

## New Working Practices: A Scientometric Review

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## Abstract

Study on New Working Practices (NWP), which is the subject of this review paper, has created a large body of literature. Studies in this research area are progressing quickly, and it is important to stay abreast of new trends and essential factors in the growth of mutual awareness. This study evaluates the global scientific output of New Working Practices (NWP) research and explores their hotspots and frontiers from 1980 to 2018 (pre-COVID-19), using bibliometric methods. 850 relevant articles were retrieved from the Web of Science Core Collection (WoSCC) and analysed. Scientometric method and Citespace VI were used to analyse the bibliometric data. Reference citation and cocitation networks were plotted, while keywords were used to analyse the research hotspots and trends. There is a significant increase in the number of annual publications with time. The United Kingdom (UK) ranked highest in the countries with most publications, and the leading author is Friedhelm Nachreiner based on publication counts. The most cited author/organisation is the UK Department of Health. Performance, work, and flexible working are the research hotspots, while flexible working arrangement represents the prominent research domain. The study offers valuable references for researchers, industry practitioners and policymakers.

*Keywords:* CiteSpace, flexible working, new working practices, scientometric, United Kingdom

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## 1.0 INTRODUCTION

Workplace transition is a global phenomenon. The essence of employment is shifting, and the population's makeup is also adapting to change (Waterhouse et al., 1999). Literature has demonstrated that businesses adapt to the changing world of work, while workplaces begin to undergo shifts in the societal, technological, and economic sense (Askenazy et al., 2002; Bell & Anderson, 1999; McEwan & Ennals, 2005; Tucker et al., 2014). This change is often engineered by the growth and extensive use of information technology (IT) and the gravitation of a manufacturing-based economy towards a service-based economy (McOrmond, 2004). In addition to the progression of IT, organisational theorists have found out that rising pressures on business institutions to be more innovative, sensitive, and customer-focused are another driver that leads to shifting patterns (Heerwagen et al., 2016). Since the early 1990s, many corporations, particularly in advanced economies, have begun to accept new working practices (NWP), with nearly two-thirds of large organisations globally adopting NWP (Dixon & Ross, 2011). NWP are innovative or flexible ways of working, typically comprising four key components viz: team-based work; job autonomy; job rotation; and interaction/communication in the workplace (Ollo-Lopez et al., 2010; Osterman, 1994). Consequently, the current pandemic of COVID-19 is having a tremendous influence on organisations around the world, with companies changing the way work is done (Bailey & Breslin, 2021). To accommodate such changes, two-thirds of large organisations, especially in the West have embraced NWP (Dixon & Ross, 2011), such as team-working, teleworking, hot-desking, activity-based-working, and home-working (Delanoije & Verbruggen, 2019; Dixon, 2005; Haynes, 2008). These are new practices that promote developing partnerships between company teams, promoting a culture of cooperation, recruiting and maintaining the best talent, improving competitiveness, and stimulating creativity. Jayantha et al. (2007) posited that the most important driver of NWP is 'space costs'. As digital technologies continue to drive the way people work in workplaces, NWP, such as task rotation, collaboration, teleworking, are gaining ground. The advent of NWP has raised concerns about hierarchical structure and power in terms of mobility, transparency, hierarchy, and cooperation. However, the lack of clarification in the area of NWP is a big concern due to various names and definitions.

A cross-country overview revealed that; NWP occur in clusters (i.e. some NWP happen together in the same place), leading to an increase in productivity, and are supported by high skills (Eriksson, 2003; Leoni et al., 2001). Other advantages of NWP include reduction in failures associated with the production process, enhanced information collection and sharing, increased diversification, and employees' satisfaction (Askenazy & Caroli, 2010; Ramirez et al., 2007; Schöne, 2009). Hence, the increasing rate of NWP adoption. For example, a global survey commissioned by Vodafone showed that 75 percent (three-quarters) of businesses across the globe have flexible working policies. However, while some businesses have switched from conventional methods of operating to NWP, they do not realise they have

done so because of a lack of knowledge of NWP. While for the same reason, some companies interested in adopting and implementing NWP may find it difficult. According to Helen (2016), 95 percent of employers claim to provide flexible working practices. Suppose NWP continue to obtain regulatory approval across nations. In that case, there is a possibility of a rise in the number of NWP that need more study to gain a better picture of the full spectrum of these activities (Kelliher & Anderson, 2010). To ensure competitiveness and survival, technological change and development pressures demand organisations to be innovative in introducing new ways of thinking and working.

The impact of changing business practices on corporate real estate requirements has been the subject of discussion in past research (Gibson & Lizieri, 2001; Manning & Roulac, 2001), emphasising the office sector (Lizieri, 2003). In the management science and business organisation literature, drivers such as globalisation, innovation and convergence in IT, reorganisation and the drive for flexibility in workplaces have brought about new ways of conducting business activities. These, in turn, have altered the pattern of demand for real estate, change the locational requirements of firms and how they manage space (Lizieri, 2003). The introduction of some NWP such as flexible working, home working, and hot-desking, implies a division of corporate space into core space, required on a permanent or long-term basis, and peripheral space which is taken on when business needs demand but is shed when surplus to requirements. A comparative study on common real-estate-related business policies and activities in Australia, Hong Kong, the UK, and the US by Gibler et al. (2002) revealed that few companies are undertaking desk-sharing, hoteling, or other property-related space intensification activities. Nonetheless, Gibson and Louargand (2001) found that NWP have changed the nature of occupier requirements and placed greater stress on the need for flexibility in provision to allow corporate real estate strategists to manage business risk. Empirical research into NWP and how they influence property portfolio suggests that change is muted and gradual, reflecting resistance to adopting working practices in part. Research in this area, as in many other areas of real estate, is hampered by a lack of attention to theory (Lizieri, 2003).

While NWP is not a new paradigm, it is gaining traction in practice worldwide and yielding extensive research from various perspectives. As a result, NWP is a progressively challenging topic to review. Although there are several relevant studies in past years, there is no comprehensive scientometric review about NWP in the literature. Given the technological advancement which has culminated in the evolution of this field, coupled with a shortage of scientometric review, this study aims to reveal the intellectual landscape of the study of NWP by identifying landmark research studies/articles and emerging trends to reveal the research trends in this field. Unlike the past conventional literature review study on NWP, which are classically performed by an experienced researcher (Blok et al., 2011), this review study adopts an algorithmic method embedded in CiteSpace software. This study has advantages over previous review studies in some aspects. First, extensively published articles and a wider diverse range of NWP-related topics are extracted. Previous review studies largely depend on keywords and are characterised by small samples. However, other text fields (e.g. titles and abstracts) can help in extracting representative terms and references to provide wider information (Chen et al., 2010). Thus, this study presents a comprehensive overview of NWP, based on broader topic extraction that incorporates keywords, titles, and abstracts in the Web of Science (WoS) database. Second, past literature review studies mainly depend on expert opinion, but experts may not appropriately capture the emerging trends in a field (Kim & Chen, 2015). The principle of the scientometric approach utilised in this study is to obtain a wide-ranging landscape on NWP. The remainder of the paper is arranged as follows. It begins with the background of NWP, followed by a discussion on the methodology employed in the study. The following section presents the analysis and discussion of results, whilst the last section concludes and suggests future research direction.

## 2.0 METHODOLOGY

For a literature review study to be a stand-alone work, a type that transcends a mere report of references (Zhou et al., 2015), a systematic approach identifies, retrieves, selects, and evaluates relevant quality publications regarding a research topic is imperative. A systematic review approach methodology was adopted in this study to elicit existing literature on NWP to explore useful findings and identify knowledge gaps for future research directions. The process of identifying, screening, and selecting eligible research publications for this study followed a combined structured approach for scientometric review using WoS and CiteSpace software.

### 2.1 Identification and Selection of Academic Journal Papers

In effect, the scientometric analysis is established to collect literature data (Jin et al., 2017). To identify and retrieve academic journals that have published relevant papers related to NWP from 1980 to 2018, a robust search engine, WoS database by using a topic search, was employed in this study. Aside from being a major archive for most research output, the choice of WoS rests on its ability to perform better in accuracy than other search engines. For instance, WoS offers the most reliable download function (Chen et al., 2008) and gives more accurate results in terms of centralisation of collected data (Jin et al., 2017). With the help of the WoS database, a search strategy for NWP was developed in early November 2018 with previously identified pertinent terms relating to NWP, following a preliminary literature review. To guarantee the use of publications of acceptable quality, only academic articles that appeared in peer-reviewed journals were included (Ng, 2016). The search was limited to articles published in English-language from 1980 up till 2018 and articles not related to the topic as deemed by the authors were removed. Having conducted a systematic search on WoS to locate published articles associated with NWP, 850 journal papers were generated for the analysis. These papers were downloaded with a full record and exported in plain text format compatible with CiteSpace. Since this is the first-ever scientometric review NWP, the authors narrowed their search to interchangeable keywords. The search code generated by WoS is as follows:

Topic: (“New working Practices” OR “new working patterns” OR “new organisational practices” OR “new ways of working” OR “workplace innovations” OR “high-performance work organisations” OR “flexible working” OR “post-Fordist work practices” OR “work transformation”) Refined by DOCUMENT TYPES: (ARTICLE) AND LANGUAGES: (ENGLISH) Timespan: 1980-2018. Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, ESCI.

## 2.2 Method of Analysis

One of the important ways by which researchers can influence industrial practice is through research publications (Cohen et al., 2002). It is believed that the number of academic publications emanating from a geographic location could determine the extent of the practice of the subject matter within the industrial sectors of such location or country (Hong et al., 2012). Osterman (1994) revealed that restructuring processes such as NWP are widespread regarding countries and sectors, but NWP vary across countries (Ollo-López et al., 2011). Hence, to understand the streams of NWP-related research in different regions, the authors identified various NWP clusters in the literature and evaluated the numbers of publications attributed to different countries, authors, institutions, and funding bodies. This study primarily employed CiteSpace to detect, analyse and visualise evolving trends and citation patterns in the literature (Chen, 2006). CiteSpace is a java application that combines information visualisation, bibliometric processes, and data mining algorithms in an interactive approach. CiteSpace portrays a simple dynamics model that enables scholarly communication in a way that a transient body of scientific publications, commonly recognised as a research front, refers to a cluster of publications in the literature, which is known as the intellectual basis (Chen, 2006).

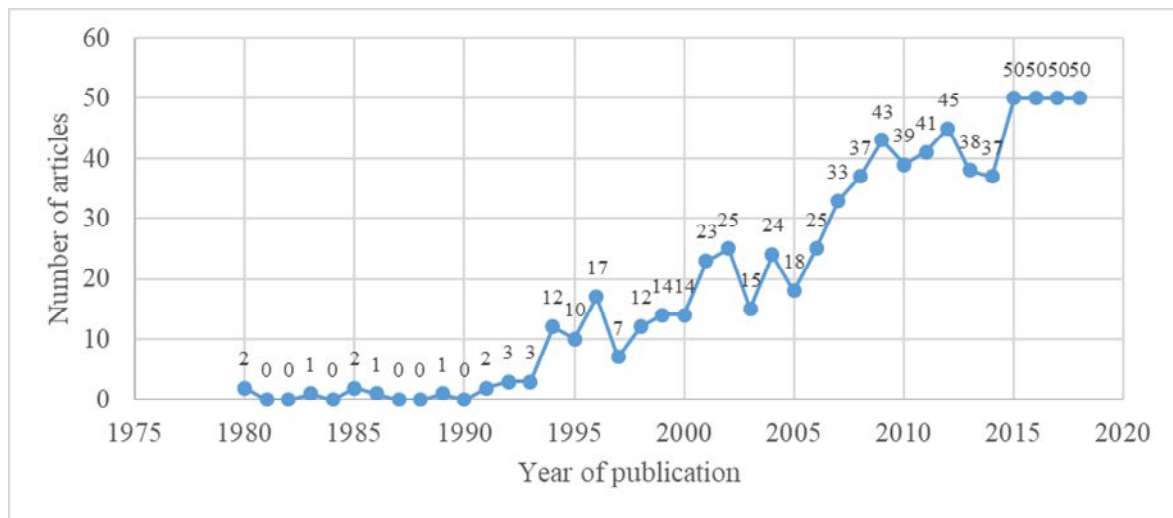
CiteSpace enables easy identification of some special classes of articles in terms of landmarks (by eliciting citation popularity), hotspots based on a rapid increase in numbers of citations received, and pivotal papers that are essential due to their strategic position in cocitation networks (Chen et al., 2008). The method of analysis and visualisation of the identified articles in this study follows the general procedure for using CiteSpace, including time slicing, thresholding, modelling, pruning, merging, and mapping (Chen, 2004). Subsequently, the network is grouped into clusters in which each group is signifying a discrete field or a thematic focus. The larger the members of a cluster, the larger the size of the cluster, and that reflects the degree of hotspots (Jin et al., 2017). Clusters were used to determine the emerging trends in the NWP field based on the recency of the average publication year. Also, the burst detection algorithm was applied to reveal unusually huge changes in the frequency of an entity (e.g. keywords and document citations) over time (Pollack & Adler, 2015). CiteSpace will expose the subject field’s research context and growth direction by combining the subject research frontier of network data analysis, the topic evolution trend, and the relationship between investigating the knowledge base. In comparison to the classical literature review, the CiteSpace technique can make the research context in this field more straightforward and more intuitive while still being repeatable to some extent, to eliminate the potential deviation induced by subjective judgment. Conventional narrative-based document reviews are qualitative, relying heavily on individual judgments and explanations, whereas CiteSpace software can visualise this non-descriptive judgment.

## 3.0 ANALYSIS AND DISCUSSION OF RESULTS

This review study explores various NWP and provides insights into NWP related research trends across the world by reviewing selected relevant research publications during the study period. The results are presented in terms of different labels associated with NWP, a yearly frequency of publication, and research contributions by various sources. The use of scientometrics in this paper is more than a trivial measure of quantities, but rather an analysis, understanding, and ability to make managerial decisions (Klochkov, 2019). Scientometric analysis is used in determining the scholarly potential of an individual scholar, a research team, an institution, and even an entire country with varying degrees of accuracy. The use of scientometric analysis is growing because of its cheapness and faster speed of verification and the absence of a subjective “human factor” in the rapid evaluation of the publication activity of scholars. The outcome of this paper also benefits from the threshold constraints on scientometric metrics, which are a form of filter that enable unsuitable applicants to be screened out (for example, when obtaining grants). This will thereby decrease the expense of performing costly and time-consuming expert evaluations of the consistency of scholarly performance. Cocitation and cluster analyses were conducted to: (1) show the temporal evolution of NWP, (2) define main disciplines and identify possible relationships between disciplines in the study of NWP, (3) to evaluate widely quoted scholars and their research focus, and to investigate the major fields of study and scholarly groups that use NWP.

### 3.1 Annual Publications on NWP Research

Figure 1 shows the yearly publication of the analysed NWP related studies. It revealed that only 7 papers were published in the 1980s. This could be attributed to NWP becoming prominent in the late 1980s and early 1990s (Bell & Anderson, 1999). It is therefore sufficed to say that NWP were emerging in the 1980s. Hence, it attracted only a few publications in that period. Meanwhile, the remaining identified papers were published between 1990 and 2018, indicating the period with increased research attention on NWP. As earlier stated, technology is one of the major drivers of NWP, and significant advancement in information technology actually took place during the 1990s (Oliner & Sichel, 2000). The findings reveal that NWP have become an attractive research dome for many researchers in the past three decades, and the trend may continue as long as technological innovations continue to boom.



**Figure 1** Annual number of publications on NWP from 1980 to 2018

### 3.2 Research Output by Authors

Figure 2 shows the co-authorship network, representing the network of authors reflected in nodes and links, where the node denotes an identified author. Each link signifies an array of the relationship between authors being connected by the link (Zhao, 2017). To prune the network, pathfinder utility in Citespace was utilised for pruning the network. The resultant network produced 55 nodes and 40 links. The size of a node indicates the number of articles published by the corresponding author, whereas the thickness of each link signifies the intensities of collaboration between the connecting authors (Olawumi & Chan, 2018). Four most productive authors published more than 2 articles concerning NWP. They are; Friedhelm Nachreiner (5 articles) being a top-ranked author, Peter Vink (4 articles), Liesbeth Groenesteijn (4 articles) and Jane Lewis (4 articles), whereas other authors published 1 to 2 articles. These authors, with the exception of Lewis, have a centrality score of 0.01 each. This score quantifies the number of times a node (author in this case) acts as a bridge along the shortest path between two other nodes (authors). The betweenness centrality is used to quantify the control of a human on the communication between other humans in a social network (Freeman, 1977). Hence, these authors with betweenness centrality have an influence to some extent over other authors in the scientific network.

Considering the established collaborative efforts among the authors in this research domain, the co-authorship network portrayed numerous research communities comprising some productive focal authors cooperating with other authors in the network. Two principal research communities were identified: (1) community constituted by the most productive author, Nachreiner F., as the central author, collaborating with other authors such as Janssen, D., Giebel O., and Wirtz A. Friedhelm Nachreiner is a professor at Carl von Ossietzky University of Oldenburg, Germany and his research focus is on shift work, mental workload, and monitoring. As the most productive author in terms of publications, he has collaborated with other researchers in this domain; (2) robust collaboration in the research circuit of Groenesteijn L. and Vink P. as the central authors, forming a community with other researchers such as Blok M., Formanoy M., De Korte E. and Schelris R. This research community focuses on New Ways of Working (NWW) and flexibility in workplaces.

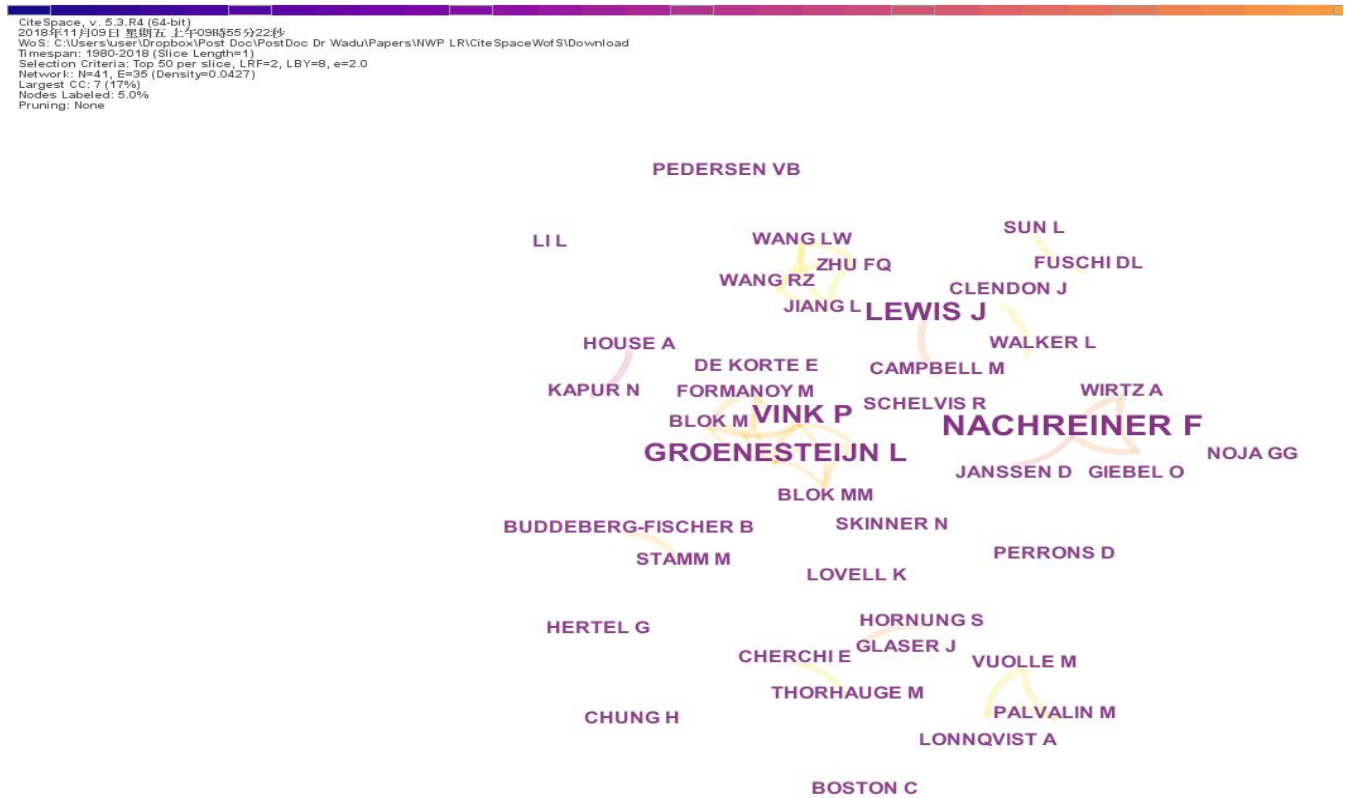


Figure 2 Co-authorship network

### 3.3 Research Output by Countries

The number of publications emanating from a country in a research area is a good yardstick to measure how policies regarding such research are being practiced in that country. As illustrated in Table 1, during the studied period, NWP related studies have been conducted mostly in developed countries. This shows that the contribution of developed countries towards NWP research is very significant. The predominance of NWP research in developed nations indicates that NWP research is not yet a global interest. This is logically meaningful because of the great emphasis on flexible working practices in the developed world. The numerous flexible working initiatives can also explain this by developed nations in enhancing the adoption of NWP. For instance, most governments are currently promulgating some useful legislation and policies supporting NWP (such as equal benefits for both part-time and full-time employees). The high betweenness centrality scores as identified in Table 1 also indicate the significant influence of these countries on the NWP research field.

Table 1 shows the 10 top-ranked countries by citation counts (in descending order). The results revealed that the UK (England and Scotland) is the leading country with the highest number of publications, which is 41.61%, confirming the prevalence of NWP in the region. A previous study in the UK (Millward, 1992) revealed that the spread of NWP in the region resulted from the removal of barriers to NWP by firms' managers who are responding to changes in the technological environment rapid globalisation in the business world. European countries including Finland, the Netherlands, Germany, and Sweden, recorded 123 articles and ranked the second-highest number of publications on NWP related research. This result affirms the recent finding in the literature that NWP have significantly increased across firms in European countries (Goñi-Legaz & Ollo-López, 2015). Although NWP originated from the US (Arabandi, 2011), contrary to Eriksson (2003) who observed that NWP are common only in the US because of scanty evidence about the spread of NWP in other parts of the world, it is clear that NWP have now prevalently extended beyond its origin as UK and Europe are now leading the US in terms of numbers of publications. The results show that China is the leading country in Asia (30 publications) followed by South Korea with 6 publications. Other Asian countries that made the list include Japan, Thailand, and India, with 2 publications each. Aside from South Korea, other Asian tigers (Hong Kong, Singapore, and Taiwan) were not included in the list, indicating research potential in this area in those countries. It was found that 4 publications come from Africa as a continent (2 publications each from Ghana and South Africa). Various factors could be attributed to the lack of research output in Africa, including an immature sense of publication, NWP are yet to be embraced as a priority in business workplaces, and lack of understanding of the potential benefits of NWP. Hence, there is great potential for NWP research in African countries.



**Table 1** Publication frequency by countries

Frequency	Centrality scores	Country	%	Rank
287	0.56	ENGLAND	37.91	1
92	0.38	USA	12.15	2
73	0.11	AUSTRALIA	9.64	3
41	0.24	NETHERLANDS	5.42	4
36	0.03	GERMANY	4.76	5
30	0.03	PEOPLES R CHINA	3.96	6
28	0.12	SCOTLAND	3.70	7
24	0	FINLAND	3.17	8
22	0.05	SWEDEN	2.91	9
16	0.22	CANADA	2.11	10

Furthermore, citation bursts are another important tool to understand research areas and domains. Citation bursts indicate a strong surge of frequency abrupt change in citation counts in a given period (Chen et al., 2014). Significant citation bursts were recorded in 6 countries (see Figure 3). All the nodes that exhibited citation bursts represent countries or prominent regions with significant studies and research in NWP. It was noted that the USA, England, Netherland, and Finland, recorded high frequencies and high citation bursts. Moreover, 4 out of the 6 countries with citation burst are European nations, indicating that there are significant research effort and devotion to NWPs in Europe. Moreover, the most recent citation bursts are connected to European countries.

### Top 6 Countries with the Strongest Citation Bursts

**Figure 3** Country citation burst

### 3.4 Author Co-Citation Analysis

With the aid of a dataset collected from WoS, CiteSpace was employed to show visualisation and analysis of how authors are co-cited within the research area of NWPs from 1980 to 2018. As shown in Figure 4, there are 687 nodes and 2201 links with pathfinder pruning, forming a merged author cocitation network with 17 clusters (red labels) obtained and labelled by locally linear regression (LLR). In CiteSpace, terms are selected for clustering by three different algorithms, LSA, LLR, and mutual information. LLR was chosen for this analysis because it reflects the unique aspect of a cluster (Chen et al., 2010). The purple labels represent nodes that stand for authors and institutions with the sizes corresponding to the number of times they were cited within the study period. Each node represents an author or organisation, and the links connecting the nodes represent direct partnerships established through the co-authorship of papers. The network is divided into 17 cocitation clusters. Index terms from their own citers label these clusters. Five major clusters have been generated with more than 50 members and named with, mediating role (106, 2008), labour market transformation (77, 2004), individual performance (76, 2013), schedule flexibility (73, 2012), and activity-based flexible office (62, 2015) by CiteSpace based on LLR algorithm. Note, corresponding citation size and mean citation year for each cluster are enclosed in parentheses. The largest cluster (mediating role) has 106 members and the mean citation year of 2008. The most active citer to this cluster is Atkinson and Hall (2011), who explore the influence of flexible working on employee happiness and attitudes.

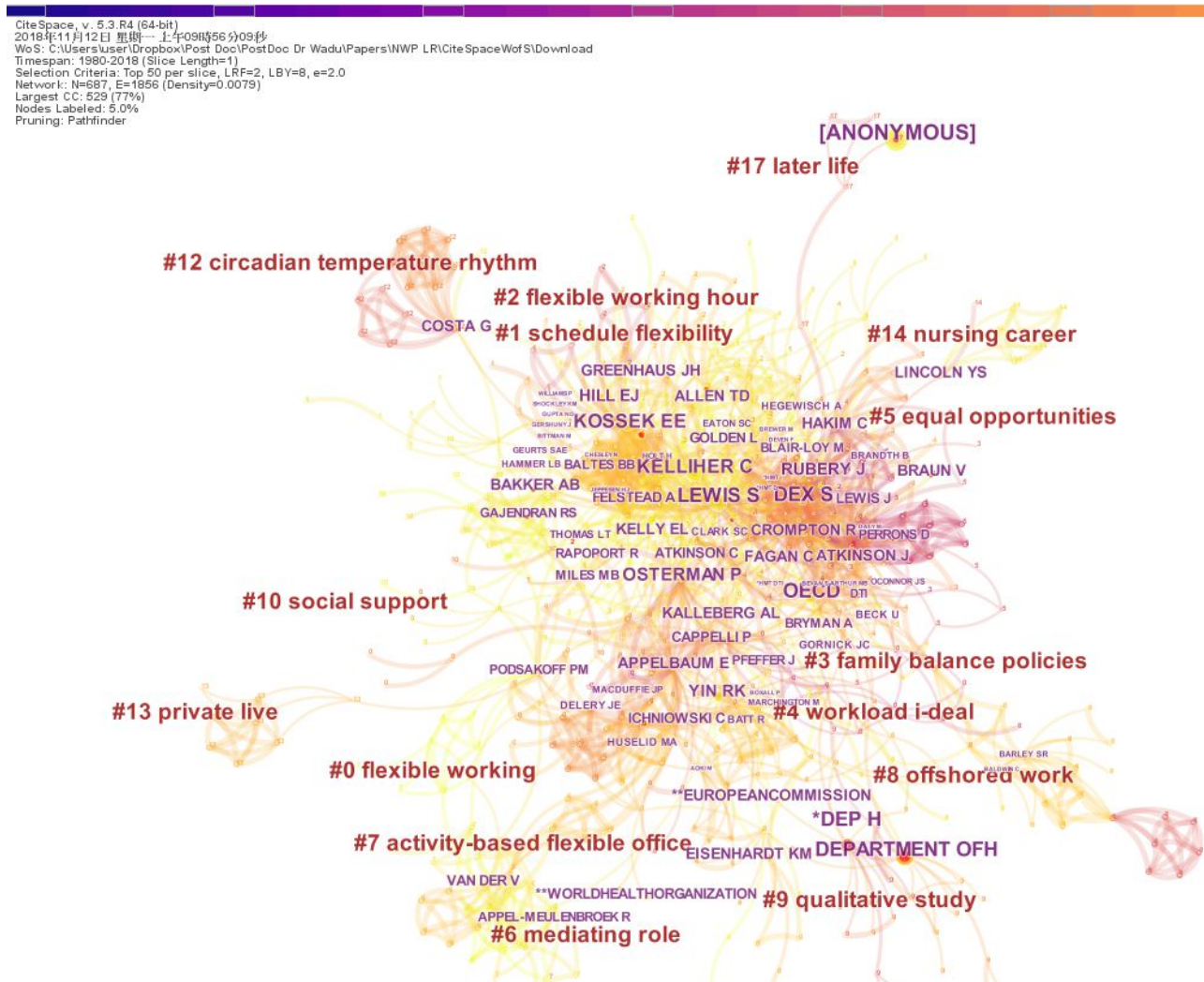


Figure 4 Merged author cocitation network with labels for clusters

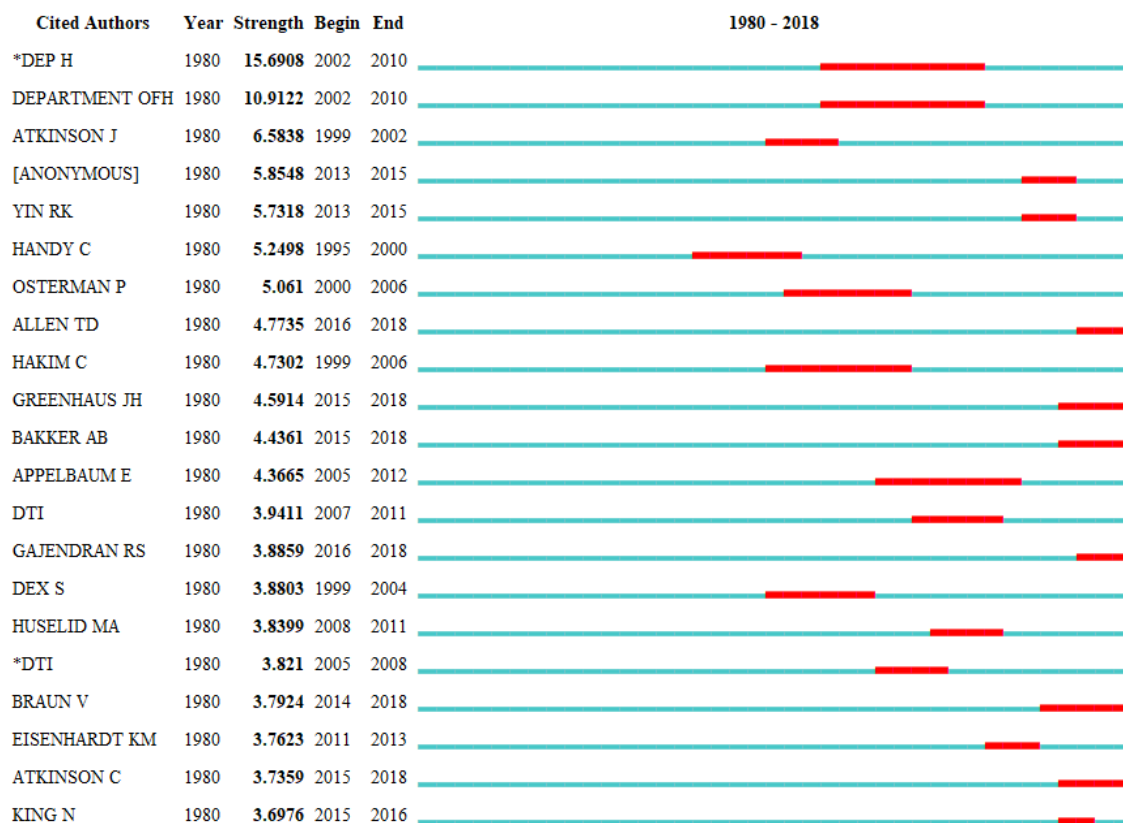
Table 2 presents detailed information about the top ten most-cited authors or organisations with the authors belonging to different clusters. It was observed that the same organisation appeared in different names in different articles and is therefore identified differently by CiteSpace. The results show that the Department of Health (DH) can equally be identified by \*dep H and Department of H (both from cluster 6). Hence, the most cited author is DH, the branch of the United Kingdom government concerned with the maintenance of public health. DH is responsible for providing leadership for the National Health Service (NHS) and the government's social care and public health agendas. In collaboration with the National Institute of Health Research (NIHR), DH also provides funding support for health research, including NWP related studies (for example, Smith & Ward, 2015). The next top-ranked author by citation counts is [Anonymous] in Cluster #5, with citation counts of 66. Anonymous authorship is unreliable because it might combine many references without precise author information (Gong et al., 2013). Therefore, the actual second most cited author is Lewis Susan in Cluster #3, with citation counts of 59 and the mean citation year of 2002. Lewis Susan is a Professor at the Business School of the Middlesex University, London, United Kingdom. Her research focuses on gender and 'work-life balance' issues and workplace practice, culture and change, flexible working arrangements, all in diverse national contexts. Shirley Dex, in Cluster #1, having 43 citation counts, is the third most cited author. Shirley Dex is an Emeritus Professor of Longitudinal Social Research at UCL Institute of Education, University College London. Interestingly, most of the top-cited authors and organisations are based in the UK, indicating that NWP related research is famous in European countries.

**Table 2** The top ten most-cited authors

Citation counts	References	Cluster #	Country	Institution
59	Lewis S.	3	UK	Middlesex University, London
43	Dex S	1	UK	University College London
35	Kossek EE	3	USA	Purdue University
35	Kelliher C	5	UK	Cranfield University
28	Rubery J	2	UK	University of Manchester
28	Osterman P	0	USA	MIT Sloan School of Management, Cambridge

The changes happening among productive authors in a field can be described in part by authors that have gained an abrupt increase of citations, which refer to citation bursts. Figure 5 is a visualisation of the burst analysis of the cited authors in the dataset from 1980 to 2018, showing the top 21 bursting authors, as sorted by the burst weight. It can be seen in Figure 5 that the burst in author citation continues from 1995 to 2018. The earliest burst is attributed to Handy C with his prominent publication on ‘trust and the virtual organisation’ (Handy, 1995) being cited 416 times from the Web of Science Core Collection as at the time of this study. The author with the overall strongest burst is the Department of Health based in the UK, as discussed earlier. Although the author was identified as two different entities by CiteSpace that is \*Dep H and Department H, with burst strengths of 15.69 and 10.91, respectively, they belong to the same citation burst as their bursts both begin in 2002 and end in 2010. This implies that the Department of Health significantly impacted the NWP’s research community between 2002 and 2010. The author with the most recent strongest citation is Allen Tammy of the University of South Florida, United States, with a burst strength of 4.77 beginning from 2016 and still bursting. Her publication with the highest citations (Allen et al., 2000) discussed issues concerning the measurement of work-family conflict.

### Top 21 Cited Authors with the Strongest Citation Bursts

**Figure 5** Top 21 authors with the strongest citation bursts

### 3.5 Document Co-Citation Analysis

Figure 6 shows a timeline visualisation of cocitation references from 1980 to 2018, containing 334 nodes and 603 links. The nodes in the figure symbolise cited references, while the links denote the cocitation relationship. The colour pattern at the topmost part of the Figure follows a gradual change (in line with time slices across the study period) from blue (1980) to yellow (2018). The colours of cocitation links are set to reveal time slice that a connection was made for the first time. The colour of a node represents the time slice that a reference



belongs to, while cluster colour shows the time slice for the average year of a cluster member references' publication date (Chen et al., 2014). The red shaded circle represents certain time slices. The citation frequency of a corresponding paper abruptly increased, signifying citation burst, and the circle's size reflects how strong the burst is. References that have high betweenness centrality are highlighted nodes with a purple ring in the network, pointing to pivotal nodes that connect two clusters.

Cluster symbolises a concentration of themes in the bibliographic settings. CiteSpace's cluster recognition trajectory is used to simulate the development trends of NWP's research. To establish the nature of a cluster of co-cited references in a network, CiteSpace algorithmically generates cluster labels, identifies symbolic concepts in the cluster, and provides rich text from an interesting article (Chen, 2013). The cluster labels are obtained from a pool of references. The reference clusters of NWP's are labelled in ascending order based on the cluster size. Thus, individual performance, longitudinal effect, and contagious flexibility are the three largest clusters in the network, revealing the major research hotspots of NWP's.

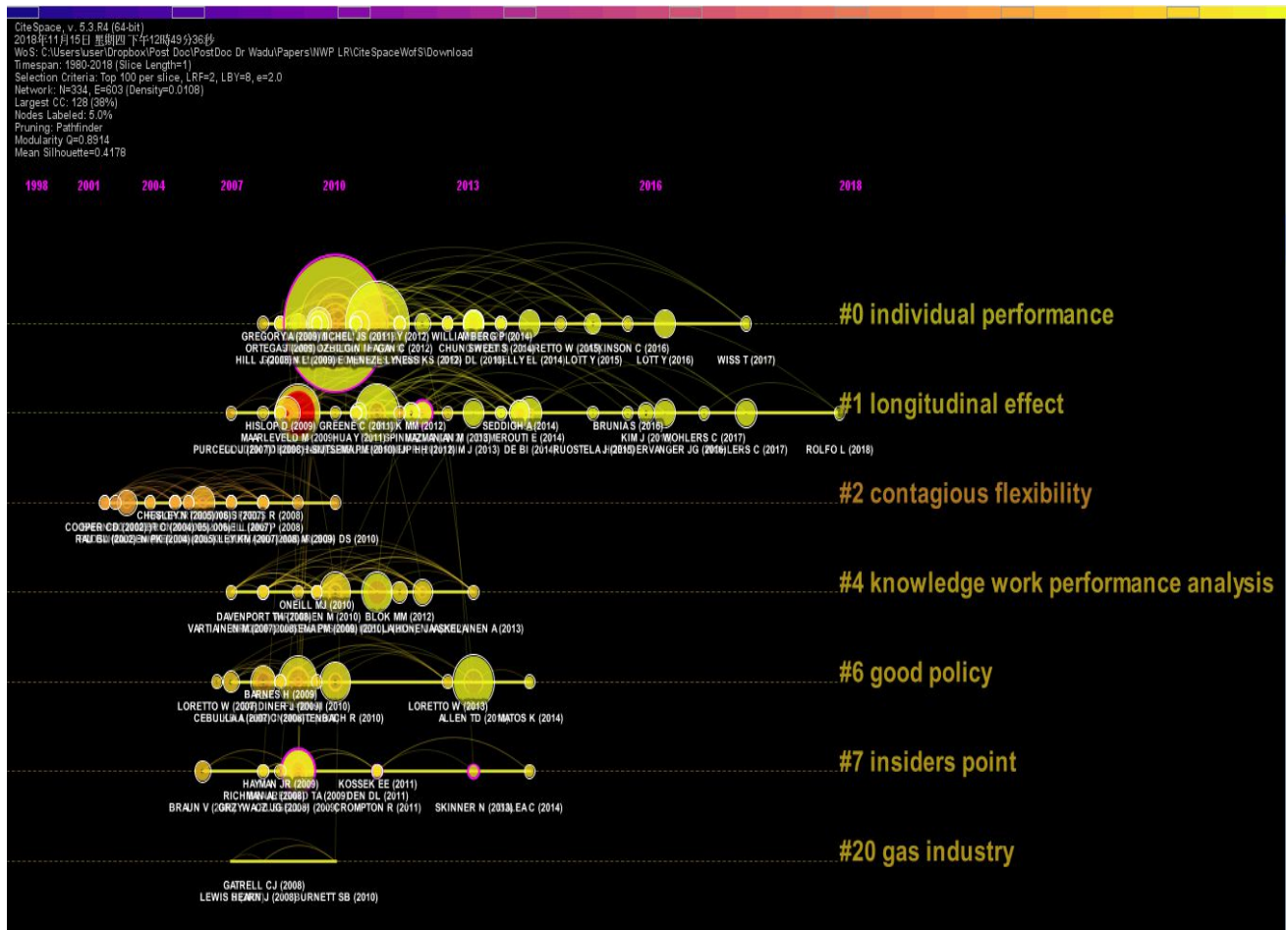


Figure 6 Timeline view of cocitation references

The network is divided into 7 cocitation clusters. Index terms from their own citers label these clusters. The largest 2 clusters were automatically summarised by CiteSpace and were named by LLR. The largest cluster (numbered as #0) has 37 members and was labelled as an individual performance by LLR. The most active citer in this cluster is Chung (2018). The study by the active citer used data from 30 European countries to examine workers' access to family-friendly working-time arrangements (WTA) including flexitime, and time off work for personal reasons. The second largest cluster (numbered as #1) has 31 members and was labelled as the longitudinal effect by LLR. Moreover, the most active citer to cluster #1 is Wohlers and Hertel (2018), which analysed the longitudinal effects of activity-based flexible office design on teamwork. It was found that cluster label by LLR is influenced by the title of the most citer paper to the cluster. The average year of publication of cluster #0 (individual performance) and cluster #1 (longitudinal effect) is 2012, which shows that the longitudinal impact of individual performance in an environment where flexible working arrangements are practised is still the emergent trend NWP's field.

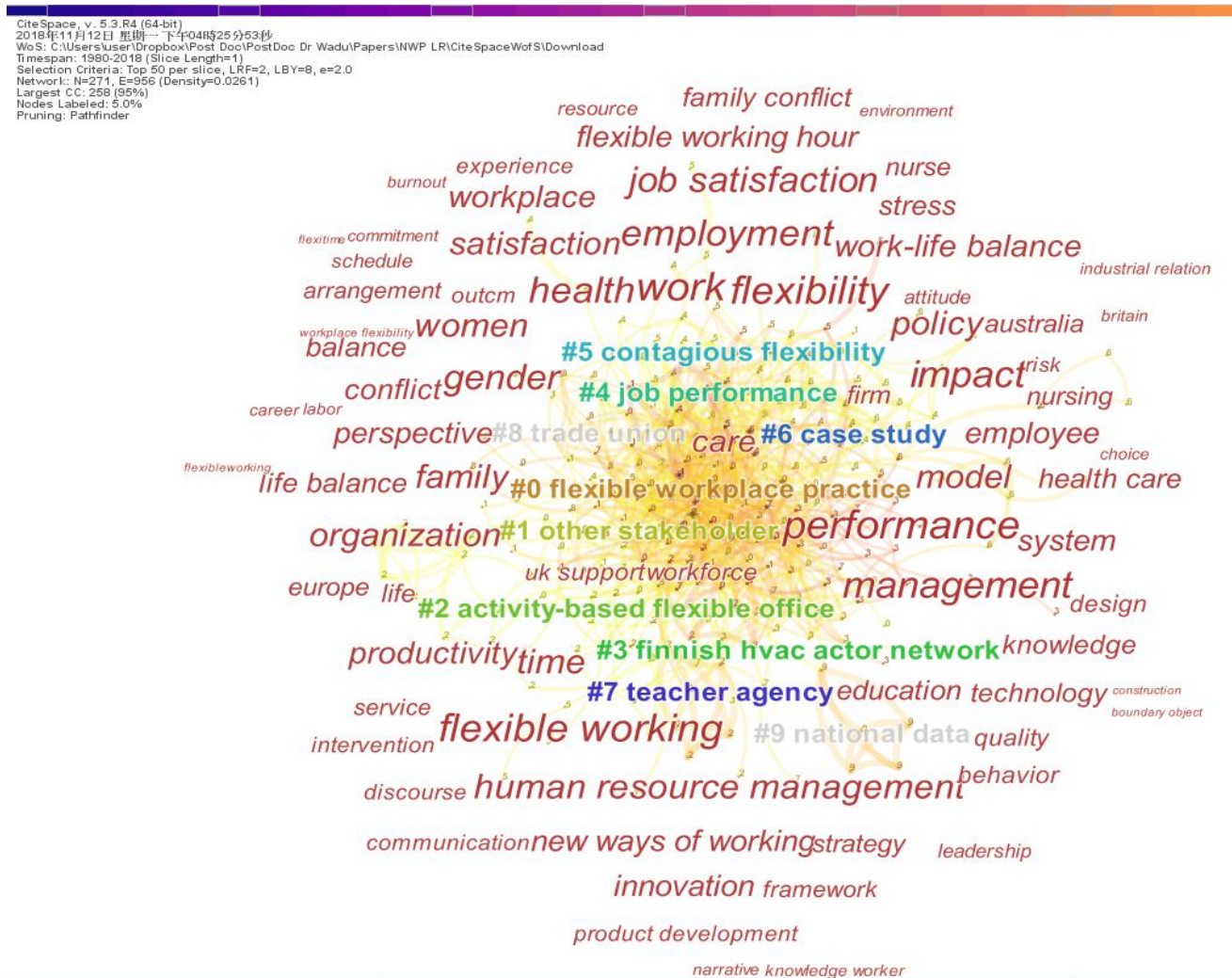
The landmark in any knowledge field can be identified by studies that attract a high number of citations (Chen et al., 2010). CiteSpace generated the top 10 widely cited papers of landmark importance and ranked according to citation counts. The top-ranked article by citation counts is Kelliher and Anderson (2010) in Cluster #0, with citation counts of 21. The second-ranked article, with citation counts of 13, is de Menezes and Kelliher (2011) also in Cluster #0. Two references (Appel-Meulenbroek et al., 2011; Yin, 2009) were ranked third because they have the same citation counts of 9, and they are from the same Cluster #1. The first reference (Kelliher & Anderson, 2010)

entitled “Doing more with less? Flexible working practices and the intensification of work”, is an empirical study that examines an unanticipated consequence of adopting flexible working practices. The study revealed that flexible workers are more satisfied and committed to their jobs than their non-flexible counterparts. In the second reference (de Menezes & Kelliher, 2017), the authors researched the relationship between flexible working arrangements and individual employee performance, demonstrating that flexible working arrangements have positive indirect effects on worker performance. One of the two references that ranked third (Appel-Meulenbroek et al., 2011) underlined some known benefits and disadvantages of the activity-based office concept. Whereas the second one (Yin, 2009) of the same ranking provided an essential guide to qualitative methods in organisational research with an extensive emphasis on the use of a case study approach. In all, the top ten landmark articles revealed that references that have a high impact in the research community began to surge after 2008 with the 4 articles published in 2009 highlighting the earlier research hotspots about NWP.

Moreover, the highlighted nodes with a purple ring, as shown in Figure 6, are the references with high betweenness centrality in the network. These are central articles that connect two clusters in the network. The top 4 ranked references by centrality with equal centrality of 0.13 are: Kelliher and Anderson (2010); Nijp et al. (2012); Kossek et al. (2011) and Skinner and Chapman (2013) in Cluster #0, in Cluster #1, #7, and #7, respectively. The only reference with an abrupt burst citation pattern is the article by Huselid (1995), which comprehensively assessed the relationships between systems of high-performance work practices (HPWPs) and firm performance. The results showed that HPWPs have an economically and statistically significant impact on employee turnover and productivity on the one hand and corporate financial performance on the other hand.

### **3.6 Keywords Co-Citation Analysis**

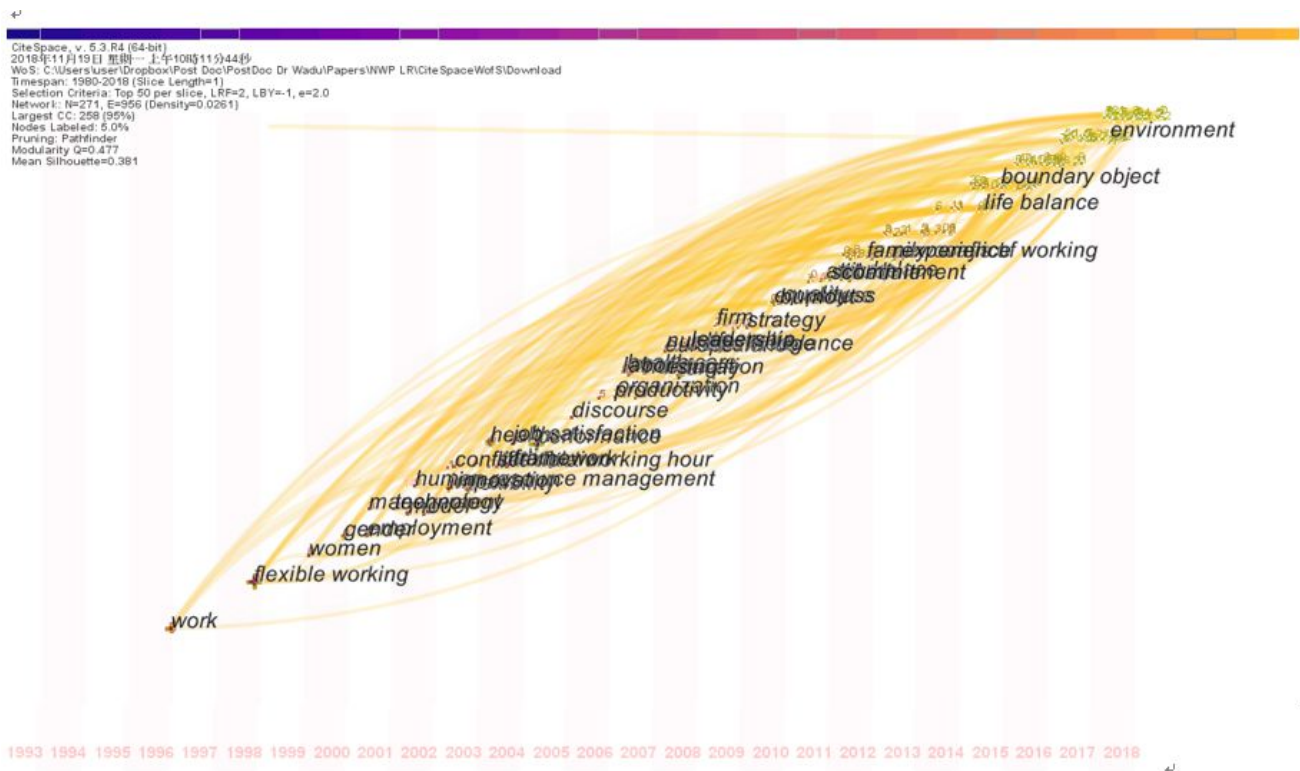
Keywords provide an understanding of the basic content of articles while a keyword network analysis enables one to scrutinise research topics and establish the evolving frontiers of knowledge (Lee & Su, 2010). Figure 7 shows the co-occurring keywords network of NWPs, containing 271 nodes and 956 links from 1980 to 2018, with each node denoting a distinct keyword and a link between two nodes are co-relationship between the connecting keywords. In total, 271 keywords extracted are organised together with the clusters in the network as shown in Figure 7. Cluster analysis can further help to identify the evolution of NWPs research. The network is divided into 10 cocitation clusters. Index terms from their own citers label these clusters. Clusters are numbered in such a way that higher ranks are issued to clusters with more references. The largest cluster (#0) has 49 members and was labelled as flexible workplace practice by LLR. The second-largest cluster (#1) has 32 members and was labelled as other stakeholders by LLR. The third largest cluster (#2) has 32 members and was labelled as the activity-based flexible office by LLR. As the keywords in the ten clusters were distinct, it was decided that these were representative of the different NWPs trends. Considering both the size and recency of member nodes, clusters #0 through #2 are representing emerging research themes in the domain. The references in this cluster influenced successive research in NWPs studies.



**Figure 7** Merged network of co-occurring keywords and clusters

The frequency of keyword citations can reveal the emerging research hotspots of a research domain, while the associated mean publication year reflects the trend of those hotspots (Chen et al., 2006). Based on the frequency of keyword, the top-ranked keywords by citation counts (note: the years in parenthesis denote mean cite years) is performance (2004) with citation counts of 60, while work (1996) occupied the second position with citation counts of 58, flexible working (1998) is third, with citation counts of 51, the fourth one is flexibility which could be another name for flexible working. Meanwhile, these two entities were not merged to appear as a single node because flexibility is a broad word that could have different meanings, such as flexible office arrangement or work arrangement. In essence, the top-ranked keywords (i.e. performance, work, and flexible working) are hotspots in NWP research. One important hotspot (health) reflects a different application field of NWPs.

Although the mean cite years may suggest the evolution of top hotspots to some extent, the overall understanding of the period that each keyword occurred is not clear enough (Jin et al., 2017). Therefore, Figure 8, provides a clear visualisation of the overall emerging trends by showing the time zone of co-occurring keyword network. The network's time zone enables chronological visualisation of the most applied keywords, revealing the structure of the trend of research hotspots on NWPs at varying times. However, this further presentation does not change the meanings of relevant parameters as displayed in Figure 7. As shown in Figure 8, NWPs research has concentrated on 'work' is the first hotspot that attracted the research community's attention. The results also showed that the emerging trends of NWPs application include life balance, boundary object, and environment. The findings can enable researchers to decide the status of research topics and identify new directions for potential research.



**Figure 8** Timeline view of the keywords

Only 5 keywords exhibited citation bursts in their appearances between 1980 and 2018. Keywords associated with an uptick in citations, which often occurred over time, were thought to be indicators of frontier topics or new research developments. Keywords started to burst since 1996 with work being the first bursting keyword from 1996 till 2004 with a burst strength of 5.91. This is followed by impact bursting from 2002 till 2010 with a burst strength of 4.65. These two keywords have the equal longest period of a burst of 8 years, but they do not have the strongest citation strength. This implies that the research focusing on these keywords has drawn the research community's continuous attention, but a massive explosive growth was not noticed. Flexible working hour is another important keyword with a relatively long period of burst beginning from 2003 till 2010. The keyword with the strongest burst is care which is related to health and family issues, and interestingly, this keyword has the most recent burst, lasting from 2007 till 2011. Hence, the main research frontier in terms of burst strength for NWP's research is care, revealing that care is pivotal to the development of NWP's research. On the whole, the results show that the hotspots for NWP's research significantly evolved after the 1990s.

#### 4.0 CONCLUSION

Using CiteSpace to carry out scientometric analyses (including author, country, co-word, cocitation, and clusters), several research frontiers and important nodes were identified in the NWP's literature. The study revealed that there is a remarkable increase in publications from 2 papers in 1980 to 50 papers in 2018. In terms of research output by authors, it was revealed that Friedhelm Nachreiner, Peter Vink, Liesbeth Groenesteijn, and Jane Lewis are the top four lead authors in the field. However, these authors received limited citations and none of them received citation burst over the study period. Meanwhile, the topmost cited authors, including Lewis Susan, Department of Health and Shirley Dex, are all originated from the UK. Although the Department of Health recorded the overall citation burst, the author with the most recent strongest citation burst is Allen Tammy (2016 to date). The notable authors can be contacted for research collaboration or expert panelists. Prospective research students can also shortlist them for research supervision. The findings also revealed that the majority of the research output is from the UK, USA, Europe, Australia, and China. Although the USA recorded the strongest citation strength, the most recent citation bursts are associated with European countries, indicating that NWP's research is trending in Europe and is attracting the research community's attention. Regarding keywords, the largest cluster which represents a prominent research hotspot is identified as flexible working arrangements. Meanwhile, the latest research trend focuses on the environment. Kelliher and Anderson (2010) and de Menezes and Kelliher (2011) are the most cited documents, but only one document (Huselid, 1995) received citation burst. Also, the largest 2 clusters are individual performance and longitudinal effect, indicating emerging trends and hotspots in NWP's research. This information will guide interested researchers in searching for relevant materials. The main research frontier in terms of burst strength for NWP's research is care which is useful information for interested researchers willing to apply for grants in this domain.

As the workplace continues to respond to technological advancement, NWP's will also continue to advance. This calls for more distinct research works that meet the organisation's needs and cater to employees' wellbeing. This research direction can be explored



further by interested researchers from different fields to provide more insights into identifying reasonable work practices in other firms. This is imperative because work practices differ based on nature and cultural routine in various organisations. Given that technology has been a critical enabler of NWP's trend and innovations in technology increasingly ubiquitous, NWP's are gradually becoming and may eventually become the norm. Therefore, developing countries, especially Africa, must heed this challenge by exploring valuable research potentials in NWP's. To date, research on NWP's has given special attention to specific subjects while being severely biased toward others. The performance aspect of NWP's has been a central focus, whereas studies about the impact of NWP's on real estate development are largely missing. Scholars in the NWP's area must widen their focus beyond performance and work to consider and include the changes that real estate and property development brought about by NWP's. As the topic of NWP's has become commonplace within industry and academia, it is high time for researchers to shift their focus to creating clusters of research projects that focus on particular issues relating to new ways of working. Diverse NWP's are revealed in the literature with a different approach in different countries and institutions; hence, every country should develop NWP's best suited to its specific market. As a result, future research is a huge opportunity to focus on developing and disseminating NWP's for nations that have yet to create their approach. According to the findings of this research, there is a need for more active collaboration among the actors across organisations, institutions and countries that are engaged in NWP's, research collaboration offers great benefits. Research institutions and financing agencies interested in NWP's research should develop policies to encourage global, interinstitutional, and interdisciplinary research cooperation as a prerequisite for applying for similar funding schemes.

While this paper provides useful information, users should be cautious of some limitations in the findings from this study. First, the authors only collected bibliographic records on NWP's from one database, namely WoS which selectively index publications. Hence, the possibility of partially investigating intellectual hotspots, landmark articles, and emerging trends in NWP's research cannot be ruled out. Second, the authors recognised that some important articles could be missing especially if the query phrases for topic search in WoS do not exist in the indexing terms. To address this, we employed possible variations of queries relevant to NWP's studies, hence the finding in this article is highly generalisable. However, readers should bear in mind that no single international bibliographic database considers all of the author's publications typically. Also, the literature was searched using seemingly broad keywords, thus overestimating the final number relevant to real estate research. Future research should use more precise keywords and focus on a specific field. Thirdly, only articles were used as research objects for quality information, which may omit important records. Future research can include other research objects such as books and conference proceedings. There are also limitations to using Citespace software the most significant of which is the learning curve needed to set proper visualisation parameters. Furthermore, some maps and clusters may be highly complex, necessitating specialised domain expertise for interpretation. There is a need to compare the analysis conducted by human experts to the interpretation cues provided by Citespace automatic labelling and summarisation methods. Therefore, a cross-study comparison is recommended in future research to establish a comparable platform to accommodate findings made by different researchers regarding NWP's. In all, the results of this study will allow researchers, particularly beginners, to understand the context, current status, and outcomes of NWP's as a field of study and provide a guide for future research.

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