Journal of Scientometric Research, 2023; 12(1):211-228.
https://www.jscires.org

Research Article

A Pathway to Counterproductive Knowledge Behaviour: Integrating Knowledge Hoarding, Knowledge Withholding, and Knowledge Hiding

Zakky Zamrudi

Department of Management, Faculty of Economics, Islamic University of Kalimantan, Banjarmasin, INDONESIA.

ABSTRACT

Introduction: Counterproductive knowledge behaviour is considered to negatively impact all organizations, either in business or public institutions. **Objectives:** This study aims to provide a comprehensive picture of knowledge management, integrating three counterproductive knowledge behaviours: knowledge hoarding, knowledge withholding, and knowledge hiding. **Materials and Methods:** This study uses a bibliometric approach using 337 documents from the Scopus database to understand the field development behind counterproductive knowledge behaviours. The data analysis involves the evaluation of performance analysis and thematic mapping. The performance analysis is aimed to understand the pioneering authors and manuscripts within the field, while the scientific maps aim to depict the thematic development of current fields. The performance analysis results discover pioneering authors, trending topics, prominent sources and articles, and country-wise performance. **Results:** The performance analysis indicates growing interest since 2011 mainly published in "knowledge" theme journal, mainly authored by Chinese researcher. However, from the authorship results, this research also pin-point pioneering author within the field. The results from scientific map analysis indicate different concepts between knowledge hoarding, knowledge withholding, and knowledge hiding while at the same time discovering the position of knowledge sharing within these three concepts. This study also discovers several basic theories on counterproductive knowledge behaviour. **Conclusion:** This research contributes to the scientific community by comprehensively combining the performance and scientific map analysis to measure the research development in counterproductive knowledge behaviour. Additionally, this paper provide future research agenda within the fields inviting future researcher to explore any potential theoretical integration, model integration such as involving technological aspect.

Keywords: Knowledge hoarding, Knowledge withholding, Knowledge hiding, Scientometric, thematic analysis, Biblioshiny.

Correspondence:
Zakky Zamrudi
Department of Management, Faculty of Economics, Islamic University of Kalimantan, Banjarmasin, INDONESIA.
Email: zakky@uniska-bjm.ac.id
ORCID ID: 0000-0003-4483-2311

Received: 06-06-2022;
Revised: 07-10-2022;
Accepted: 05-01-2023.

INTRODUCTION

In the contemporary digital era, knowledge, as one kind of intellectual property, is an intangible asset that is extremely valuable to both commercial and governmental entities. Consequently, learning management in private firms is critical for achieving corporate objectives.[1] Regarding the importance of knowledge management in businesses, information sharing helps organizations and all of their components improve intangible collective value by improving responsiveness to market dynamics, innovative capabilities, assessment, and learning.[2]

The study of knowledge sharing behaviour itself has developed quite intense. However, studies on counterproductive behaviour about reluctance to share are still limited.[1] Counterproductive behaviour towards knowledge or known in its original term as Counterproductive Knowledge Behaviour (CKB) in question, is knowledge hoarding (KHo), Knowledge Withholding (KWh), and Knowledge Hiding (KHi). The pioneering article has popularized CKB, and its three concepts were proposed by Connelly *et al.* in 2012.[3] However, the term knowledge hoarding itself appeared in research in 1978 on social research where knowledge in the traditional scope is considered very valuable so that knowledge is hoarded by people who have power and only distributed in minimal amounts.[4]

The causes and consequences of KHo, KWh, and KHi have been studied, generating various studies making it difficult for future researchers to map existing research. To the best of our knowledge, previous researchers used a systematic review/

DOI: 10.5530/jscires.12.1.019

Systematic Literature Review (SLR) to map research. Using a meta-synthesis approach, researchers map previous research on counterproductive behaviour to determine the relationship between knowledge hoarding, withholding, and hiding.[1,2] The SLR approach is also proposed to produce a concept map of KHi in various educator roles as researchers, lecturers, and public servants.[5] However, these SLR studies are insufficient to provide a comprehensive picture of CKB. A more comprehensive analysis is expected to provide an overview of the interrelationships between sciences, topic/theory developments, authors, institutions, and collaborations.[6,7]

To date, there are at least two bibliometric studies that look at KHi. Bibliometric research on CKB, especially on the concept of KHi by Di Vaio *et al.*,[8] focuses on the role of Knowledge Hiding (KHi) on individual and group performance and its relation to organizational strategy, organizational performance and Knowledge Management Systems (KMS). This study examined a dataset of 117 articles taken from the Web of Science (WOS) database from 1988–2020. This study indicates that research in KHi shows a relationship with several concepts but cannot show how the relationship between KHi and CKB concepts is related from one to another. Furthermore, research conducted by Bernatović *et al.*[6] used data obtained through WOS with a total of 103 data records. This study found that KHi is essential in organizations where most research findings use a theoretical basis from psychology. Furthermore, bibliographic coupling was carried out to detect several topics that were still not well explained, so that further research was needed regarding these findings, especially those related to the implications for performance at the individual, group and organizational levels.

From those two bibliometric studies, our research tries to map the interrelationships between concepts in CKB. Therefore, this study aims to determine scientific developments in knowledge hoarding, knowledge withholding, and knowledge hiding through bibliometric analysis.

Literature review

Counterproductive Knowledge Behavior, Knowledge Withholding, Know Knowledge Hoarding, dan Knowledge hiding

Counterproductive Knowledge Behaviour (CKB) is the behaviour of individuals/groups with bad intentions towards other individuals/groups in the organization. CKB's behaviour can consist of sabotage, theft, fraud, and interpersonal conflicts that harm the organization. Serenko and Bontis[9] divide CKB into two based on intention and intentional, as shown in Table 1. However, of the many types of CKB, some of the most frequently used terms include knowledge hiding, Knowledge Hoarding, Knowledge Manipulation, knowledge sharing disengagement, and knowledge withholding.[10] Additionally, Fox *et al.*[11] mentions antisocial behaviour as a counterproductive behaviour manifested by a withdrawal from the work environment and friendships in the work environment, resulting in a Lack of Knowledge Sharing (LKS). This LKS is one form of CKB. What distinguishes LKS from Knowledge Withholding (KWh) behaviour is that LKS

Table 1: Different Types of Counterproductive Knowledge Behaviour.

Types of CKB	Definition
Intentional	
Knowledge Hiding	Employees' deliberate attempts to withhold their knowledge when requested by their co-workers.
Knowledge-Withholding	Intentional concealment and unintentional hoarding of knowledge for personal gain or the contribution of knowledge that is less than necessary.
Information-Withholding	The intentional failure of employees to share important information with co-workers, even though they recognize its value to others.
Knowledge sharing hostility	Accumulation and concealment of personal knowledge and denial of external knowledge.
Knowledge Hoarding	Deliberate accumulation of knowledge and hiding the fact that the person has this knowledge.
Less/No intention	
KS ignorance	Disabilities that prevent employees from effectively managing the knowledge held by the organization.
Disengagement from KS	Employees who do not actively communicate their knowledge, despite lack of motivation to protect knowledge.
Information Exchange Delay	The gap between "when the focused employee expects to receive information to the time the focused employee (consciously) receives the information or decides to stop waiting."
Partial KS	Only some relevant knowledge is shared (i.e., no full knowledge disclosure).
KS barriers	Organizational and individual factors that hinder the knowledge sharing process.

Source: Authors elaboration adopted from Serenko and Bontis[14]

is caused by a lack of awareness among individuals regarding organizational demands or individual needs.[2]

Furthermore, knowledge with holding is a counterproductive behaviour that manifests in two forms of behaviour, namely knowledge hoarding and knowledge hiding.[1] The cause of KWh itself is more due to the awareness of individuals who focus on refusing to help others unless they receive personal benefits.[2] Knowledge Hoarding (KHo) is the intentional concealment of information (accumulated knowledge) that is relevant to others but not requested by other individuals.[12,13] Knowledge Hiding (KHi) is an individual's attempt to store or hide the knowledge that has been requested by others.[3]

Bibliometric Analysis

Bibliometric studies are used for bibliographic and topic modelling using mathematical and statistical techniques from publication metadata.[15,16] The publication metadata are analysed to build a structural image of a specific scientific field known as a scientific map.[7,17] The bibliometric method can create research maps and is also helpful in evaluating scientific performance at the individual level of researchers and the level of publication institutions.[7] The analysis unit includes the individual (authors, documents, journals, and terms) to knowledge mapping in network analysis.[17]

There are various steps to conduct bibliometric, ranging from data crawling such as Publish or Perish to data analysis such as BibExcel, Citespace, HisCite, and VOSviewer.[18] In data visualization, Gephi, Net draw and Pajek provide an image of dynamic correlations in research networks.[18] In recent work, multistep analysis using different software has been widely applied in many fields.[19] Recently, an advanced bibliometric analysis based on R language was introduced by Aria and Cuccurullo in 2017, namely Bibliometrix. This R package contains comprehensive bibliometric analysis ranging from descriptive analysis to data visualisation to explain the synthesis of knowledge based on bibliographic.[16] Additionally, many researchers have developed procedures in bibliometric studies. However, the hallmark of bibliometrics starts from study design, data collection, data analysis, data visualisation, and interpretation.[7,16] The process in a bibliometric study is presented in Figure 1.

METHODOLOGY

Research Design

The use of bibliometric methods in social research is not new. This method can be helpful in the early stages of a research project to track topic developments and identify predecessor researchers.[7] Therefore, this study adopted a bibliometric research design by identifying several essential points of descriptive data analysis and knowledge synthesis through science mapping. Overall stages of the entire process in this bibliometric research are presented in Figure 1.

Source and types of data

Research in the scope of KHi and Kho is relatively new. An appropriate database source has to follow the rules of bibliometric analysis.[6] The data used in this research comes from the Scopus database. Scopus data can provide a more comprehensive data coverage than WOS, especially in the emerging research field.[7] As mentioned at the beginning of this study, the prior bibliometric studies used data from WOS. So, the use of data from Scopus is expected to provide a different picture.[6,8] Furthermore, Zupic and Čater.[7] explained that Scopus provides all author data in cited references, making author-based citations and co-citation analysis more accurate.

Moreover, in the earliest stage, a search-string is designed for data query. This list includes wildcards, Boolean operators and includes a filters of proceeding papers, articles, book chapters and books. The search string design is "TITLE-ABS-KEY ("knowledge hid*" OR "knowledge withhold*" OR "knowledge Hoard*" OR "knowledge conceal*")" generating 732 metadata retrieved until October 25, 2021. To eliminate data unrelated to business and management research, such as big data analytics, programming languages, cryptography, and software engineering, keywords excluded from the search page are examined. Due to the possibility of multidisciplinary research data, this study does not limit the scope of publishers/journals.[20] This filtered process resulting 337 articles (395 excluded data), then downloaded in BibTex format for data analysis. The detailed process of data retrieval is presented in Figure 2.

Data Analysis

Data analysis, also known as data visualization used to answer research problems in this study, uses the approach compiled by Zupic and Čater,[7] where bibliometric analysis consists of two stages: performance analysis and science mapping. Additionally, Di Vaio *et al.*,[8] describe performance analysis in descriptive, source, authorship, and document analysis. The science mapping analysis consists of conceptual structure analysis, intellectual structure analysis, and social structure analysis. Using the help of Software R and the addition of the Bibliometrix R Package v.3.1 module developed by Aria and Cuccurullo,[16] this study tries to perform Performance Analysis and Science Mapping in the same function. Some of the functions used in the performance analysis and science mapping are then matched with the Bibliometrix and Biblioshiny analysis functions, as shown in Table 2.

Table 2: Specific Bibliometrix Analysis.

Bibliometric Features	Type of Analysis	Bibliometrix R function
Performance Analysis	Descriptive and Trend Analysis	Annual Scientific Production; Average Citation per-year.
	Source Analysis	Most Relevant Sources; Source Impact; Bradfords Law.
	Author Analysis	Top Contributor; Authors Productivity; Authors Impact; Country-wise Analysis.
	Document Analysis	Top Global Cited Paper; Word Cloud; Trending Topic.
Science Mapping	Conceptual Structure	Co-occurrence Network; Thematic Map; Thematic Evolution.
	Intellectual Structure	Co-Citation Network; Historiography.
	Social Structure	Authors Collaboration Map; Country collaboration map.

Source: Authors elaboration adopted from Aria and Cuccurullo;[17] Di Vaio *et al.*;[8] Zupic and Čater[7]

Table 3: Bibliographic Main Information.

Description	Results
Main Information	
Timespan	1978-2022
Sources (Journals, Books, etc)	184
Documents	337
Document Types	
Article	280
Conference paper	46
Book chapter	10
Book	1
Description	Results
Authors	
N. Authors	817
Co-Authors per Documents	3.13
Collaboration Index	2.69
Single-authored documents	48

Source: Authors compilation (2022)

RESULTS AND DISCUSSION

Performance Analysis

At the initial stage of performance analysis, the results of the descriptive analysis are presented in Table 3. From Table 3, the publication is started in 1978 to 2022 consists of 377 articles published in 184 scientific publishers. Furthermore, the data consist of 280 articles, 46 proceedings, 10 book chapters, and 1 book title. The next results of the authorship analysis indicates 817 authors with 3.13 co-authors per document by 2.69 collaboration index, where 48 documents is written by a single author. Additionally, Figure 3 depicts the publication trend where only 1 article appeared in 1978 with relatively high citation records of 42. The second and third articles appeared in 1995 and 2004. Since 2004, attention towards KHo, KWh, and KHi has increased, indicated by the first spike in 2008, the second spike in 2015 and the highest spike in 2020. However, most articles related to the field appeared in 2021, recording 87 articles. Figure 3 also shows that the three highest citations emerged in 2013 and 2014, and 2012.

Authors Analysis

The results of the authorship analysis shown in Table 4 show 20 authors with consistent publications and the total citations. From Table 4, consistent research is indicated by the red line connecting the year of publication. The circle-shaped Node indicates the number of publications in the same year, where the size indicates the number of articles. Additionally, the Node's colour density indicates the total of citations. From Table 4, it is known that the author with the highest number of articles is Butt, with 13 articles and an *h*-index of 8, published from 2019–2021. However, some authors have shown earlier research in 2009 and 2012, such as Connelly, Cerne and Skerlavaj.

Table 5 shows the authors' countries of origin in the next step. The five countries with the highest productivity are China, Pakistan, the USA, Canada, and the UK. Based on the total number of citations, the five countries with the highest citations are China, Canada, the USA, South Korea, and Norway. Additionally, based on the collaboration index shown by the Multiple Correspondence Publication (MCP) Ratio, the five countries with the highest collaboration index respectively are China, Pakistan, the USA, India, and Canada.

Source Analysis

The source analysis employing Bradfords Law analysis in Table 6, indicates 10 primary sources within the fields. Table 6 shows that the publisher with the highest score is the Journal of Knowledge management has 37 articles and an *h*-index of 18.

Document Analysis

The document analysis aims to find popular documents based on global and local citations, identity frequently occurring terms, and identify trending terms. Table 7 shows the results of document identification to determine the popularity of documents based on global and local citations equipped with direct links to related

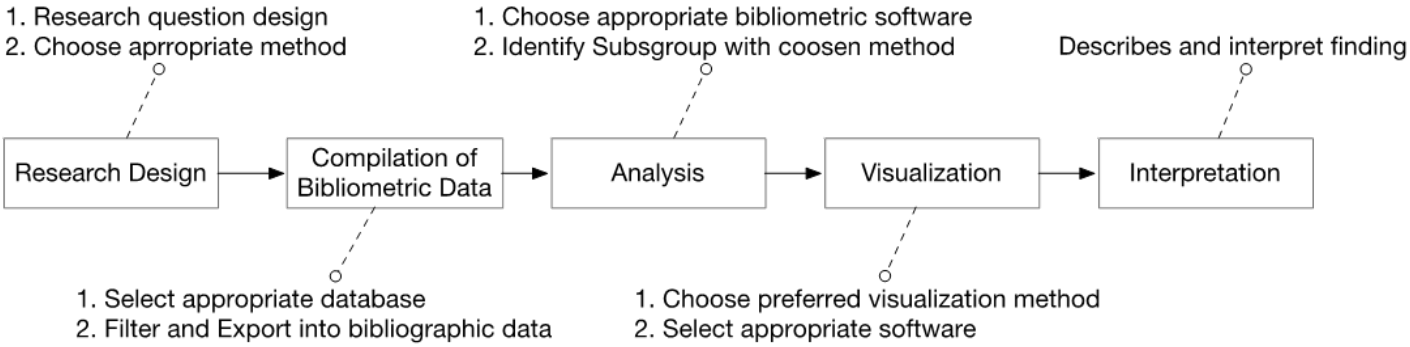

Figure 1: Bibliometric science mapping procedure.

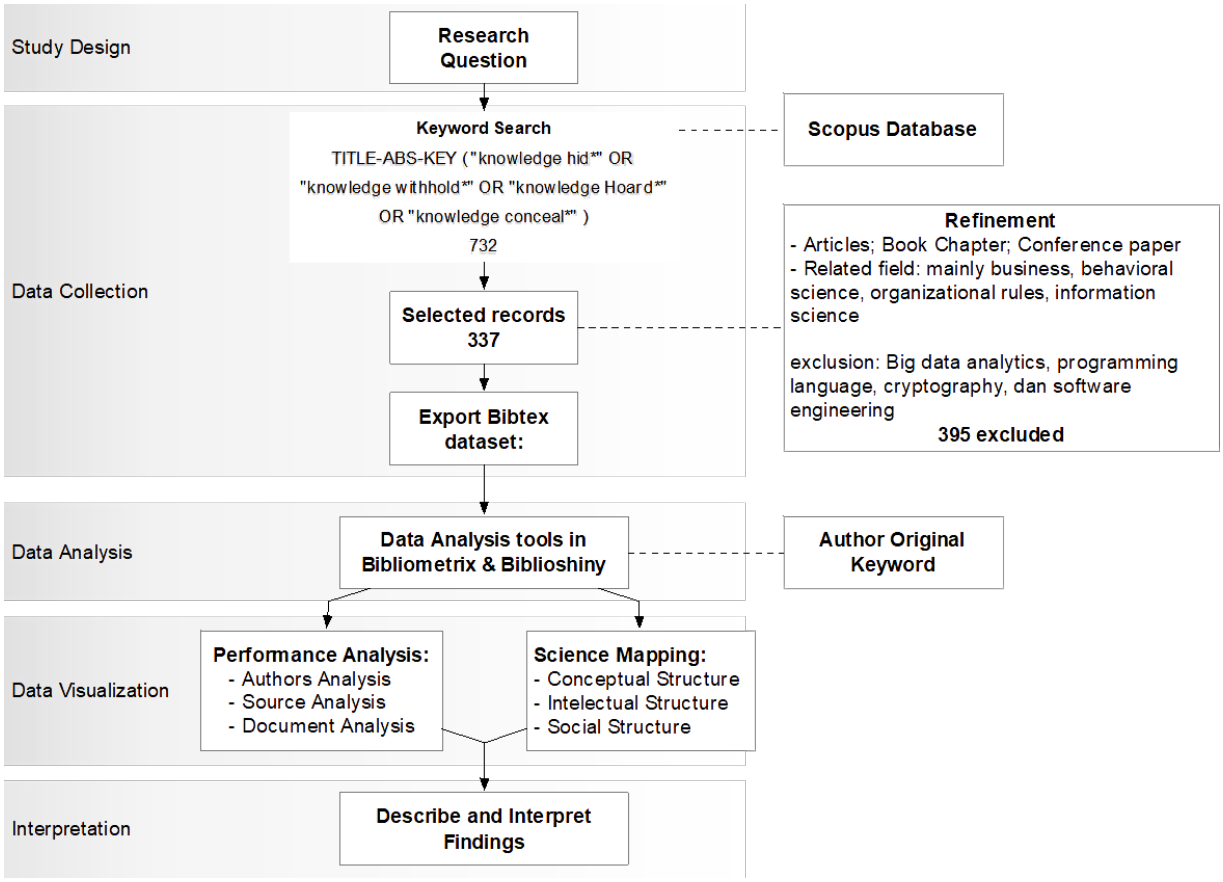

Figure 2: Bibliometric Research Work-Flow.

articles. Globally, the top five ranks are indicated by documents written by Connelly in 2012, Cerne in 2014, Peng in 2013, Connelly in 2015, and Witherspoon in 2013. However, the results of a local citation analysis measuring the number of reference citations between documents in the dataset show that the five documents with the highest citations are Connelly in 2012, Peng in 2013, Serenko in 2016, Bogilovi in 2017, and Connelly in 2015.

In the next section, based on the results of the keyword analysis in the document, it is known that the words appear most often. From Figure 4, several words often appear in the document: knowledge sharing, knowledge management, knowledge hoarding, and knowledge withholding. In addition, Figure 5 shows the trend of keywords in the field. From Figure 5 shows several underlying KHo, KWh, and KHi research theories. The underlying theory includes the social cognitive theory, theory of planned behaviour, theory of reasoned action, self-determination theory, and the most recently emerged is the conservation of resource theory. In addition, some contexts that have emerged recently are performance, job security/insecurity, employee well-being, and several matters related to leadership. However, the relationship between the keywords in this section cannot be determined, so further analysis is needed on knowledge mapping.

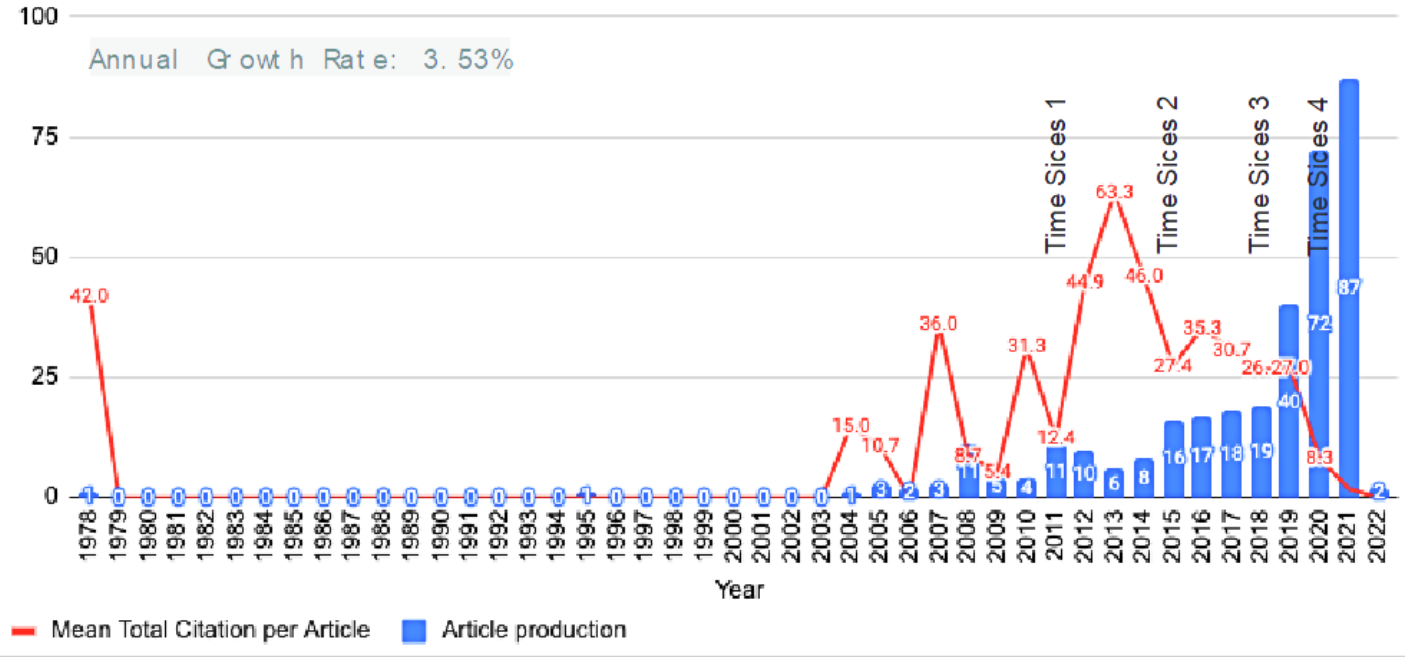

Figure 3: Annual Scientific Production and Citation.

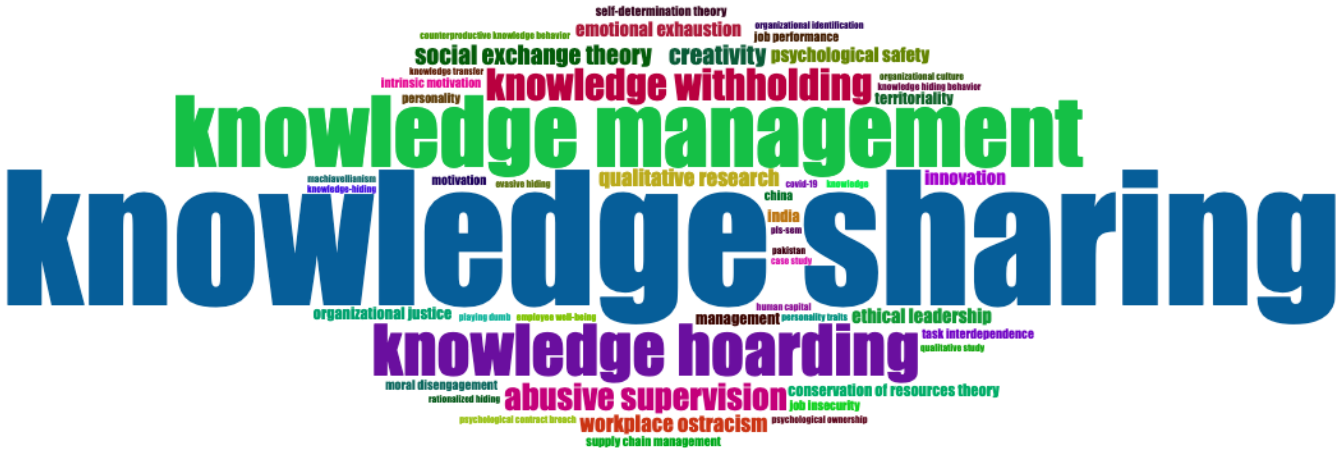

Figure 4: Document frequent keywords.

Scientific Maps

The knowledge mapping in this section aims to discover the big picture of scientific developments, especially in the KHo, KWh, and KHi areas. Thus, the dynamics and structure of knowledge can be systematically identified. This section will explain three main parts of knowledge mapping: conceptual structure, intellectual structure, and social structure.

Conceptual Structure

Based on the analysis results on the keywords co-occurrence network, the relationship between adjacent topics is known as three main clusters. From Figure 6, it is known that several nodes that connect between clusters are knowledge hiding, knowledge sharing, knowledge management, and knowledge withholding.

Based on cluster 1, it is known that knowledge hiding is often studied together with abusive supervision, creativity, emotional

Table 4: Author's productivity overtime.

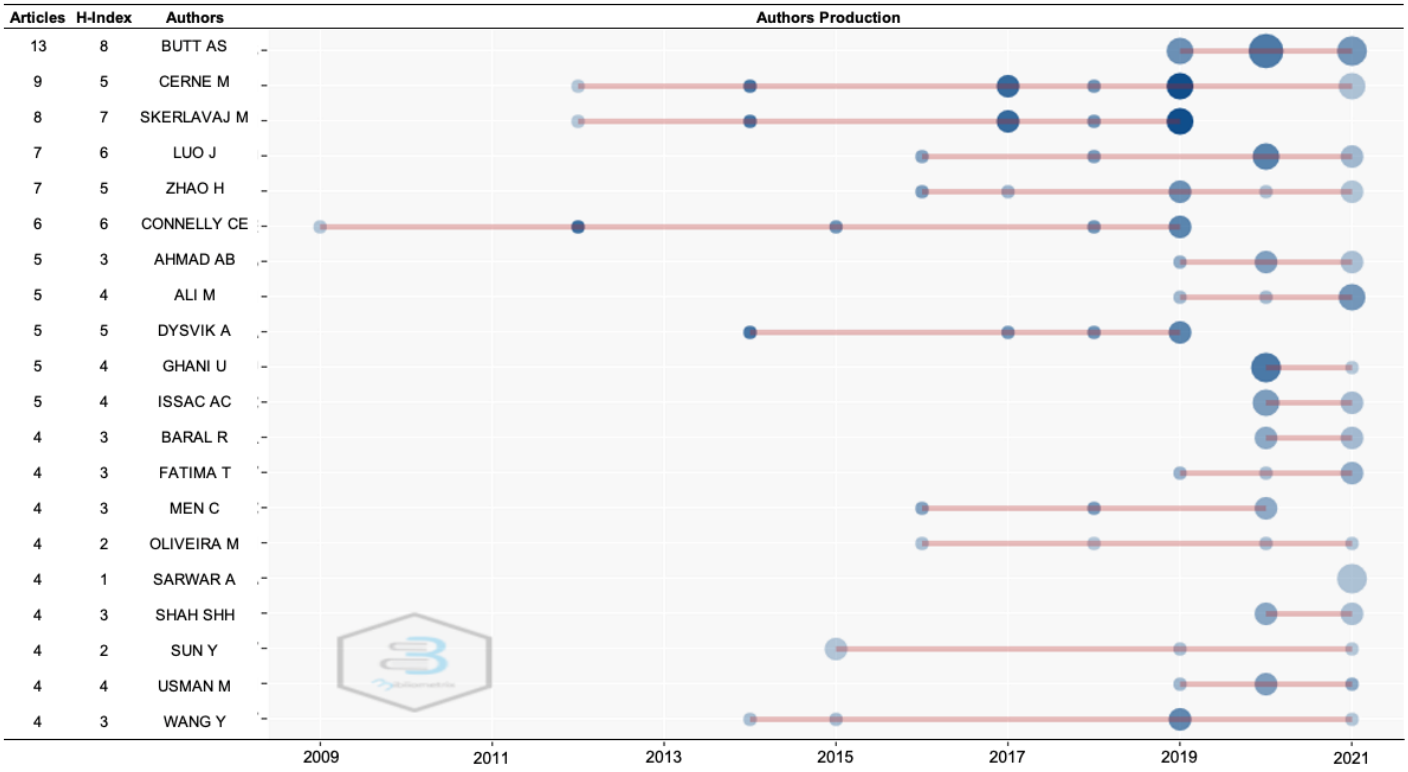

Table 5: Country wise author analysis.

Region	No. Article	Total Citation	MCP Ratio	Region	No. Article	Total Citation	MCP Ratio
China	180	1174	0.30	Finland	15	70	0.20
Pakistan	76	65	0.50	Norway	15	195	1.00
USA	59	239	0.09	Slovenia	15	119	0.75
India	55	176	0.22	France	14	38	1.00
Canada	39	909	0.62	Singapore	12	58	1.00
UK	34	171	0.54	South Korea	12	236	0.33
Australia	31	139	0.57	Germany	11	48	0.33
Italy	23	18	0.40	Iran	11	9	0.50
Malaysia	18	81	0.22	Netherlands	11	17	0.25
Brazil	15	32	0.40	Indonesia	9	10	0.00

*__MCP:__ Multiple Country Publication.

exhaustion, and moral disengagement. In cluster 2, several topics closely related to knowledge sharing, including knowledge management, knowledge hoarding, and knowledge withholding. Specifically, in cluster 2, several topics closely related to the previous three are innovation, motivation, and organizational culture. In addition, cluster 3 consists of the dimensions of knowledge hiding, namely playing dumb, evasive hiding, and rationalized hiding.

The next stage of a thematic map uses four quadrants (motor, basic, emerging/declining, and niche) divided by centrality reflecting the importance of specific themes in the general research area, and density which reflects the level of theme development. The results of the thematic map are shown in Figure 7, indicating the thematic map of the research field. First, the motor themes quadrant consists of two main clusters: knowledge hiding behaviour and organizational justice. Second, on the basic themes where the topics in this theme have strong attachments but still need further research, consist of three clusters: knowledge sharing, knowledge hiding, and social exchange theory. Third, there are two clusters in the emerging/declining themes cluster,

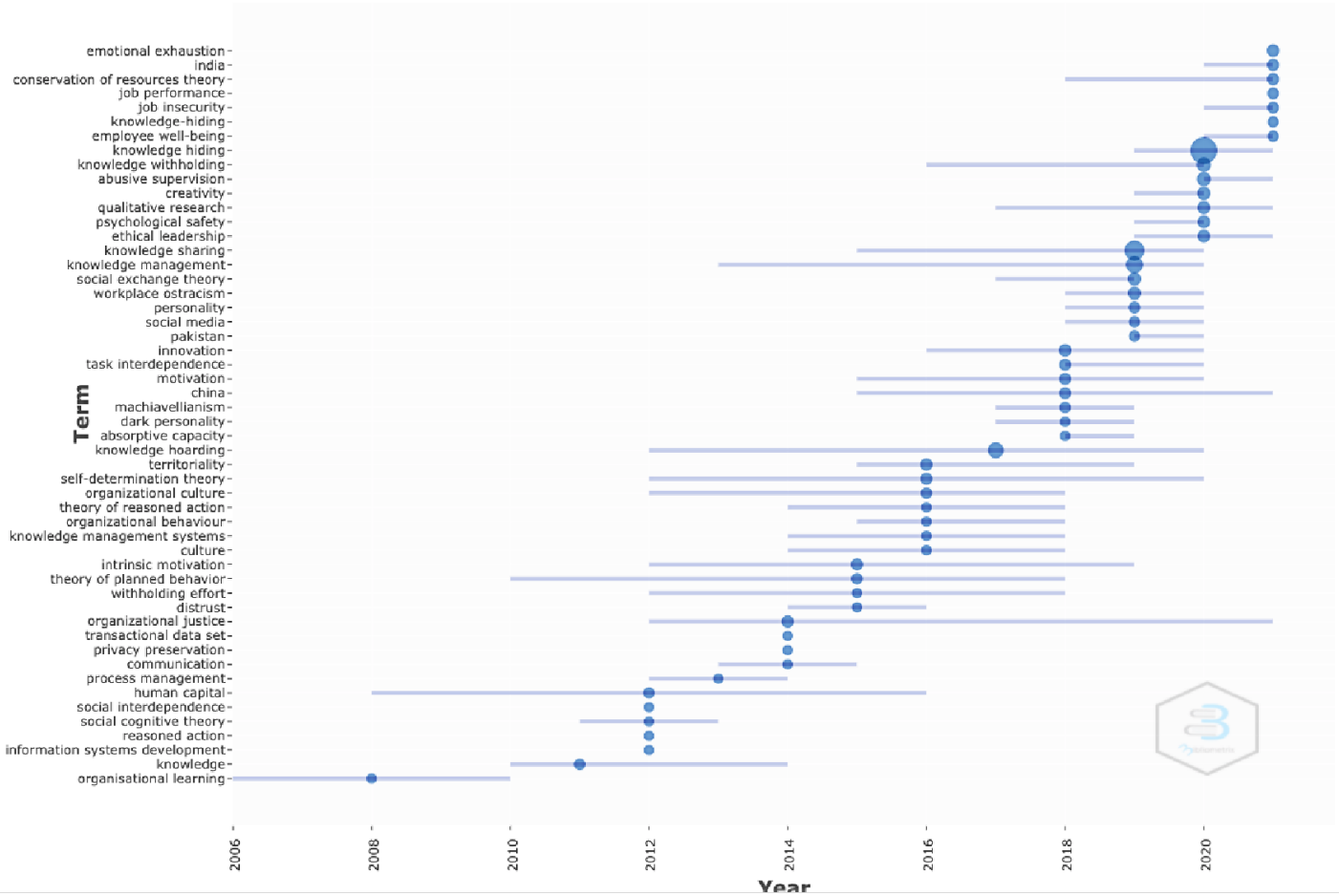

Figure 5: Trending topic based on keywords.

Table 6: Top 10 Core sources performance Based on Bradford's Law.

Sources	Articles	*h*-Index
Journal of Knowledge Management	37	18
Journal of Business Research	17	4
Vine Journal of Information and Knowledge Management Systems	13	4
Knowledge and Process Management	9	5
Journal of Organizational Behavior	8	8
Knowledge Management Research and Practice	8	4
Management Decision	7	5
Lecture Notes in Computer Science	6	2
Frontiers in Psychology	5	3
Leadership and Organization Development Journal	5	3

namely the Machiavellianism and the qualitative search. Finally, the niche themes cluster, where the incoming theme is a theme that is developing quite well but is still very specific, consisting of three clusters consist of knowledge hiding dimensions (evasive, playing dumb, and rationalized hiding), psychological ownership and job insecurity.

The thematic evolution results in Figure 8 show that the development of themes from KHi, KWh, and KHo is divided into 5 time slices. First, in 1978–2011, the theme that developed, in general, was knowledge sharing. In the second period of 2012–2015, knowledge sharing is still the same theme, but there are two emerging themes: knowledge withholding and knowledge hiding. In the third period of 2016–2018, a new theme emerged: knowledge hoarding and workplace ostracism. In the fourth period of 2019–2020, the theme of knowledge sharing disappeared, and knowledge management emerged. Finally, in 2020-2021, some main themes are knowledge hiding, knowledge management, innovation, and job security.

Intelectual Structure

The intellectual structure is used to determine the impact of articles written by authors on the scientific community. The analysis results in the Figure 9 show that there are three clusters. Cluster 1 consists of several authors who focus on knowledge management, knowledge sharing, and knowledge withholding discussions. Furthermore, in cluster 2, several authors were shown who focused on discussions in organizational aspects such

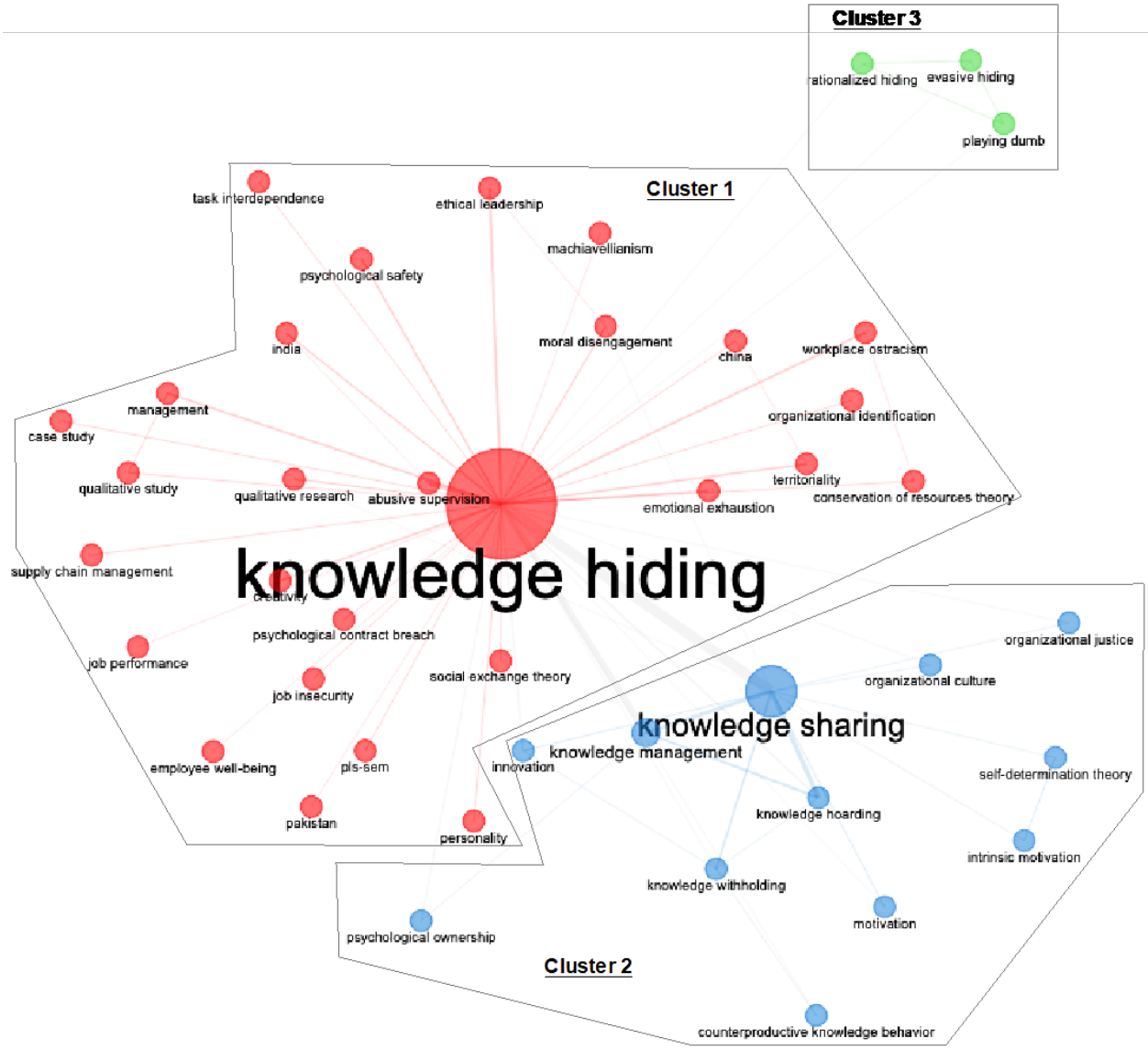

Figure 6: Keywords co-occurrence.

as leadership, supervision, teamwork, and politics. Cluster three shows a more specific discussion of individual behaviour based on psychological theories. A complete description of the article details is depicted in Appendix 1.

The social structure aims to determine the interaction between writers, institutions, and countries. From the results shown in Figure 10 shown by the line between countries, it can be seen that international collaboration is carried out by most developed countries such as China, the USA, Canada, Australia and France. Meanwhile, developing countries show patterns of domestic collaboration only.

DISCUSSION

Performance analysis finding

From the analysis results based on the author's performance, it is known that Atif Saleem Butt shows the author with the highest productivity with a total of 13 articles and an *h*-index of 8. The analysis of data based on documents indicates a pioneer in this field was shown by Connelly *et al.*[3] with an article entitled Knowledge Hiding in Organization. Based on the authors' countries of origin, it is known that China is the country with the most published articles, along with the number of citations. However, countries with the Multiple Country Publication indexes reflecting the collaboration index show that France, Norway, Singapore always collaborate with researchers from other countries.

The theory development from the word trend results shows at least six theories that emerged from the word trend analysis. First, the theory of social cognitive theory used to explore the abusive social environment effect on the use of knowledge management will increase the possibility to retain knowledge, both at the lower level and at the middle level.[21,22] Tsay *et al.*[23] used the social cognitive theory as a basis for proposing a new variable, namely knowledge withholding self-efficacy measuring an individual's

Table 7: Document Citation Records.

Paper	Sources	DOI	Citation	
			Global	Local
Connelly, 2012	Journal of Organizational Behavior	10.1002/job.737	394	116
Černe M, 2014	Academy of Management Journal	10.5465/amj.2012.0122	281	29
Peng H, 2013	Journal of Knowledge Management	10.1108/JKM-12-2012-0380	163	77
Connelly, 2015	European Journal of Work and Organizational Psychology	10.1080/1359432X.2014.931325	162	31
Witherspoon, 2013	Journal of Knowledge Management	10.1108/13673271311315204	159	9
Serenko, 2016	Journal of Knowledge Management	10.1108/JKM-05-2016-0203	155	68
Lin, 2010	Information and Management	10.1016/j.im.2010.02.001	124	11
Zhao, 2016	International Journal of Hospitality Management	10.1016/j.ijhm.2016.09.009	112	23
Černe, 2017	Human Resource Management Journal	10.1111/1748-8583.12132	107	30
Bogilovi, 2017	European Journal of Work and Organizational Psychology	10.1080/1359432X.2017.1337747	98	39
Huo, 2016	Journal of Knowledge Management	10.1108/JKM-11-2015-0451	94	18
Rhee, 2017	Journal of Organizational Behavior	10.1002/job.2168	89	15
Škerlavaj, 2018	Journal of Knowledge Management	10.1108/JKM-05-2017-0179	88	28
Singh, 2019	Journal of Business Research	10.1016/j.jbusres.2018.12.034	85	28
Fong, 2018	Management Decision	10.1108/MD-11-2016-0778	77	13
Hernaus, 2019	Journal of Knowledge Management	10.1108/JKM-11-2017-0531	74	10
Gagn, 2019	Journal of Organizational Behavior	10.1002/job.2364	72	14
Khalid, 2018	Leadership and Organization Development Journal	10.1108/LODJ-05-2017-0140	71	13
Kumar, 2018	Journal of Knowledge Management	10.1108/JKM-02-2017-0048	68	15
Evans, 2015	Organizational Science	10.1016/j.ijinfomgt.2018.05.008	67	9

Source: Authors compilation (2022)

level of confidence in the possibility of being detected by others in the team. Second, the theory of planned behaviour focuses on disclosing the attitudes of knowledge hiders towards knowledge hiding and knowledge hoarding formed together by their affective, behavioural and cognitive evaluations of behaviour and the organizational culture they perceive in fair competition.[24,25] Third, the theory of reasoned action examines organizational factors and individual factors on knowledge hoarding attitudes in employees with knowledge-intensive work criteria.[26,27] Fourth, the self-determination theory evaluates intrinsic motivation within knowledge-intensive work situations.[27,28] Fifth, the social exchange theory disclosed an individual evaluation of the costs and benefits of an interaction sharing knowledge or a reciprocal relationship.[29,30] Sixth, The resource theory is used to understand that knowledge hiding behaviour is motivated by individual preventive actions to avoid exploitative and ostracized behaviour.[31,32]

However, several studies integrate several theories in a single study to find out the various causes and effects of counterproductive knowledge behaviour at various levels. In addition, other theories are also used in several studies, such as agency theory, equity theory, social network perspective theory, self-perception theory, and affective events theory.[1] Finally, the theory samples used within the research context are summarized in Appendix 2.

Scientific mapping finding

In general, the results of the bibliometric coupling analysis show that there are three main clusters. Cluster 1 shows topics in knowledge hiding, cluster 2 shows topics related to knowledge sharing, including knowledge hoarding and knowledge withholding, and cluster 3 the dimension of knowledge hiding. This finding is consistent with the finding that knowledge hoarding and knowledge hiding are two separate concepts.[2] Furthermore, de Garcia *et al.*[2] stated that lack of knowledge sharing results from a lack of understanding about knowledge sharing. On the other hand, KHi, KWh, KHo is conscious and deliberate to hide knowledge.[1,3] In addition to the dimensions in knowledge hiding in cluster 3 are proposed by Connelly *et al.*,[3] including playing dumb, evasive hiding and rationalized hiding.

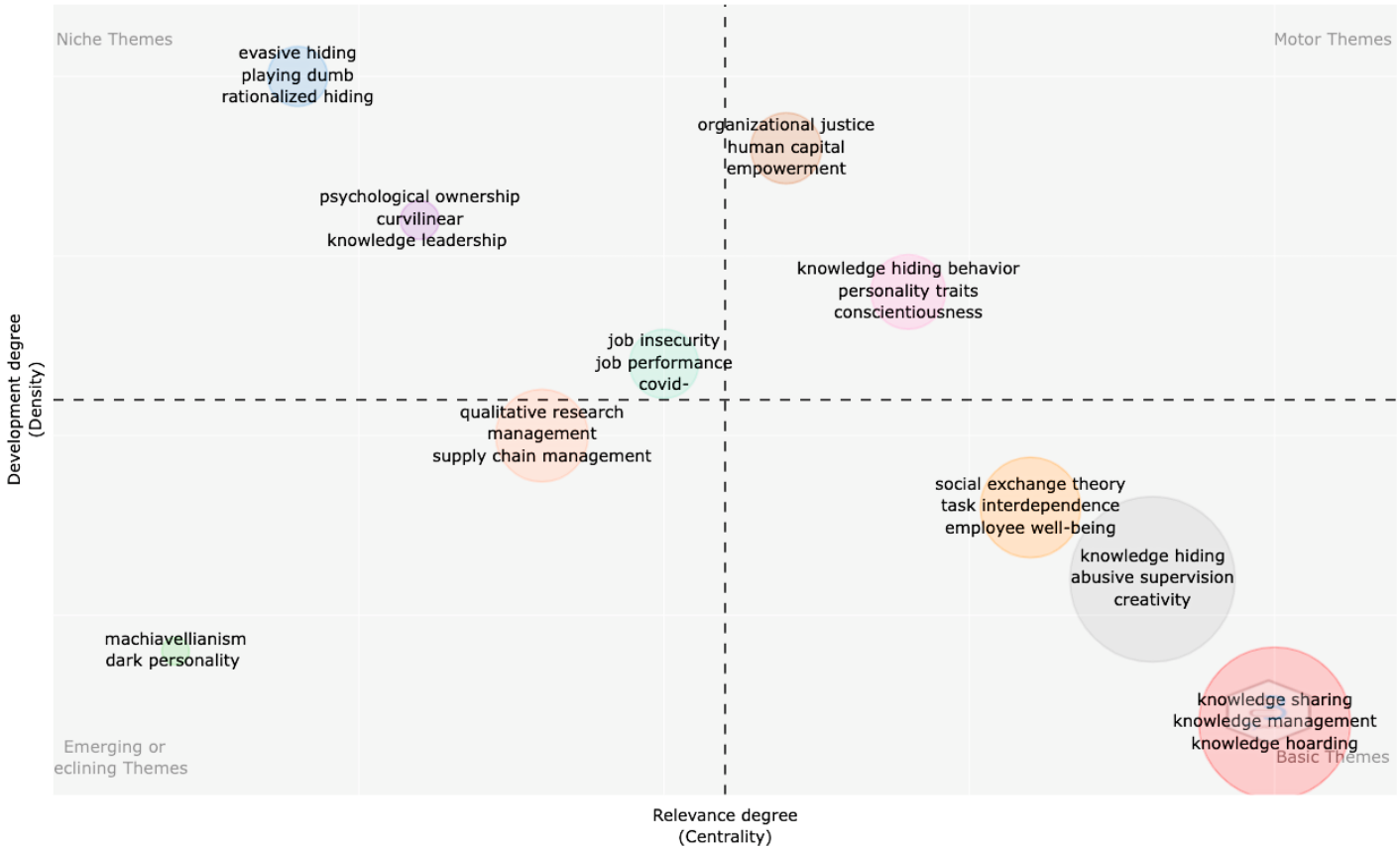

Figure 7: Thematic Map of Keywords.

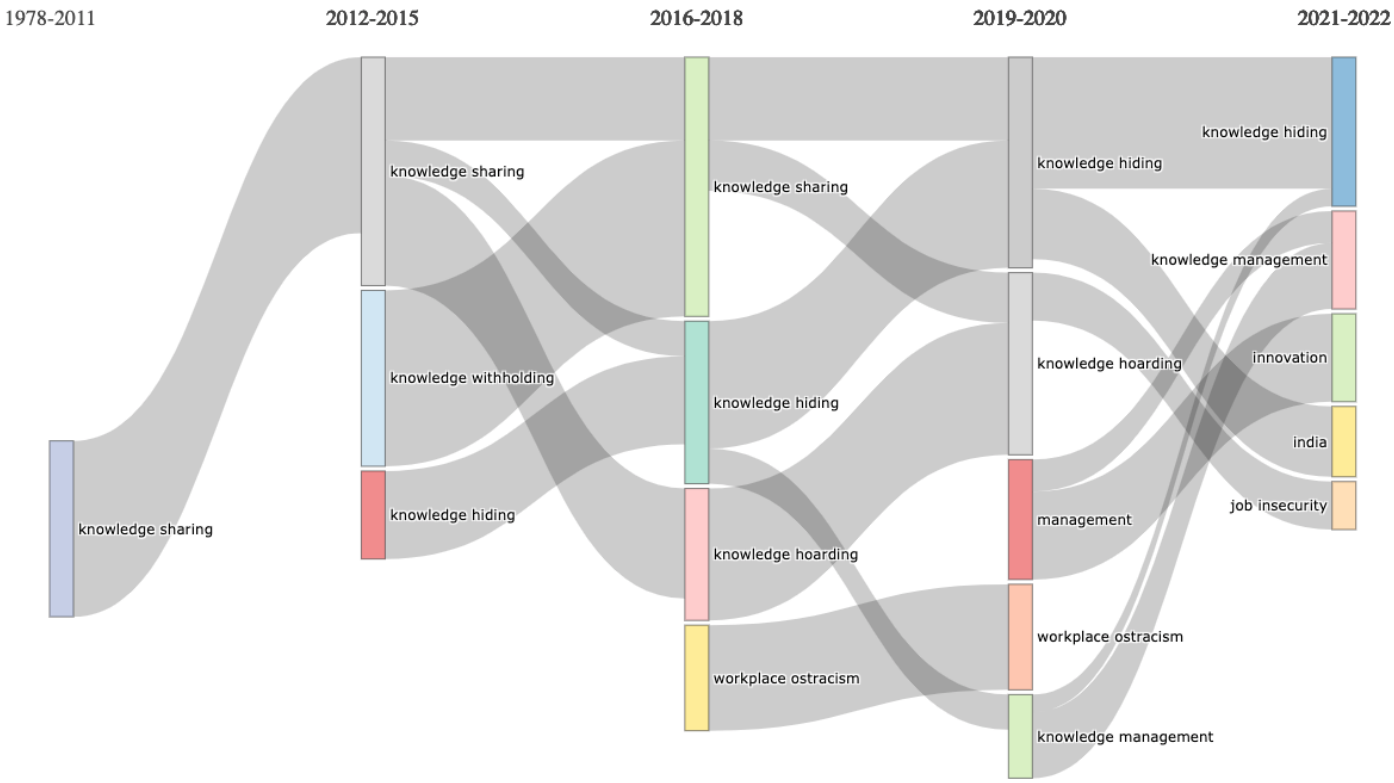

Figure 8: Thematic evolution.

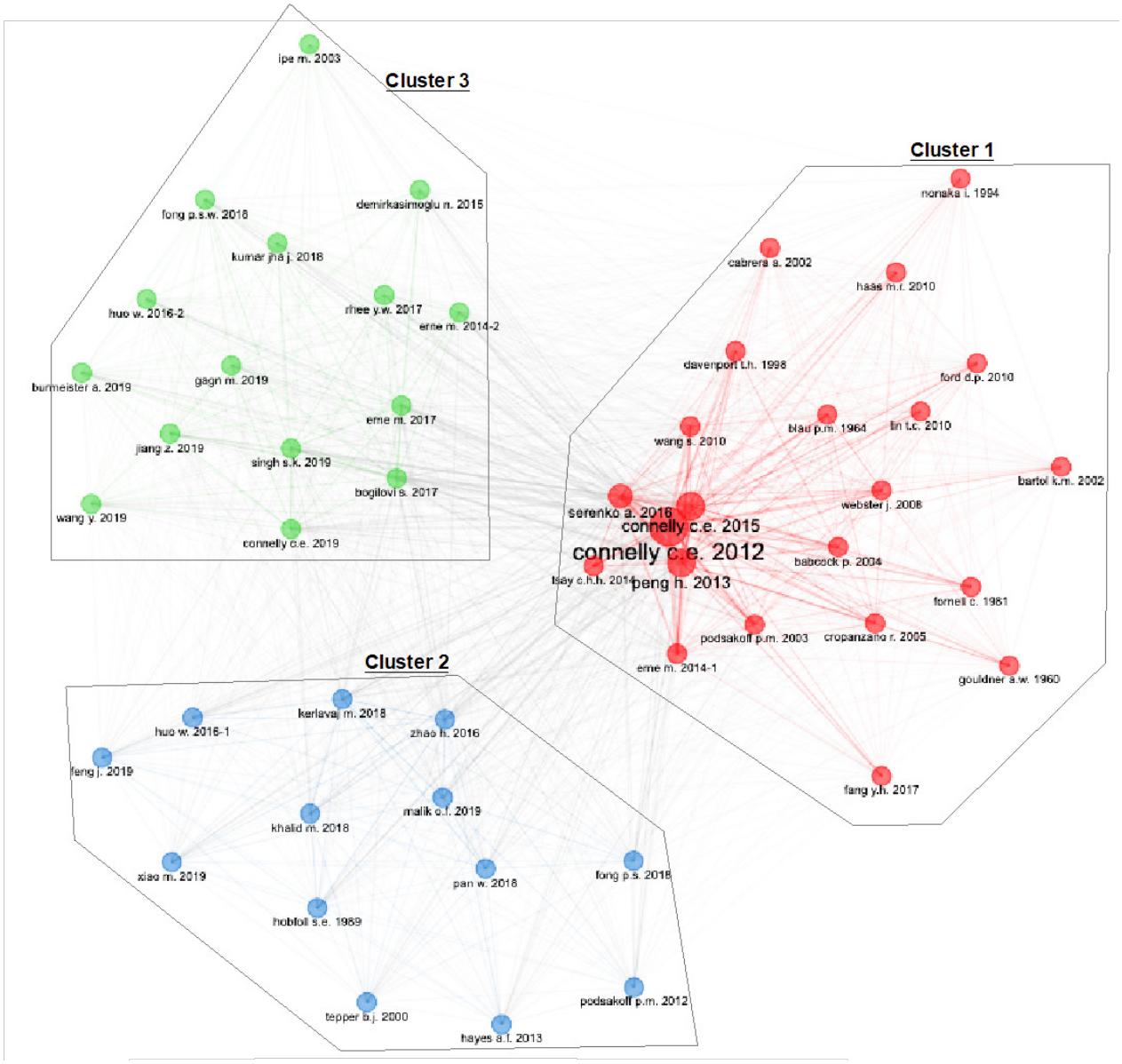

Figure 9: Intellectual structure network.

This finding follows the results where many articles appear to fully or partially use these three dimensions.[1]

The results of the conceptual structure analysis show that the research area related to knowledge hiding is a more dominating aspect. This study also found that research on knowledge hoarding in organizations has less attention. This result is due to the limited research that can thoroughly discuss knowledge hoarding in organizations, especially in knowledge-intensive firms.[1,33] From the results of the conceptual analysis, several theories are often used in knowledge hiding. Social exchange theory and conservation of resource theory has emerged recently. This finding is certainly in line with the findings in the previous trend analysis where both social exchange theory and conservation of resource theory emerged intensively in 2016 until now. Additionally, there is the emerging theory of self-determination theory.

Furthermore, the results of the thematic map found that the three dimensions of knowledge hiding (playing dumb, evasive hiding, and rationalized hiding) shows minimal attention than the others. This finding aligns with the literature study on survey research by Oliveira *et al.*[1] where further research is needed to find the elements in knowledge hiding and knowledge hoarding. The themes related to job security and job performance in the next cluster show emerging results. Although counterproductive behaviour is often associated with negative performance, it is still rarely examined. Therefore, future research that includes elements of job performance output variables. Oliveira *et al.*[1] found only four studies the effect of KHi on performance, both at the individual and team levels. In addition, a literature study conducted by Xiao and Cooke[34] stated that existing research at the individual level is related to creativity, innovation, interpersonal relationships, and future withholding.

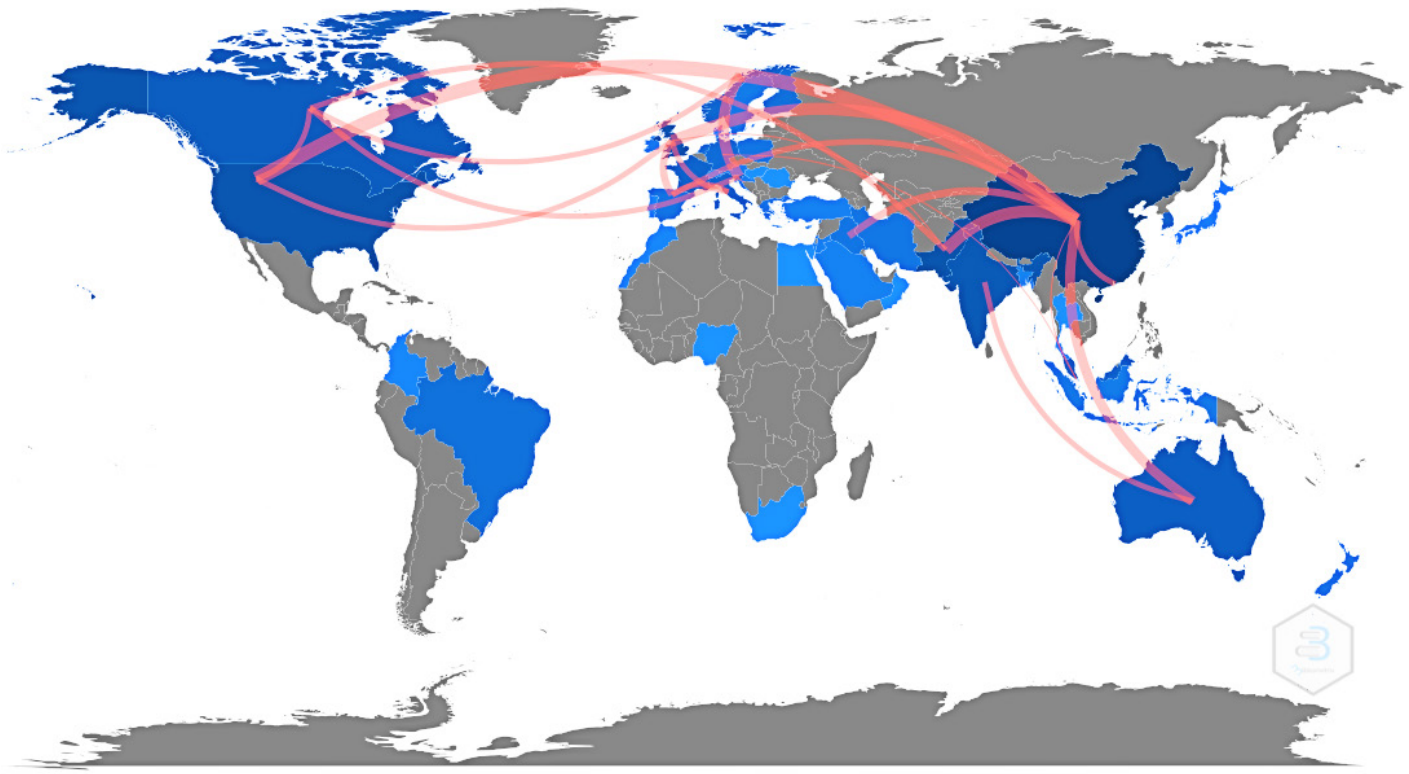

Figure 10: International collaboration map.

Based on the findings from thematic evolution, In the earliest development, the counterproductive knowledge behaviour has less attention than the knowledge sharing. In the first decade of 2000s, the concept of knowledge sharing and knowledge hoarding is used simultaneously.[1] In the next decades Connelly *et al.*[3] proposed knowledge hiding as a different concept from knowledge sharing and knowledge hoarding. The finding indicates that the terms knowledge sharing, knowledge hiding, and knowledge withholding appeared simultaneously in 2012–2015. Furthermore, from the analysis results above, it is known that the development of knowledge hiding is consistent from 2012–2022. However, the concept of knowledge hoarding has emerged earlier as an indication of behaviour contrary to the principle of knowledge sharing.[35] Knowledge hoarding became a topic discussed together with knowledge hiding in the knowledge sharing theme in 2016–2018. In this stages, the conservation resource theory is used to describes the potential benefit in knowledge hoarding for individual performance.[36,37] In any further development, topics that are more prominent in recent years are knowledge hoarding and knowledge hiding, followed by several diffused themes, such as job insecurity and workplace ostracism.

The results of the intellectual structure analysis show three clusters of authors that show the activity of quoting between authors (co-citation) that can be used to translate study groups. The first cluster shows counterproductive knowledge behaviour: knowledge hoarding, knowledge withholding, and knowledge hoarding. The first cluster consists of the earliest authors proposing three types of CKB. In the second cluster, the authors used the counterproductive knowledge behaviour in a more specific context in an organization, such as leadership, supervision, team works, and organizational politics. Several examples, such as Zhao[38] and Khalid[39] use the social exchange theory to understand the CKB on the individual responsibility towards the situation. Additionally, Skerlavaj[40] used the conservation of resource theory to understand employee KHi. In the third cluster, the authors have developed a further research design within the CKB. Connelly *et al.*[41] discuss five articles related to KHi in various contexts, including motivational behaviour. Several relationships across the boundaries from personal and team to a leader were also discussed within the personal goal orientation.[42] The relationship to the leader to subordinate relationship is discussed in detail within the Leader to Member Exchange (LMX) scope.[43] In this cluster, the use of CKB, especially the KHi, is also introduced in the context of academia.[44] This finding concludes that the recent development has occurred in cluster two and cluster three, specifying a broader context across the organization and boundaries.

Future direction

Gaps identified through this study are presented in this section citing several abstracts within datasets. First of all, there is necessary to integrate the Kho, Khw, and Khi in the same research model to explore other possible impacts.[1,45] It is interesting to implement

multiple theory backgrounds to integrate counterproductive knowledge behaviour.[24] Furthermore, it is essential to expand the research in various contexts within knowledge-intensive jobs.[1] Future research can explore organizational level performance, such as innovation capability and organizational growth.[34] In the organizational context, study related to absorptive capacity is also rarely found.[1,46] Additionally, there is still limited research on counterproductive behaviour in the context of developing countries.[34] Finally, to keep up with the digitalization trend, it is necessary to introduce the technology infrastructure in developing countries.[47]

CONCLUSSION

The finding in this study indicates the development of knowledge management issues, such as knowledge hoarding, knowledge withholding, and knowledge hiding. This study tries to find out the development of research in this field to help identify its implications for the lives of individuals as part of organizations. This study uses bibliometric techniques by reviewing previous research related to the topic to obtain an overall picture of the development of knowledge management.

The study results show that counterproductive behaviours such as knowledge hoarding, withholding, and hiding come from different domains. Knowledge hoarding is more related to knowledge sharing, where knowledge withholding and knowledge hiding are considered the same concept. The analysis results also found that the concept of knowledge hiding is also growing more rapidly than knowledge hoarding. Several fundamental theories also appear in the analysis, such as social cognitive theory, planned behaviour, theory of reasoned action, self-determination theory, social exchange theory, and conservation of resource theory. In addition, several theories are also worthy of further research, such as absorptive capacity theory. From the results of the social analysis, it is also found that research on counterproductive behaviour is mainly dominated by developed countries and is carried out by a small group of researchers. Therefore, it is necessary to conduct further research by collaborating with researchers from other countries, especially from developing countries.

In the end, this research is not without limitations. First, this research is the possibility of data noise using a database sourced from Scopus. Therefore, future research can compare data from other database sources such as a web of science. Furthermore, this study does not explicitly focus on Kho and Khi's behaviour in the realm of tacit knowledge or explicit knowledge. Future research can compare the case in tacit knowledge and explicit knowledge related to CKB. In addition, the combination of bibliometrics with other literature study methods such as systematic literature review and meta-analysis will very likely bring up more specific themes and topics and a more detailed description of the topic area being studied.

ACKNOWLEDGEMENT

We would like to give our great gratitude to Dr. Tika Widiastuti, from Airlangga University, Indonesia, for relentless support, inputs and encouragement.

CONFLICT OF INTEREST

The authors declares that there is no conflict of interest

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Cite this article: Zamrudi Z. A Pathway to Counterproductive Knowledge Behaviour: Integrating Knowledge Hoarding, Knowledge Withholding, and Knowledge Hiding. J Scientometric Res. 2023;12(1):211-28.

Appendix 1: Intellectual structure cluster.

Node	Cluster	Title
Connelly, 2012	1	Knowledge hiding in organizations.
Connelly, 2015	1	How perpetrators and targets construe knowledge hiding in organizations
Peng, 2013	1	Why and when do people hide knowledge?
Serenko, 2016	1	Understanding counterproductive knowledge behavior: antecedents and consequences of intra-organizational knowledge hiding
Wang, 2010	1	Knowledge sharing: A review and directions for future research
Webster, 2008	1	Comparing traditional and virtual group forms: identity, communication and trust in naturally occurring project teams
Wropanzano, 2005	1	Social exchange theory: An interdisciplinary review
Bartol, 2002	1	Encouraging knowledge sharing: The role of organizational reward systems
Tsay, 2014	1	Knowledge withholding intentions in teams: The roles of normative conformity, affective bonding, rational choice and social cognition
Nonaka, 1994	1	A dynamic theory of organizational knowledge creation
Fang, 2017	1	Coping with fear and guilt using mobile social networking applications: Knowledge hiding, loafing, and sharing
Lin, 2010	1	Withholding effort in knowledge contribution: The role of social exchange and social cognitive on project teams
Ford, 2010	1	Are full and partial knowledge sharing the same?
Haas, 2010	1	The double-edged swords of autonomy and external knowledge: Analyzing team effectiveness in a multinational organization
Cabrera, 2002	1	Knowledge-sharing dilemmas
Zhao, 2016	2	Workplace ostracism and knowledge hiding in service organizations
Skerlavaj, 2018	2	Tell me if you can: time pressure, prosocial motivation, perspective taking, and knowledge hiding
Malik, 2019	2	Perceptions of organizational politics, knowledge hiding, and employee creativity: The moderating role of professional commitment
Pan, 2018	2	Withholding Knowledge in Teams: An Interactionist Perspective of Personality, Justice, and Autonomy
Khalid, 2018	2	When and how abusive supervision leads to knowledge hiding behaviors: An Islamic work ethics perspective
Huo, 2016-1	2	Antecedents and intervention mechanisms: a multi-level study of R&D team's knowledge hiding behavior
Xiao, 2019	2	Why and when knowledge hiding in the workplace is harmful: a review of the literature and directions for future research in the Chinese context
Feng, 2019	2	Does abusive supervision always promote employees to hide knowledge? From both reactance and COR perspectives
Tepper, 2000	2	Consequences of abusive supervision
Bogilovi, 2017	3	Hiding behind a mask? Cultural intelligence, knowledge hiding, and individual and team creativity
Cerne, 2017	3	The role of multilevel synergistic interplay among team mastery climate, knowledge hiding, and job characteristics in stimulating innovative work behavior
Connelly, 2019	3	Understanding knowledge hiding in organizations
Singh, 2019	3	Territoriality, task performance, and workplace deviance: Empirical evidence on role of knowledge hiding
Cerne, 2014-2	3	What Goes Around Comes Around: Knowledge Hiding, Perceived Motivational Climate, and Creativity
Jiang, 2019	3	Crippling influence of knowledge hiding on the innovative performance of GDAD group

Node	Cluster	Title
Rhee, 2017	3	Knowledge management behavior and individual creativity: Goal orientations as antecedents and in-group social status as moderating contingency.
Gagne, 2019	3	Different motivations for knowledge sharing and hiding: The role of motivating work design.
Wang, 2019	3	Study on the public psychological states and its related factors during the outbreak of coronavirus disease 2019 (COVID-19) in some regions of China.
Burmeister, 2019	3	Consequences of knowledge hiding: The differential compensatory effects of guilt and shame.
Fong, 2018	3	Knowledge hiding and team creativity: the contingent role of task interdependence.
Kumar Jha, 2018	3	Are you a cistern or a channel? Exploring factors triggering knowledge-hiding behavior at the workplace: evidence from the Indian R&D professionals.
Emirkasimoglu, 2015	3	Knowledge Hiding in Academia: Is Personality a Key Factor?.

Appendix 2: Samples of theory used within research papers.

Teori	Context	Source
Social Cognitive Theory	University graduate working in IS team	[21]
	IS development team	[23]
	Supervisor-subordinate relationship	[22]
	MSC company in Malaysia	[48]
Theory of Planned Behavior	R&D professional in India	[24]
	MSC company in Malaysia	[48]
	Public HEI's non-academic employees	[25]
	Ukraine to US non-managerial employees	[49]
	Theoretical review	[50]
	Multi industry knowledge worker	[51]
Theory of Reasoned Action	General internet users (workers)	[52]
	Knowledge-intensive worker	[27]
	Theoretical review	[26]
Self- Determination Theory	Knowledge-intensive worker	[27]
	Online Knowledge Community	[28]
	Australia-China knowledge worker	[53]
	Salesperson in Myanmar	[54]
Social Exchange	University graduate working in IS team	[21]
	University student in China	[30]
	supervisor-subordinate relationship	[22]
	Online Knowledge Community	[28]
	Salesperson in Myanmar	[54]
Conservation of Resource Theory	Employee in vertically integrated business	[55]
	Internet active-user employee in the USA	[32]
	Education and manufacturing knowledge worker	[56]
	Textile industry	[57]
	Multi-sector employee	[58]
	IT and education sector employee	[59]
	Supervisor-subordinate relationship	[60]

Teori	Context	Source
	Frontline hospitality employee	[61]
	Hi-technology company	[62]
	General social media users	[63]
	Hi-technology company	[31]
	Salesperson	[64]