)	Employee Relations	421	30.1	17.5
15	Golden et al. (2006)	Journal of Applied Psychology	415	19.8	6.5

Note. TC = total citations; TC/yr = total citations per year since publication; NTC = normalised total citations (citations divided by the mean citations of documents published in the same year).

4.7 Keyword landscape and topic evolution

Table 7 shows the twenty most frequent keywords. Pandemic-related terms (COVID-19, pandemic, coronavirus disease 2019) and the various labels for the work arrangement (remote work, telecommuting, telework, teleworking, work from home, hybrid work) dominate. Several indexed descriptors (human, humans, female, adult, male) reflect the MEDLINE-style indexing of the health-oriented journals in the corpus. Among outcome and resource terms, work–life balance (245), job satisfaction (233), work engagement (207) and employee engagement (186) are the most frequent. Taken together, the two engagement labels (393 occurrences) represent the most frequent outcome construct in the field, but their split into two vocabularies anticipates a pattern discussed below.

Table 7 Twenty most frequent keywords (author and indexed keywords merged)

Rank	Keyword	Occ.	Rank	Keyword	Occ.
1	covid-19	749	11	adult	286
2	remote work	567	12	employment	283
3	human	522	13	male	283
4	humans	420	14	work from home	271

Rank	Keyword	Occ.	Rank	Keyword	Occ.
5	telecommuting	378	15	work-life balance	245
6	telework	343	16	hybrid work	239
7	pandemic	329	17	job satisfaction	233
8	article	319	18	coronavirus disease 2019	226
9	female	307	19	workplace	220
10	teleworking	295	20	work engagement	207

Note. Occ. = occurrences. Employee engagement (186), remote working (187), human resource management (152), productivity (126), leadership (109) and flexibility (105) follow.

The trend-topic analysis (Figure 5) traces the temporal evolution of terms by their median year of occurrence. Early organisational terms such as "virtual corporation" (median year 2006), "distributed work" (2009) and "industrial management" (2008) gave way to "information technology" (2019) and then to the pandemic vocabulary of "telework" (2022), "pandemic" (2022) and "COVID-19" (2023). The most recent terms signal the current research front: "remote work" (2024), "hybrid work" (2025; 239 occurrences), "employee engagement" (2025; 186), "artificial intelligence" (2026; 76), "personnel training" (2026) and "organizational cultures" (2026). In parallel, the figure displays a stream of technical terms, peaking between 2010 and 2021, that relate to the mechanics sense of "virtual work" and "flexible" (e.g. principle of virtual work, finite element method, stiffness, flexible multibody systems) and to ICT infrastructure; these are shown in grey and are treated as lexical noise.

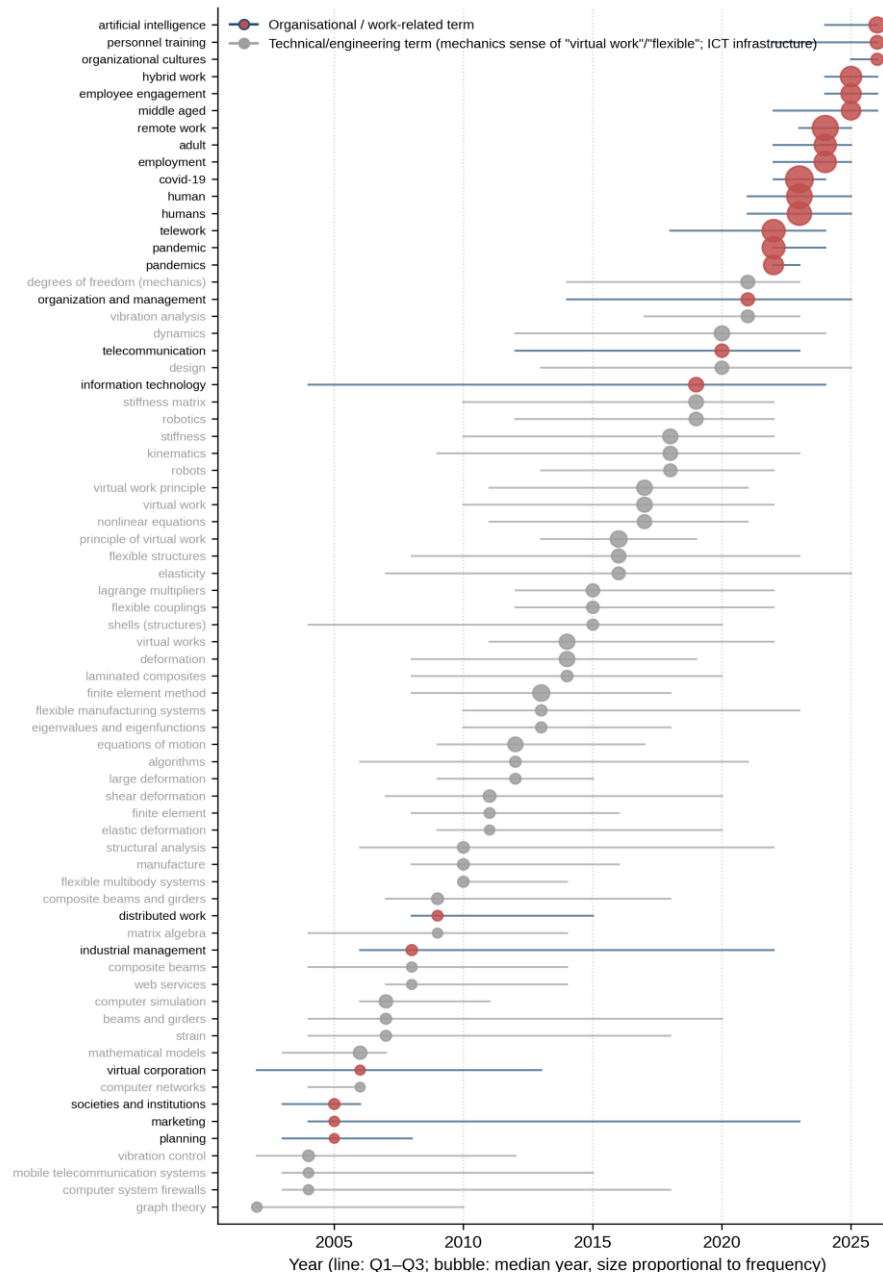


Figure 5. Trend topics by median year of occurrence

Note. The line spans the first to the third quartile of the years in which each term occurs; the bubble marks the median year, and its size is proportional to term frequency. Grey terms stem from polysemous search terms and do not belong to the organisational literature.

Because the Biblioshiny keyword indicators do not isolate the specific resources that motivated the search, a complementary text-mining of titles, abstracts and author keywords was performed on the exported full-record file ($n = 3,423$ records with complete metadata). Table 8 reveals a marked imbalance. Flexibility-related wording appears in 84.4% of records, largely because "flexib*" acted as the broadest retrieval anchor, and engagement terms appear in 12.6%. By contrast, perceived organisational support (1.3%), meaningful work (1.4%), workplace belonging (1.7%), social connectedness (1.1%), inclusive leadership (0.8%) and e-work or digital self-efficacy (0.2%) are rarely addressed, despite their theoretical relevance to engagement in distributed settings.

Table 8 Coverage of engagement-related constructs in titles, abstracts and author keywords

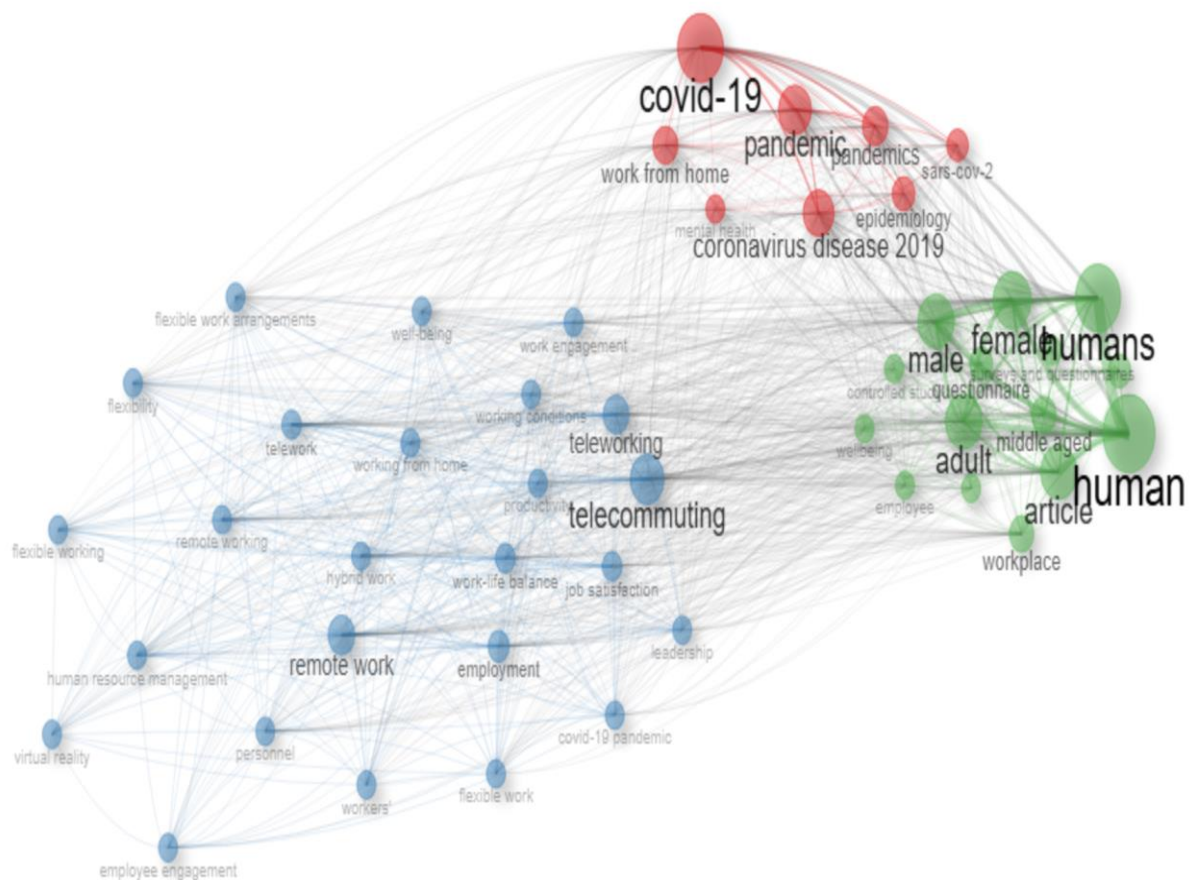
Construct (search pattern)	Records	% of records
Flexibility (flexible work, work flexibility)	2,888	84.4
Work–life / work–family interface	486	14.2
Work, employee or job engagement	432	12.6
Job or work autonomy	279	8.2
Professional isolation / loneliness	165	4.8
Burnout / exhaustion	132	3.9
Workplace belonging / belongingness	58	1.7
Meaningful work / meaningfulness	47	1.4
Perceived organisational support	45	1.3
Social connectedness	36	1.1
Technostress	32	0.9
Inclusive leadership	28	0.8
E-work / digital self-efficacy	8	0.2

Note. Based on the exported Scopus full-record file with complete metadata (n = 3,423). Counts are indicative and are intended to show relative emphasis rather than exact prevalence.

4.8 Conceptual structure: keyword co-occurrence network

The co-occurrence network of the 49 most frequent keywords is organised into three clusters (Figure 6). The pandemic and health cluster (red) is anchored by COVID-19, which has the highest betweenness centrality in the network (20.26) and a high PageRank (0.047), together with pandemic, work from home, SARS-CoV-2, epidemiology and mental health. The remote work and employment cluster (blue) is the largest and most heterogeneous. It is anchored by remote work (betweenness = 13.66), telecommuting (7.71) and employment (7.26), and it contains the managerial outcomes and resources of interest, including work–life balance, job satisfaction, productivity, leadership, flexibility, flexible work arrangements, well-being, work engagement and employee engagement. The human-subjects and study-design cluster (green) groups indexed descriptors (human, female, adult, questionnaire, cross-sectional and controlled study), which reveals the predominance of survey-based designs.

The positions of the engagement and resource terms within the network are revealing. Employee engagement has a very low betweenness (0.41) and the lowest closeness in the network (0.0145), and flexibility (0.016), flexible working (0.070) and flexible work arrangements (0.050) are similarly peripheral. In other words, although these constructs are frequent, they are mostly studied as outcomes attached to the remote-work core rather than as integrating concepts that connect different streams of the literature.



• **Figure 6. Keyword co-occurrence network (49 nodes, three clusters)**

Note. Node size reflects keyword frequency; colours denote clusters; edge thickness reflects co-occurrence strength. Source: Biblioshiny output.

4.9 Thematic map

The thematic map (Figure 7) positions the three clusters derived from the 250 most frequent merged keywords according to their centrality (relevance to the field) and density (internal development). The COVID-19 and human-centred well-being theme (cluster frequency = 9,104; centrality = 1.68; density = 9.32) is a motor theme: it is both highly connected and well developed. It contains telecommuting, work from home, work engagement, mental health, leadership, burnout, social support and motivation. The remote work and employment theme (frequency = 7,413; centrality = 1.31; density = 6.55) has high centrality but lower density and therefore functions as a basic, transversal theme; it gathers remote and hybrid work, work-life balance, job satisfaction, employee engagement, human resource management, productivity, flexibility and flexible working, digital transformation and artificial intelligence. The finite element and virtual work theme (frequency = 1,095; centrality = 0.13; density = 5.40) is isolated in the lower-left quadrant and corresponds to the engineering stream identified above.

Two observations stand out. First, the psychological construct "work engagement" is embedded in the well-being motor theme, whereas the managerial construct "employee engagement" belongs to the remote-work basic theme. Engagement therefore straddles two conceptual communities that rarely share vocabulary. Second, within the thematic network, flexibility (betweenness = 393.9), technostress (178.5), leadership (173.6), autonomy (160.4), trust (134.8) and job autonomy (116.3) act as bridging concepts that link sub-areas, which suggests that these resources and demands are the conceptual hinges through which the health and managerial streams can be integrated.

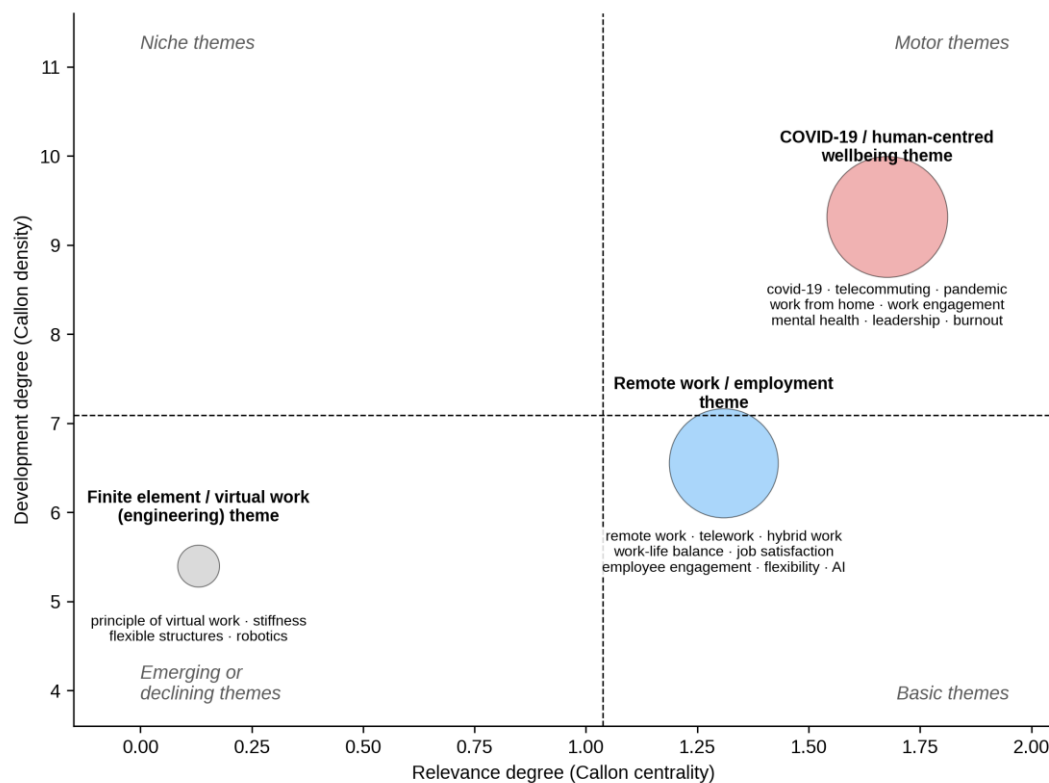


Figure 7. Thematic map based on Callon centrality and density

Note. Bubble size is proportional to cluster keyword frequency; axes intersect at the mean centrality and density of the clusters. In the rank-based Biblioshiny output, the remote-work theme lies at the intersection of the axes, which confirms its transversal role.

4.10 Intellectual structure: author co-citation analysis

Author co-citation analysis identifies three intellectual bases (Figure 8; Table 9). The first cluster, engagement psychology and survey methods, is the most central. It is led by Bakker (betweenness = 86.2; PageRank = 0.056), Demerouti (40.6) and Schaufeli (22.3), together with Salanova, González-Romá, Nachreiner, Sonnentag and Van den Broeck, and it is anchored in the JD-R model and the measurement of engagement (Bakker & Demerouti, 2007; Demerouti et al., 2001; Schaufeli et al., 2002). Eisenberger represents the organisational-support tradition (Eisenberger et al., 1986), and Tarafdar the technostress tradition (Tarafdar et al., 2007). The same cluster contains prominent methodologists (Podsakoff, MacKenzie, Ringle, Sarstedt and Henseler), which indicates a strong reliance on cross-sectional survey designs, common-method-bias controls and partial least squares structural equation modelling (Henseler et al., 2015; Podsakoff et al., 2003).

The second cluster, telework and the work–family interface, gathers the pre-pandemic foundations of the field: Golden (34.3), Gajendran (26.5), Kossek (13.1) and Felstead (11.5), together with Greenhaus, Raghuram, Bailey, Kelliher, Shockley, Kreiner and Ashforth. It builds on the meta-analysis of Gajendran and Harrison (2007), the review of Bailey and Kurland (2002), work–family conflict theory (Greenhaus & Beutell, 1985) and boundary theory (Ashforth et al., 2000). The third cluster, pandemic-era future of work and productivity, links economists and management scholars studying the persistence and productivity of working from home (e.g. Barrero, Choudhury and Brynjolfsson) with organisational psychologists who studied remote work during the crisis (e.g. Tramontano, Charalampous, Parker, Antonakis and Kniffin). Tramontano, whose work includes the e-work self-efficacy scale (Tramontano et al., 2021), shows the highest betweenness in this cluster (23.5), which indicates a bridging role between digital competence research and the other bases.

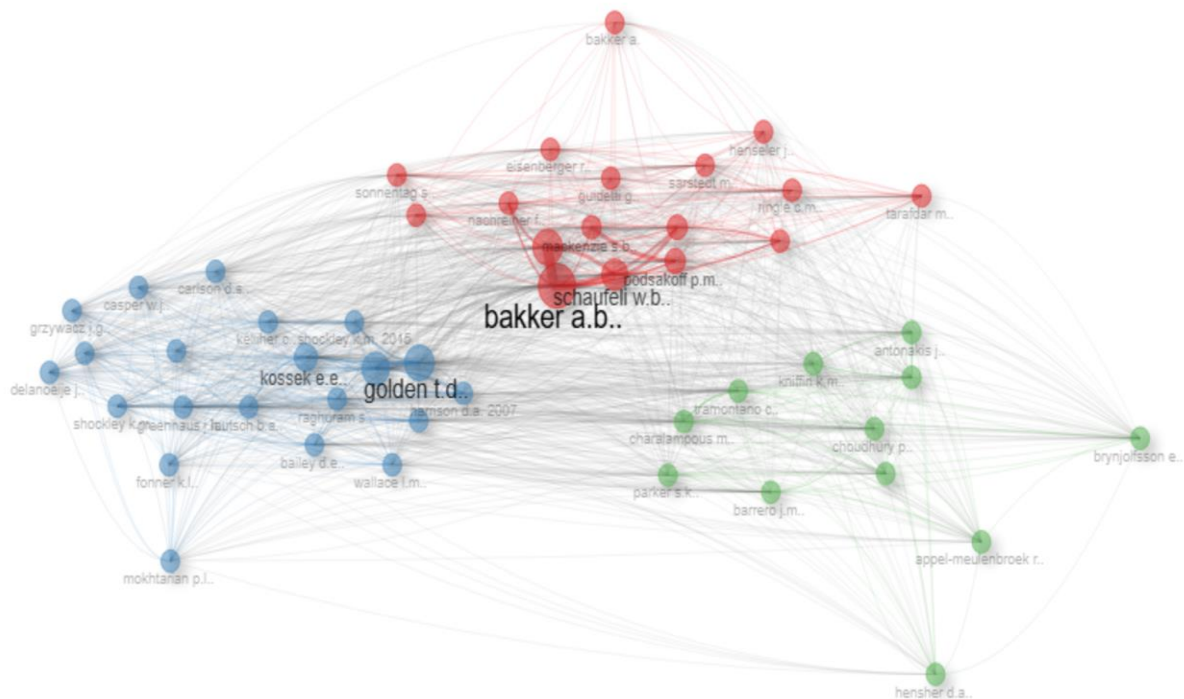


Figure 8. Author co-citation network (50 nodes, three clusters)

Note. Node size reflects co-citation frequency; colours denote clusters. Source: Biblioshiny output.

Table 9

Intellectual bases identified by author co-citation

Cluster	Most central authors (betweenness)	Intellectual focus
1. Engagement psychology & survey methods (red)	Bakker (86.2); Demerouti (40.6); Schaufeli (22.3); Podsakoff (13.6); MacKenzie (10.8); Salanova (8.0); Van den Broeck (7.0); Nachreiner (6.9)	JD-R model; measurement of engagement and burnout; perceived organisational support; technostress; common-method bias and PLS-SEM
2. Telework & work–family interface (blue)	Golden (34.3); Gajendran (26.5); Kossek (13.1); Felstead (11.5); Raghuram (6.7); Kelliher (5.9); Harrison (5.3); Shockley (5.0)	Effects of telecommuting on job attitudes, work–family conflict, boundary management, isolation and career outcomes
3. Pandemic-era future of work & productivity (green)	Tramontano (23.5); Charalampous (18.7); Narayanan (14.5); Antonakis (13.2); Choudhury (8.5); Barrero (8.3); Parker (7.2); Kniffin (6.5)	Persistence and productivity of working from home; work design; e-work self-efficacy; well-being in remote e-work; post-pandemic organising

4.11 Research fronts: bibliographic coupling

Bibliographic coupling of the most locally cited documents identifies three research fronts (Figure 9; Table 10). Cluster 1, telework effectiveness and well-being (121 documents), has the highest centrality (0.413) and impact (5.73). It is led by the work-design framework of Wang et al. (2021) and the review of Allen et al. (2015), and it includes reviews of telework and health (Beckel & Fisher, 2022) and of work-life balance (Shirmohammadi et al., 2022), the within-person quasi-experiment of Delanoeije and Verbruggen (2020), the study of Palumbo (2020) and the dual-pathway meta-analysis of Gajendran et al. (2024). Cluster 2, the engagement-resources nexus in remote work (100 documents; centrality = 0.392; impact = 4.15), is the front most directly aligned with the focus of this study. It originates in the JD-R analysis of telework by Sardeshmukh et al. (2012) and includes COR-based qualitative evidence on remote working and engagement (Adisa et al., 2023), public-sector telework (de Vries et al., 2019), a person-centred analysis of engagement antecedents (Mäkikangas et al., 2022), hybrid-workplace engagement (Naqshbandi et al., 2024) and studies of engagement, turnover intention and identification (Parent-Lamarche, 2022; Uru et al., 2022). Cluster 3, hybrid work design and organisational support (29 documents; centrality = 0.371; impact = 3.24), is the smallest and youngest front. It includes the technology-organisation-environment perspective on remote work (Ng et al., 2022), social support as a mediator-moderator (Slavković et al., 2022), the constraints-coping-effectiveness framework (Ahmad et al., 2022) and managerial presence in hybrid teams (Wiatr, 2026), and it contains a high share of 2026 publications.

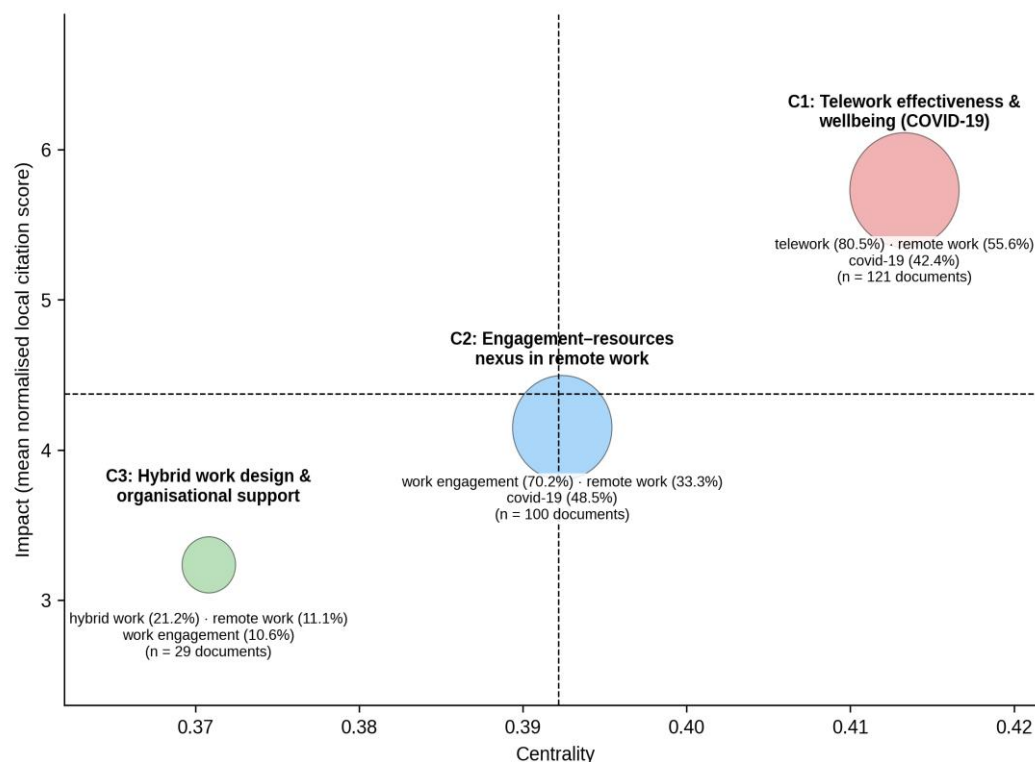


Figure 9. Clusters by bibliographic coupling of documents

Note. Bubble size is proportional to the number of documents; labels show the cluster's most characteristic keywords with their confidence values. Cluster names were assigned by the authors after inspection of the constituent documents.

Table 10 Research fronts identified by bibliographic coupling

Cluster (n; centrality; impact)	Representative documents (NLCS)	Thematic focus
C1. Telework effectiveness & well-being (121; 0.413; 5.73)	Wang et al. (2021) (47.3); Allen et al. (2015) (28.1); Beckel & Fisher (2022) (20.0); Shirmohammadi et al. (2022) (16.9); Metselaar et al. (2023) (10.1); Palumbo (2020) (9.8); Gajendran et al. (2024) (8.3); Delanoeije & Verbruggen (2020) (7.2)	Work design, productivity, health, work–life balance and the dual (positive and negative) effects of remote-work intensity
C2. Engagement–resources nexus (100; 0.392; 4.15)	Sardeshmukh et al. (2012) (16.2); Adisa et al. (2023) (15.6); de Vries et al. (2019) (13.6); Mäkikangas et al. (2022) (12.8); Naqshbandi et al. (2024) (8.7); Sandoval-Reyes et al. (2021) (6.7); Parent-Lamarche (2022) (5.9); Uru et al. (2022) (4.4)	JD-R and COR explanations of engagement, exhaustion, isolation and retention in telework and hybrid work
C3. Hybrid work design & organisational support (29; 0.371; 3.24)	Ng et al. (2022) (5.9); Slavković et al. (2022) (2.5); Ahmad et al. (2022) (1.9); Wiatr (2026) (1.8)	Organisational readiness, social and managerial support, coping and team management in hybrid arrangements

Note. NLCS = normalised local citation score within the corpus.

5. Discussion

5.1 Three waves of research on distributed work and engagement

Triangulating the performance and science-mapping results (RQ1–RQ3) suggests that the field has developed in three waves, each with a distinct intellectual base. The first wave (2000–2011) treated telework as an alternative work arrangement and asked whether it altered job attitudes, work–family conflict and control (Golden et al., 2006; Hill et al., 2003; Kossek et al., 2006). Its intellectual base is the telework and work–family cluster of the co-citation map. The second wave (2012–2019) connected flexible and remote work with effort, work intensification, well-being and engagement, and introduced the JD-R lens into telework research (Felstead & Henseke, 2017; Grant et al., 2013; Sardeshmukh et al., 2012). The third wave (2020–present) was triggered by the pandemic and produced more than four-fifths of the corpus. It began as crisis research on health, productivity and engagement under enforced home-working (Galanti et al., 2021; Wang et al., 2021), drawing on the engagement-psychology base, and it is now shifting towards the deliberate design of hybrid arrangements, as reflected in the trend topics and in the youngest coupling cluster (Demerouti, 2026; Toscano et al., 2025; Wiatr, 2026).

5.2 The engagement–resource nexus: what the maps reveal

Four insights emerge regarding the place of engagement and its enabling resources in the field. First, engagement is conceptually fragmented. The psychological term "work engagement" is embedded in the health-oriented motor theme, whereas the managerial term "employee engagement" belongs to the remote-work and HRM theme and is one of the most peripheral nodes in the co-word network. The two vocabularies, which often denote closely related phenomena, appear to evolve in parallel communities with limited cross-fertilisation, which risks duplicated effort and inconsistent measurement.

Second, flexibility and autonomy dominate, while relational and personal resources are marginal. Flexibility is the most pervasive construct and a key bridging concept, and autonomy features in about one in twelve records.

By contrast, POS, meaningful work, belonging, social connectedness, inclusive leadership and e-work self-efficacy each appear in less than 2% of records. This imbalance is theoretically consequential: SDT and the JD-R model suggest that autonomy without relatedness and competence is unlikely to sustain engagement (Ryan & Deci, 2000), and evidence already shows that telecommuting can erode belongingness and meaningfulness (Afota et al., 2024) and that isolation and loneliness can offset its benefits (Bollestad et al., 2022). Emerging studies on inclusive leadership (Katsaros, 2025; Mohase et al., 2025), organisational support in hybrid work (Naqshbandi et al., 2026) and e-work self-efficacy (Dogra & Parrey, 2024; Tramontano et al., 2021) indicate a nascent but still thin research stream.

Third, the evidence base is methodologically narrow. The prominence of survey-methods authors in the co-citation network and of study-design descriptors in the co-word network indicates that the field relies heavily on cross-sectional questionnaires analysed with structural equation modelling. Designs capable of addressing within-person dynamics and causality, such as diary studies (Toscano et al., 2025), quasi-field experiments (Delanoeije & Verbruggen, 2020), person-centred analyses (Mäkikangas et al., 2022), intervention studies (Demerouti, 2026) and meta-analyses (Gajendran et al., 2024), remain comparatively rare.

Fourth, the field is geographically concentrated but thinly connected. Four countries produce the largest share of output, yet only about one in five documents is internationally co-authored. Because remote work is shaped by regulation, housing, digital infrastructure and cultural norms, the low level of cross-national collaboration limits the generalisability of findings, especially for emerging economies where the adoption of hybrid work is accelerating.

5.3 An integrative resource-based framework

Building on these insights and on the JD-R, COR and SDT perspectives, Figure 10 proposes an integrative framework that organises the constructs mapped in this review. The remote-work arrangement, characterised by its intensity and schedule freedom, shapes three bundles of resources (organisational, job-design and personal–relational) as well as specific demands (isolation, technostress, work intensification and blurred boundaries). Resources drive engagement through a motivational path, demands impair engagement and well-being through a health-impairment path, and engagement in turn mediates the effects of remote work on performance, well-being, work–life balance, retention, career success and innovation. Boundary conditions, including whether the arrangement is crisis-imposed or voluntary, gender and caregiving responsibilities, sector, national context and the digital infrastructure (including artificial intelligence), moderate these relationships.

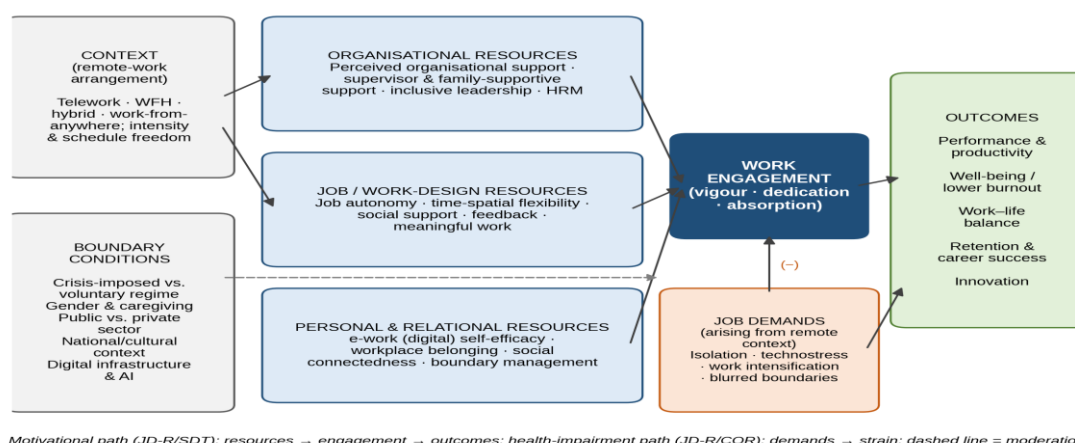


Figure 10. Integrative resource-based framework of engagement in remote and hybrid work

Note. Framework developed by the authors from the bibliometric synthesis, drawing on the job demands–resources model, conservation of resources theory and self-determination theory.

The framework yields four propositions for empirical testing. Proposition 1: The effect of remote-work intensity on engagement is curvilinear and depends on the balance between resources gained (autonomy, flexibility) and resources lost (social connectedness, visibility, support). Proposition 2: Organisational resources (POS and inclusive leadership) and relational resources (belonging and connectedness) compensate for the reduced face-to-face contact inherent in remote work and are therefore stronger predictors of engagement in high-intensity than in low-intensity arrangements. Proposition 3: E-work self-efficacy is a personal resource that conditions whether autonomy and flexibility translate into engagement rather than into technostress and work intensification. Proposition 4: The resource–engagement relationships differ between crisis-imposed and voluntary, post-pandemic hybrid regimes, and across institutional and cultural contexts.

6. Future research agenda

To address RQ4, Table 11 organises the gaps identified in the maps according to the TCCM framework (Paul & Rosado-Serrano, 2019), which specifies directions related to theory, context, characteristics (constructs) and methodology.

Table 11 Future research agenda based on the TCCM framework

Dimension	Gap identified in the bibliometric maps	Illustrative research questions
Theory	JD-R dominates; COR, SDT, boundary and belongingness theories are rarely integrated; the "work engagement" and "employee engagement" streams are disconnected.	How do SDT needs (autonomy, competence, relatedness) jointly explain engagement across remote-work intensities? Can COR spirals explain the erosion of belonging over time? How can the psychological and managerial engagement literatures be reconciled?
Context	Output and collaboration are concentrated in a few countries; single-country studies prevail; public-sector, SME, frontline–remote mixed and Global South settings are under-represented; most evidence stems from the crisis period.	Do resource–engagement relationships differ between crisis-imposed and voluntary hybrid regimes? How do labour regulation, housing and culture shape these relationships in emerging economies? What are the effects on employees excluded from remote work?
Characteristics (constructs)	POS, inclusive leadership, belonging, social connectedness, meaningful work and e-work self-efficacy appear in fewer than 2% of records; AI, training and organisational culture are emerging but untheorised.	Does inclusive leadership foster engagement in hybrid teams through belonging? Does e-work self-efficacy moderate the autonomy–engagement relationship? How do AI-enabled tools and algorithmic monitoring affect autonomy, meaningfulness and engagement?
Methodology	Heavy reliance on cross-sectional surveys and PLS-SEM; few diary, longitudinal, experimental, multilevel, mixed-method or meta-analytic designs; lexical ambiguity of key terms in the literature.	What are the within-person effects of office versus home days on engagement? Which interventions (e.g. job crafting or leader training) raise engagement in hybrid work? Can team-level and multi-source data reduce common-method bias?

7. Implications

7.1 Theoretical implications

This study contributes to theory in three ways. First, it shows that the knowledge base on engagement in distributed work rests on three largely separate intellectual traditions, namely engagement psychology, telework and work–family research, and future-of-work economics, and it identifies bridging constructs (flexibility, autonomy, leadership, technostress and trust) through which they can be integrated. Second, it documents a conceptual split between work engagement and employee engagement, and calls for construct clarity and shared measurement. Third, the integrative framework and propositions extend the JD-R logic to remote and hybrid work by specifying which resource bundles compensate for the loss of co-presence and under which boundary conditions they operate.

7.2 Practical implications

For managers and HR professionals, the findings indicate that flexibility alone is an insufficient engagement strategy. Hybrid policies should combine autonomy with visible organisational support, inclusive leadership practices that ensure remote employees feel valued and heard, deliberate opportunities for social connection and belonging, and training that builds e-work self-efficacy. Because remote-work intensity has simultaneous positive and negative effects (Gajendran et al., 2024), organisations should monitor engagement and exhaustion jointly and adjust the balance of home and office days according to task interdependence and employee needs. For policymakers, the geographical concentration of evidence suggests caution in transferring findings across institutional contexts and supports the collection of national data on hybrid work practices and outcomes.

8. Limitations

Several limitations should be acknowledged. First, the analysis relies on a single database; although Scopus offers broad coverage, relevant work indexed only in Web of Science or other databases may be missing. Second, the lexical search strategy included polysemous terms: "virtual work" and "flexib*" retrieved an engineering stream and "new normal" retrieved education studies. These records were transparently identified in the science maps, but they inflate some descriptive indicators; future replications should apply subject-area filters or exclusion terms. Third, no document-type or language filters were applied, so conference papers, book chapters and non-English documents are included alongside journal articles. Fourth, author names are not fully disambiguated, which affects author-level rankings. Fifth, the construct-coverage analysis (Table 8) is based on the exported full-record file of 3,423 records and should be interpreted as indicative. Finally, 2026 is a partial year, and citation-based indicators disadvantage recent documents. Despite these limitations, the triangulation of several independent bibliometric techniques provides a robust picture of the structure and evolution of the field.

9. Conclusion

Research on remote and hybrid work and engagement has grown from a small telework literature into a large, multidisciplinary field, with more than four-fifths of its output published since 2020. The field is anchored in three intellectual bases and organised around a pandemic-driven well-being theme and a transversal remote-work theme, and its research front is moving towards hybrid work design, employee engagement, artificial intelligence and organisational culture. Yet engagement remains conceptually split, and the relational, organisational and personal resources that theory identifies as crucial for distributed employees are still marginal. By mapping these patterns and offering an integrative framework and a TCCM agenda, this study aims to help researchers move from documenting the effects of where people work to explaining how organisations can resource engagement wherever work takes place.

Declarations

Conflict of interest: The authors declare no conflict of interest.

Data availability: The bibliographic data were retrieved from Scopus under institutional licence; the search string and analytical parameters are fully reported to enable replication.

Declaration of AI use: The authors used Claude (Anthropic), SciSpace, and PaperPal to assist with drafting the text, checking vocabulary and syntax errors and ensuring simple language flow for easy understanding. The bibliometric analysis was conducted using the bibliometrix R package. The authors reviewed and verified all content and take full responsibility for the publication.

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