VOSviewer Analysis Regarding Communities of Practice in Intelligence Domains

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Abstract
Since ancient times, intelligence has been considered one of the most important intangible assets that could strategically enhance decision-making and provide a significant advantage for its beneficiary. In this fast-changing environment we live nowadays, where different types of threats and vulnerabilities, as well as opportunities, appear in entirely new ways and forms, intelligence is seen as an indispensable asset for any organization, either governmental or private. Over time, researchers and practitioners developed different kinds of "intelligences," such as national security intelligence, competitive intelligence, or business intelligence. In each context, intelligence has the same core meaning: the capacity of an entity to gather valuable data, successfully analyze it, and provide useful information and knowledge (also referred to as foreknowledge) to decision-makers to ensure competitive advantage in a specific field. The difference between these types of intelligence domains comes from their specific mission, targets, methods, and means. Nevertheless, the rational, emotional, and spiritual knowledge created, used, stored, or acquired from or for intelligence processes also represents a valuable intangible asset for organizations. Given this, both governmental and private organizations began to share this type of knowledge inside the organization or with their allies, using specific methods and tools. Therefore, this research aims to identify the state of the literature regarding implementing communities of practice, a highly recognized knowledge-sharing method, in intelligence domains. For this proposed objective, this research is based on a bibliometric analysis using the specialized software VOSViewer, aiming at identifying the connections and similarities between communities of practice, on the one hand, and national security intelligence, business intelligence, and competitive intelligence, on the other hand.

Keywords
Bibliometric Analysis; Communities of Practice; National Security Intelligence; Business Intelligence; Competitive Intelligence.

Introduction

For decades, intelligence was defined over and over again, being researched through different views and directions based on its outcome and purpose. However, all these definitions could be summarized as follows: intelligence is the capability to collect valuable data that is later analyzed to achieve information and knowledge for the decision-maker. Although intelligence depends on knowledge, it is much more than that (Kent, 1949; Spender, 1996).

Knowledge sharing is a complex process that takes place at the individual or organizational level and involves one or more individuals who share their experience and information without demanding any compensation (Massingham, 2020; Nonaka & Takeuchi, 1995). Communities of practice are well-known for their capability to enhance knowledge sharing between the participants. These groups of people are

established to work together as they share the same concerns or passion for a specific topic (Bratianu, 2015; Wenger, 1998; Wenger et al., 2002)

This research will focus on three branches of intelligence often studied in the last decades, namely national security intelligence, business intelligence, and competitive intelligence, alongside the concept of communities of practice. The first type of intelligence is specific to state-controlled institutions called intelligence agencies, while business intelligence and competitive intelligence are used by private entities to obtain the necessary knowledge to achieve competitive advantage (Bratianu, 2022; Nonaka, 1994; Nonaka & Toyama, 2003; Porter, 1985; Zack, 1999).

This research aims to offer a literature review using bibliometric analysis generated using the specialized software VOSViewer (Van Eck & Waltman, 2020) about the possible connections between communities of practice and national security intelligence, business intelligence, or competitive intelligence. Therefore, this paper is structured as follows: introduction, literature review, methodology, results and discussions, and conclusions.

Literature review

By all means, researchers from the business field consider intelligence as a driving force for achieving and maintaining competitive advantage (Alnoukaria & Hanano, 2017; Fleisher, 2001; Ivan, 2016; Jourdan et al., 2008; McGonagle, 2016; Rajnoha et al., 2016; Søilen, 2017). Therefore, intelligence in the business area was developed in two main directions: business intelligence and competitive intelligence (Krizan, 1999).

Nevertheless, researchers, practitioners, and experts in national security consider intelligence as an indispensable asset for state leaders to ensure stability, equilibrium, and resilience at a state level, as well as compliance with human freedom, rights, and duties (Hannah et al., 2005; Johnson, 2010; Kent, 1949; MacGaffin & Oleson, 2016; Oleson & Cothron, 2016; Pili, 2018; Waltz, 2003).

According to Rouibah & Ould-ali (2002, p. 133), “business intelligence is a strategic approach for systematically targeting, tracking, communicating and transforming relevant weak signs into actionable information on which strategic decision-making is based.” Also, Watson & Wixom (2010, pp. 96-97) stated that “business intelligence consists of business users and applications accessing data from the data warehouse to perform enterprise reporting, online analytical processing, querying, and predictive analytics.” Being defined in various ways, business intelligence refers to specific activities conducted using advanced analytic tools to obtain valuable information from inside the organization needed by the decision-makers (Botos & Radu, 2017; Skyrius, 2021). Therefore, business intelligence is oriented exclusively inside the organization's boundaries, targeting internal topics such as value chain, market position, or cost structure (Alnoukaria & Hanano, 2017).

Although there is confusion between business intelligence and competitive intelligence (Ivan, 2016), these two different fields of intelligence have completely distinct objectives and assignments. Therefore, besides business intelligence, competitive intelligence is oriented to the external environment, outside the organization's

boundaries (Alnoukaria & Hanano, 2017). McGonagle (2016, p. 371) defined competitive intelligence as "using lawful and ethical procedures to collect data and then analyze it to assist an enterprise, profit, non-profit, or governmental, to compete better." Competitive intelligence is oriented toward the entire competitive environment, from competition, competitors, customer behavior, and supplies to political and legal frameworks (McGonagle, 2016; Vella & McGonagle, 1987). Also, Calof & Wright (2008, p. 717) saw competitive intelligence as "a system of environmental scanning," while Fleisher (2001) presented the ability of competitive intelligence to connect unrelated data to obtain trends and patterns about the business environment. Nevertheless, competitive intelligence processes could create valuable knowledge about the environmental changes or expected actions of competitors, as well as the industry's possible future (Martins, 2001).

It is important to differentiate competitive intelligence from business espionage. Besides business espionage, which is illegal, competitive intelligence practitioners collect data legally and ethically, from public information and open sources (Fleisher, 2001; Ivan, 2016). It is also important that business intelligence and competitive intelligence practices development benefited from the advancements in the national security intelligence (Prescott, 2001). The intelligence activities often borrowed from the national security field were implemented in the business domain to protect the products and assets, better understand the external environment, and obtain knowledge used for strategic planning (Oleson, 2016).

Kent (1949) saw national security intelligence in three different forms: knowledge, organization, and activity, analyzing this concept from the process, outcome, and framework perspective. Also, Kent (1949, p. 3) considers intelligence as "the knowledge upon which we base our high-level national policy." National security intelligence was later defined in various ways based on each researcher's perspective, some of the definitions being presented as follows:

- "national intelligence refers to the strategic knowledge obtained for the leadership of nation-states to maintain national security" (Waltz, 2003, p. 15);
- "intelligence can be viewed as a subset of surveillance: a ubiquitous social practice, combining processes of knowledge and power and lying at the heart of all risk management" (Gill, 2010, p. 45);
- "the intelligence cycle is an entire epistemic activity based on gathering data and information, collecting them to analyze them to deliver a report whose goal is to enhance the rationality of a decision maker" (Pili, 2018, p. 398).

Therefore, national security intelligence is the knowledge or foreknowledge (Waltz, 2003) obtained through systematic processes that include data collection and analysis conducted by law-enforced entities to ensure a better understanding of a specific topic and obtain a decision advantage for the leaders, having the main objective of protecting the national security (MacGaffin & Oleson, 2016; Oleson & Cothron, 2016; Paicu, 2022; Posastiuc, 2011). The triad proposed by Kent (1949) for national security intelligence, respectively knowledge, organization, and activity, was redefined by Johnson (2010), who described the concept using four perspectives, as follows: as information, process, missions, and organizations.

Intelligence agencies that act in the national security field use classified methods, means, and sources. Wirtz (2010) describes some of these capabilities, such as intercepted communications, espionage, specific analytic tools, or clandestine agents.

From an analyst perspective, a relevant classification was given by Clark (2016), who presented literal and nonliteral intelligence (Figure 1). Literal intelligence can be processed without special requirements, while nonliteral information requires special knowledge and expertise to understand and process it (Clark, 2016).

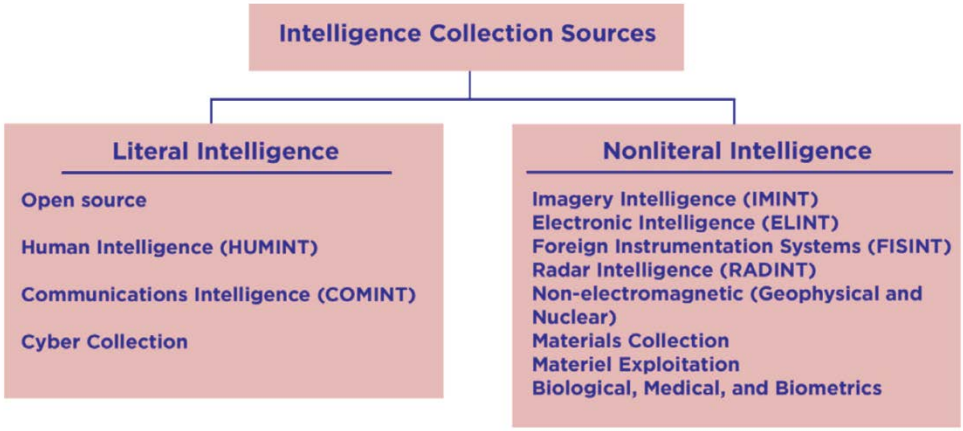

Figure 1. Analyst's Functional View of Intelligence Collection (Source: Clark, 2016, p. 186)

According to Wenger et al. (2002, p. 4), "communities of practice are groups of people who shape a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on ongoing basis." Communities of practice function on two pillars: a high level of trust and common interest (Bratianu, 2015). Employees involved in communities of practice could work together in the same organization of could be part of different ones, but have shared goals and expectations to achieve the strategic goals (Bratianu & Lefter, 2001; Bratianu & Murakawa, 2004). Individuals working in a practice community share their rational, emotional, and spiritual knowledge. The theory of knowledge fields was defined by Bratianu and Bejinaru (2019a), who proposed the triad of knowledge consisting of rational knowledge, emotional knowledge and spiritual knowledge. Rational knowledge represents the knowledge that could be expressed by natural or symbolic language, emotional knowledge is composed of our feelings and emotions, while spiritual knowledge represents the values and meanings (Bratianu, 2011, 2022; Bratianu & Bejinaru, 2019a, 2019b).

According to Bratianu (2022, p. 43), "knowledge sharing is a generic expression used to designate the voluntary transfer of knowledge from one entity to another." This process is based on the goodwill of the participants to share their experiences without demanding anything in return, including mercantile compensation (Massingham, 2020). Therefore, Armstrong (2001) presented the possibility of implementing communities of practice in the competitive intelligence process to develop new capabilities. Also, Skyrius (2021, p. 115) mentioned the communities of practice as an alternative approach to manage expertise" in the business intelligence field.

Nevertheless, Desouza (2009) proposed using communities of practice in the national security intelligence field to share knowledge between intelligence agencies. Therefore, Desouza (2009) thought about a framework where different intelligence agencies could access the knowledge created by similar experiences and analyze special situations.

Methodology

This paper proposes a literature review based on a bibliometric analysis regarding the publications that could connect the communities of practice concept to national security intelligence, business intelligence, and competitive intelligence. The bibliometric analysis is conducted using the specialized software VOSviewer. In order to identify the possible connections between the proposed concepts, this research used the co-occurrence investigation procedure offered by VOSViewer. This procedure aims to identify the similarities and possible links between article titles, abstracts, and keywords from the selected publications.

For enhancing the research accuracy and objectivity, as well as to cover a large variety of publications from the selected areas of literature, this research will use information from the largest scientific citation databases, respectively, Web of Science core collection and Scopus. Therefore, the databases needed for this research were retrieved on 31 May 2024. For retrieving the data from both Web of Science core collection and Scopus we used "All fields" and all the time frame requirements. The keywords and expressions used for searching through the designated databases were "national security intelligence – communities of practice," "business intelligence – communities of practice," "competitive intelligence – communities of practice," and "intelligence agencies – communities of practice." The results are shown in Table 1.

Table 1. Keywords and expressions used to retrieve databases from Web of Science core collection and Scopus (Source: Author's research)

Expression	*Total number of publications in Web of Science core collection/First year of publication*	*Total number of publications in Scopus/First year of publication*
"national security intelligence – communities of practice"	0/0	1/2024
"business intelligence – communities of practice"	6/2009	610/1995
"competitive intelligence – communities of practice"	2/2007	259/2000
"intelligence agencies – communities of practice"	0/0	31/2009

The publications indexed in the Web of Science core collection are significantly fewer than the ones from the Scopus database. Nevertheless, we found only one publication for the keywords "national security intelligence – communities of practice" in Scopus database, respectively the article Forum: "Making Peace with Un-Certainty: Reflections on the Role of Digital Technology in Peace Processes beyond the Data Hype", written by Andreas T. Hirblinger, Martin Wählisch, Kate Keator, Chris McNaboe, Allard Duursma, John Karlsrud, Valerie Sticher, Aly Verjee, Tetiana Kyselova, Chris M A Kwaja

and Suda Perera, in *International Studies Perspectives*, Volume 25, Issue 2, May 2024, pages 185–225.

Also, for the expression "competitive intelligence – communities of practice," Web of Science core collection generated only two publications, respectively:

- "Using competitive intelligence as a strategic tool in a Higher Education context", written by Miguel Rombert Trigo, Luis Borges Gouveia, Luc Quoniam and Edson Luiz Riccio, in *Proceedings of the 8th European Conference on Knowledge Management*, Volume 1 and 2, September 2007, pages 1017-1029;
- "Data, Information and Intelligence", written by Scott Erickson and Helen Rothberg, in *Proceedings of the International Conference on Analytics Driven Solutions*, September 2014, pages 48-54.

The databases retrieved from Scopus for the "business intelligence – communities of practice," "competitive intelligence – communities of practice," and "intelligence agencies – communities of practice," as well as the database from Web of Science core collection for "business intelligence – communities of practice," will be analyzed using VOSViewer, to see the co-occurrence of specific keywords.

Results and discussion

The research objective was to analyze the literature from national security intelligence, business intelligence and competitive intelligence to identify the possible connection with communities of practice and the implementation of this concept in the intelligence domains. Therefore, this research analyzed the databases that generated relevant results. The expressions used for retrieving data are "business intelligence – communities of practice," "competitive intelligence – communities of practice," and "intelligence agencies – communities of practice." These databases will be analyzed using VOSViewer through the co-occurrence investigation procedure that generated the connections between specific keywords. The first database analyzed was retrieved from the Web of Science core collection for "business intelligence – communities of practice" expression, which contains six publications. Therefore, VOSViewer generated 44 keywords imported using the minimum threshold of one occurrence and placed in 2 clusters (Figure 2).

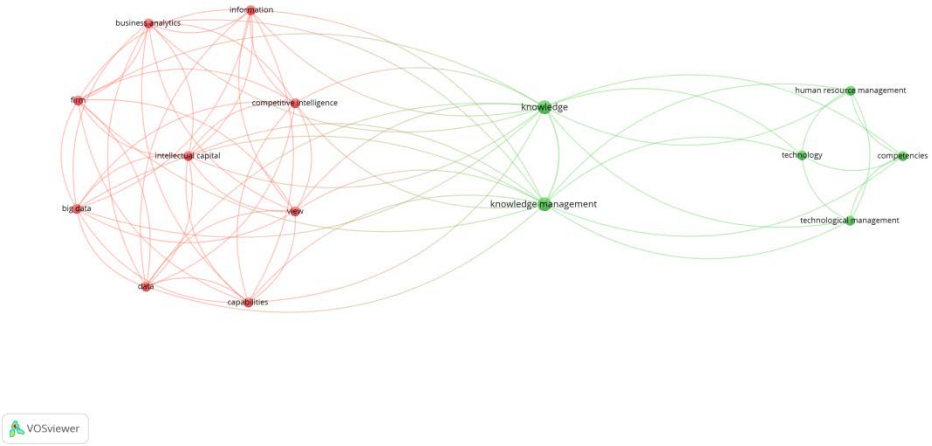

Figure 2. The relationship map generated by VOSViewer for "business intelligence – communities of practice" expression – Web of Science core collection (Source: Author's research)

Given the small amount of publications and keywords, the map generated by VOSViewer does not show a strong correlation between concepts. However, in the center of the map, the specialized software placed "knowledge management" and "knowledge" keywords (green cluster) that are connected with all the keywords from the red cluster, such as "competitive intelligence," "intellectual capital, or "information. Also, the keywords from this database are presented in Table 2.

Table 2. Keywords analysis for "business intelligence – communities of practice" expression – Web of Science core collection (Source: Author's research)

Keywords	*Occurrences*	*Total link strength*
big data	1	10
business analytics	1	10
business intelligence	2	13
business processes	1	6
capabilities	1	10
careflow compliance	1	6
careflow management system	1	6
careflows	1	6
communities of practice	1	5
competencies	1	5
competitive intelligence	1	10
computer-networks	1	7
cyberinfrastructure	1	8
data	1	10
design	1	6
design science	1	8
digital humanities	1	8
firm	1	10
fuzzy concept analysis	1	7

healthcare intelligence	1	6
human resource management	1	5
influencer detection	1	7
information	1	10
intellectual capital	1	10
knowledge	2	15
knowledge creation	1	5
knowledge management	2	15
knowledge sharing	1	5
knowledge transfer management	1	5
latent topic analysis	1	7
modern curriculum	1	8
online discourse	1	8
online social networks	1	7
process mining	1	6
semantic modeling	1	7
social media	1	8
social network analysis	1	7
social web	1	8
success	1	8
technological management	1	5
technology	1	5
view	1	10
virtual communities	1	7
wikis	1	5

Switching to the databases retrieved from Scopus, we analyzed the information gathered from the 610 publications for "business intelligence – communities of practice" expression. Given the high number of publications, VOSViewer generated 3155 keywords. Consequently, we used a higher number for the minimum threshold of occurrences, respectively 9, and obtained 56 keywords placed in 6 clusters (Figure 3).

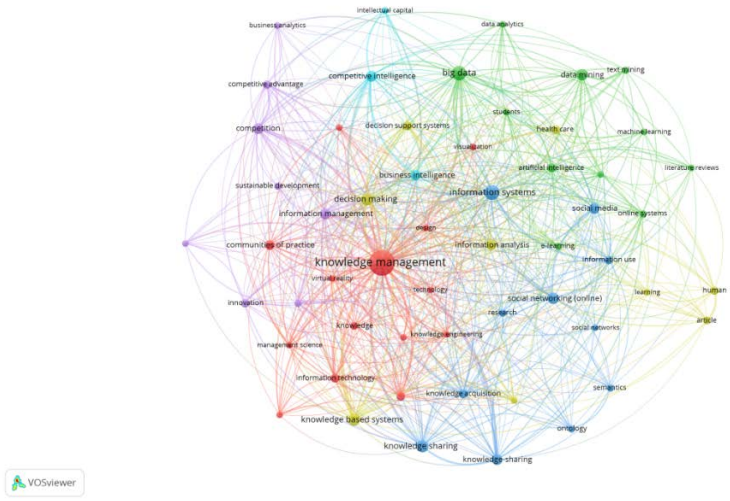

Figure 3. The relationship map generated by VOSViewer for "business intelligence – communities of practice" expression – Scopus
(Source: Author's research)

In the map's center, VOSViewer placed the "knowledge management" keyword (red cluster), which is linked with all the other clusters. Also, the red cluster contains the "communities of practice" keyword, proving that these two concepts are strongly connected. It needs to be noted that the "communities of practice" keyword is linked with both "business intelligence" and "competitive intelligence" concepts from the light blue cluster, with a link strength of 3 and, respectively, 1. These connections prove the fact that "communities of practice," on the one hand, and "business intelligence" and "competitive intelligence," on the other hand, were the subject of research. However, the progress in this area is still incipient. The keywords that met the minimum threshold are presented in Table 3.

Table 3. Keywords analysis for "business intelligence – communities of practice" expression – Scopus (Source: Author's research)

Keywords	*Occurrences*	*Total link strength*
article	12	32
artificial intelligence	17	52
big data	43	120
boundary objects	9	25
business analytics	9	24
business intelligence	22	74
communities of practice	18	55
competition	23	87
competitive advantage	14	49
competitive intelligence	25	100
data analytics	10	25
data mining	26	54
decision making	30	92
decision support systems	16	57
design	10	33
e-learning	11	30
education	10	33
health care	14	33
human	15	31
human resource management	9	29
information analysis	21	67
information management	25	98
information systems	45	119
information technology	17	62
information use	14	47
innovation	15	38
intellectual capital	9	30
knowledge	13	41
knowledge acquisition	17	72
knowledge based systems	31	99
knowledge engineering	10	35
knowledge management	136	358
knowledge sharing	30	82
knowledge-sharing	23	87
learning	10	23
literature reviews	9	22
machine learning	10	22
management science	9	45
online systems	11	42

ontology	11	29
organizational learning	15	60
organizational performance	9	26
project management	10	26
research	11	36
semantics	11	26
social media	25	57
social networking (online)	27	68
social networks	10	16
societies and institutions	11	46
students	10	33
sustainable development	11	14
tacit knowledge	10	43
technology	10	27
text mining	11	27
virtual reality	9	36
visualization	9	16

Next, we analyzed the 259 publications retrieved from Scopus for "competitive intelligence – communities of practice" expression. Therefore, VOSViewer generated a total number of 1237 keywords, and for this reason, we used a minimum number of 5 occurrences, obtaining 46 keywords that met the criteria. The specialized software placed these keywords in 6 clusters (Figure 4).

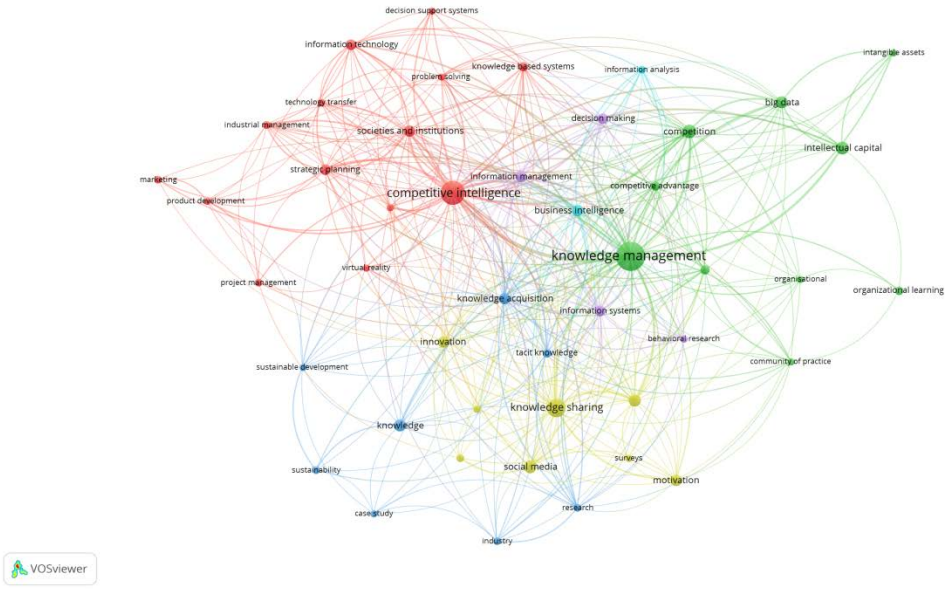

Figure 4. The relationship map generated by VOSViewer for "competitive intelligence – communities of practice" expression – Scopus (Source: Author's research)

Unlike the previous map, VOSViewer placed two keywords in the center of the map, respectively, "knowledge management" in the green cluster and "competitive intelligence" in the red cluster. These two keywords are strongly connected, with a link strength of 23. The "Communities of practice" concept is placed in the green cluster among "knowledge management." It is connected with both "competitive intelligence" and "business intelligence," which is placed in the light blue cluster. The link strength between "communities of practice" and "business intelligence" is 1, while the one between "communities of practice" and "competitive intelligence" is 3. Therefore, the statement previously formulated by which we affirmed that "business intelligence," "competitive intelligence," and "communities of practice" represent an area of research that is just at the beginning remains valid. Also, the keywords from this database are described in Table 4.

Table 4. Keywords analysis for "competitive intelligence – communities of practice" expression – Scopus (Source: Author's research)

Keywords	*Occurrences*	*Total link strength*
behavioral research	5	20
big data	13	41
business intelligence	12	53
case study	5	9
communities of practice	8	31
community of practice	5	20
competition	17	72
competitive advantage	8	40
competitive intelligence	50	179
decision making	10	35
decision support systems	5	18
industrial management	6	29
industry	6	18
information analysis	6	28
information dissemination	5	16
information management	10	50
information systems	10	43
information technology	10	40
innovation	11	28
intangible assets	5	14
intellectual capital	15	34
knowledge	13	24
knowledge acquisition	11	59
knowledge based systems	8	35
knowledge engineering	5	27
knowledge management	74	215
knowledge sharing	29	69
knowledge-sharing	13	58
marketing	6	11
motivation	12	24
organizational	5	15
organizational learning	7	6
problem solving	5	28
product development	5	18
project management	6	11
research	6	31
social media	14	30

social networking (online)	6	12
societies and institutions	12	50
strategic planning	10	53
surveys	5	11
sustainability	6	13
sustainable development	5	19
tacit knowledge	7	32
technology transfer	5	22
virtual reality	5	19

The last database analyzed in this research is the one retrieved from Scopus for "intelligence agencies – communities of practice," which contains information from 31 publications. VOSViewer generated 161 keywords for this database, while only 11 met the requirement of a minimum of 2 occurrences. Out of these, only 4 keywords were connected, and the specialized software placed them in 1 cluster (Figure 5).

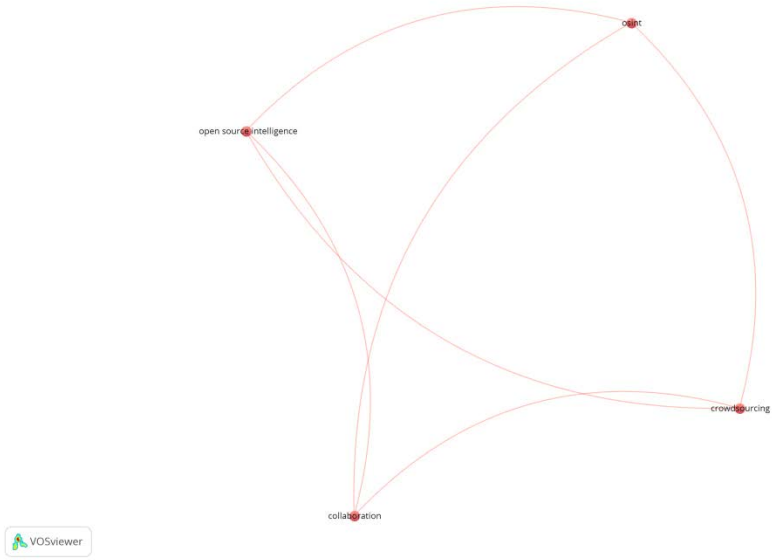

Figure 5. The relationship map generated by VOSViewer for " intelligence agencies – communities of practice" expression – Scopus
(Source: Author's research)

The four keywords that form the red cluster and the entire map for this database are "OSINT," "open source intelligence" (which represents the same concept as the first one), "collaboration," and "crowdsourcing." Given this, we can conclude that "intelligence agencies" and "communities of practice" are concepts that were not researched together.

Conclusions

This research aimed to identify the connections between national security intelligence, business intelligence, and competitive intelligence on one part and communities of practice on the other, as well as the research interests and state of literature in these

domains. To achieve the designated goal, we analyzed the information retrieved from the two most significant databases worldwide, respectively, Web of Science Core Collection and Scopus. After examining these databases, it can be concluded that the concept of communities of practice is present in business intelligence and competitive intelligence domains, but the research in these fields is just at the beginning.

Also, it is important to note that national security intelligence or intelligence agencies are not connected with the communities of practice concept. This means these domains were not researched in a publication indexed in the Web of Science core collection or Scopus.

The main contribution of this paper is that it identified a research gap in the literature that was indexed in the Web of Science core collection or Scopus, respectively the integration of communities of practice in national security intelligence. Therefore, we consider that these two concepts should be researched together.

This paper's main limitation is that it analyzed only the publications indexed in the Web of Science core collection or Scopus and not the entire specialty literature, especially from the national security intelligence domain, where we identified the research gap. Therefore, future research should include these publications, as well as the ones from Google Scholar.

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