Journal of Intelligence Studies in Business

Mapping the structure and evolution of JISIB: A bibliometric analysis of articles published in the Journal of Intelligence Studies in Business between 2011 and 2017

José Ricardo López-Robles[a]*, Jose Ramón Otegi-Olaso[a], Rubén Arcos[b], Nadia Karina Gamboa-Rosales[c], Hamurabi Gamboa-Rosales[c]

[a]University of the Basque Country, Department of Graphic Design and Engineering Projects, Bilbao, Spain; [b]King Juan Carlos University, Department of Communication Sciences and Sociology, Madrid, Spain; [c]Autonomous University of Zacatecas, Academic Unit of Electric Engineering, Zacatecas, Mexico *jrlopez005@ikasle.ehu.eus

PLEASE SCROLL DOWN FOR ARTICLE

Stevan Dedijer
1911-2004

Mapping the structure and evolution of JISIB: A bibliometric analysis of articles published in the Journal of Intelligence Studies in Business between 2011 and 2017

José Ricardo López-Robles[a]*, Jose Ramón Otegi-Olaso[a], Rubén Arcos[b], Nadia Karina Gamboa-Rosales[c], and Hamurabi Gamboa-Rosales[c]

[a] University of the Basque Country, Department of Graphic Design and Engineering Projects, Bilbao, Spain; [b] King Juan Carlos University, Department of Communication Sciences and Sociology, Madrid, Spain; [c] Autonomous University of Zacatecas, Academic Unit of Electric Engineering, Zacatecas, Mexico

Corresponding author (*): jrlopez005@ikasle.ehu.eus

ABSTRACT Today, organizations are facing technological, economic and social challenges that require the intelligent use of data, information and knowledge. To this end, organizations are developing capabilities around intelligence. From the organizational point of view, intelligence in business is a relatively new field study, so it is convenient to know and understand what the main themes are and their evolution in order to facilitate their integration. Taking this into account, the current research conducts a conceptual and structural analysis of the *Journal of Intelligence Studies in Business (JISIB)*. JISIB is one of the few academic journals devoted purely to publishing articles about business intelligence, collective intelligence, competitive intelligence, economic intelligence, market intelligence, marketing intelligence, scientific and technical intelligence, strategic intelligence, and their equivalent terms in other languages. This analysis is carried out by quantifying the main bibliometric performance indicators, identifying the main authors and evaluating the development of the main themes within it using *SciMAT* as a bibliometric analysis software. To this purpose, the documents published in JISIB from 2011 to 2017 were retrieved from two different sources: the JISIB official web page and the Web of Science. In this way, the bibliometric performance analysis evaluates the impact of the scientific output based on publications and their citations, while science mapping illustrates the intellectual structure of the journal and the evolution of the main research themes. Bearing in mind that JISIB provides an open platform for the publication of original research articles, opinion articles, book reviews and conference proceedings about the intelligence field, this research allows to understand its structure and evolution and all the themes associated with it. It provides a framework to support intelligence researchers and professionals in the development and direction of future research by identifying emerging, transversal, core and declining themes. Finally, this study includes a performance analysis of *JISIB*.

KEYWORDS Business intelligence, competitive intelligence, conceptual evolution map, co-word analysis, science mapping analysis

1. INTRODUCTION

In an age of information, organizations face the challenge of improving their competitiveness and agility through the intelligent use of data and information in the research, development and innovation process. This makes it possible

to predict situations, improve decision-making processes, increase profitability and thereby the success of organizations, mainly. Both companies and educational organizations seek to respond to this challenge through the effective development of areas of knowledge such as: *competitive intelligence, business intelligence, market intelligence, scientific and technical intelligence, collective intelligence* and *geoeconomics*. Nevertheless, in comparison with other fields of knowledge, intelligence in business is relatively novel, so there are not many ways in which academics and professionals can improve and share their advances and proposals.

The concept of intelligence has its origins in the military and national security fields, through the processes of adaptation that organizations develop to respond to the information use challenges that they face today. It was not until 1958 when Luhn defined *business intelligence* as the ability to apprehend the interrelationships of presented facts in such a way to guide action towards a desired goal (Luhn, 1958). This definition can be considered to be one of the first in the intelligence field, because it mentions the systematic process by which the organization collects data and organizes them in the form of useful information to later analyze them and convert them into intelligence, providing the necessary criteria for the decision making process. However, the term *business intelligence* is more often used for internal or transactional aspects of an organization, giving space for the use of *competitive intelligence* in a broader, external framework.

In this way, Prescott and Gibbons said that competitive intelligence is a formalized, yet continuously evolving, process by which the management team assesses the evolution of its industry and the capabilities and behavior of its current and potential competitors to assist in maintaining or developing a competitive advantage (Prescott and Gibbons, 1993; Prescott and Bharadwaj, 1995).

Bearing this in mind, it is possible to observe that the intelligence is implemented in different areas of the organization, which means that the approach given to it varies according to the people who develop it or the area where it is developed. This has given rise to different intelligence terminology, within which can be highlighted the following: *business intelligence* (Gilad and Gilad, 1985; Søilen, 2017), *collective intelligence* (Devouard, 2011; Sheremetov and Rocha-Mier, 2004;

Shimbel, 1975), *competitive intelligence* (Calof and Dishman, 2007; Davenport and Cronin, 1994; Du Toit, 2003; Du Toit and Sewdass, 2014; James, 2014; Tuta et al., 2014), *economic intelligence* (Larivet, 2009; Menychtas et al., 2014; Perrine, 2004; Seiglie et al., 2008; Smith, 1953), *market intelligence* (Maltz and Kohli, 1996; Navarro-Garcia et al., 2016), *marketing intelligence* (de' Rossi, 2005; Kelley, 1965; Zhou and Lai, 2009), *science and technology intelligence* (Castellanos and Torres, 2010; Chang et al., 2007; De Coster et al., 2013; McCormick et al., 2015; Mortara et al., 2009), among others, such as *financial intelligence, public intelligence,* and *competitor intelligence*.

Nowadays, there are few scientific journals focused exclusively on the publication of intelligence articles which the practitioners of intelligence can use to share and further develop their knowledge. One of the most recognized and specialized sources in this field is the *Journal of Intelligence Studies in Business (JISIB)*, which is an open publication journal, indexed in the main scientific databases and that gathers contributions from many authors of international prestige.

Considering the heterogeneity, novelty and evolution of this field, intelligence professionals are interested in evaluating the evolution of the main themes and the relationship between them, in order to identify opportunities and challenges in the future. In this regard, authors such as Du Toit (Du Toit, 2015) and Søilen (Søilen, 2013; Søilen, 2015; Søilen, 2016) have carried out research to identify trends in the intelligence literature by analyzing publications, journals and authors.

The objective of this article is to identify and analyze the main themes in the field of intelligence used in peer-reviewed articles published in *JISIB* from 2011 to 2017 and its performance through the use of bibliometric techniques and tools (Cobo et al., 2011b).

Finally, this paper is organized as follows: Section 2 introduces the methodology (including the bibliometric analysis tool) and the data set. Section 3 and Section 4 present the bibliometric and science mapping analyses, respectively. Section 5 shows the conclusions and future research lines.

2. METHODOLOGY AND DATASET

Scientific journals represent one of the main knowledge sources today, so their analysis is of interest to academic, scientific and business communities (Bjork et al., 2009; Dewatripont et al., 2006). Within the research aimed at
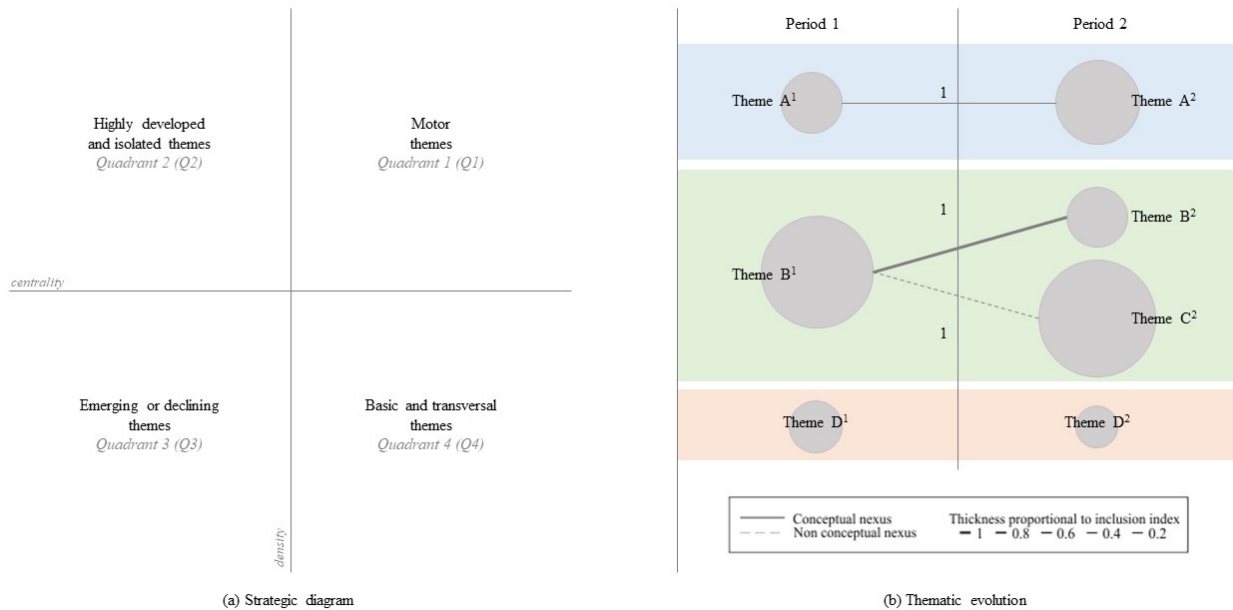
(a) Strategic diagram

(b) Thematic evolution

Figure 1 Strategic diagram (a) and thematic evolution (b) structure. The structure of the strategic diagram (a) and thematic evolution (b) used to describe the evolution of the themes related to intelligence and the field). The strategic diagram is dived into four sections: motor themes, highly developed and isolated themes, emerging and declining themes and basic and transversal themes, according to the centrality and density of the themes. The thematic evolution shows the evolution of these themes in the period defined. This figure groups these themes into thematic areas (color areas).

evaluating the performance of scientific journals, three main approaches can be identified: (i) bibliometric analysis based on performance indicators, (ii) thematic analysis, and (iii) research methods and techniques.

In this contribution, a complete bibliometric analysis based on performance indicators and a thematic analysis of the *Journal of Intelligence Studies in Business (JISIB)* has been carried out (Batagelj and Cerinšek, 2013; Börner et al., 2003; Gutiérrez-Salcedo et al., 2017).

The performance analysis is based on bibliometric indicators that measure the production of different actors, and the international impact achieved. The most cited articles (Moral-Munoz et al., 2016) in the field are identified using the H-Classic approach (De la Flor-Martinez et al., 2016; Martínez et al., 2014), which is based on the well-known h-index (Hirsch, 2005). In general terms, the H-Classic uses the h-index in order to establish the threshold cut, that is, the number of highly cited documents that correspond with the most cited paper.

A longitudinal conceptual science mapping analysis and a strategic diagram based on a co-words network are developed by means of the software tool *SciMAT* (Cobo et al., 2012). This thematic analysis is based on a four-stage approach: (i) *research themes detection, (ii) visualizing research themes and thematic*

network, (iii) discovery of thematic areas and (iv) performance analysis.

To do this the research themes are set out in a strategic diagram and thematic evolution map (Figure 1). The first is a two-dimensions map divided in four areas according to their relevance (centrality and density rank values) where the themes are represented as a sphere and its volume is proportional to the number of documents associated with the theme (Cobo et al., 2011a):

a. *Motor themes (upper right quadrant – Q1):* The themes within this quadrant are relevant to the structure and develop the research field.

b. *Highly developed and isolated themes (upper left quadrant – Q2):* The themes within this quadrant are relevant but are not important enough to be considered more than a very specialized or peripheral activity for the research field.

c. *Emerging or declining themes (lower left quadrant – Q3):* The themes within this quadrant are weak, but this weakness can be understood as emerging or disappearing themes.

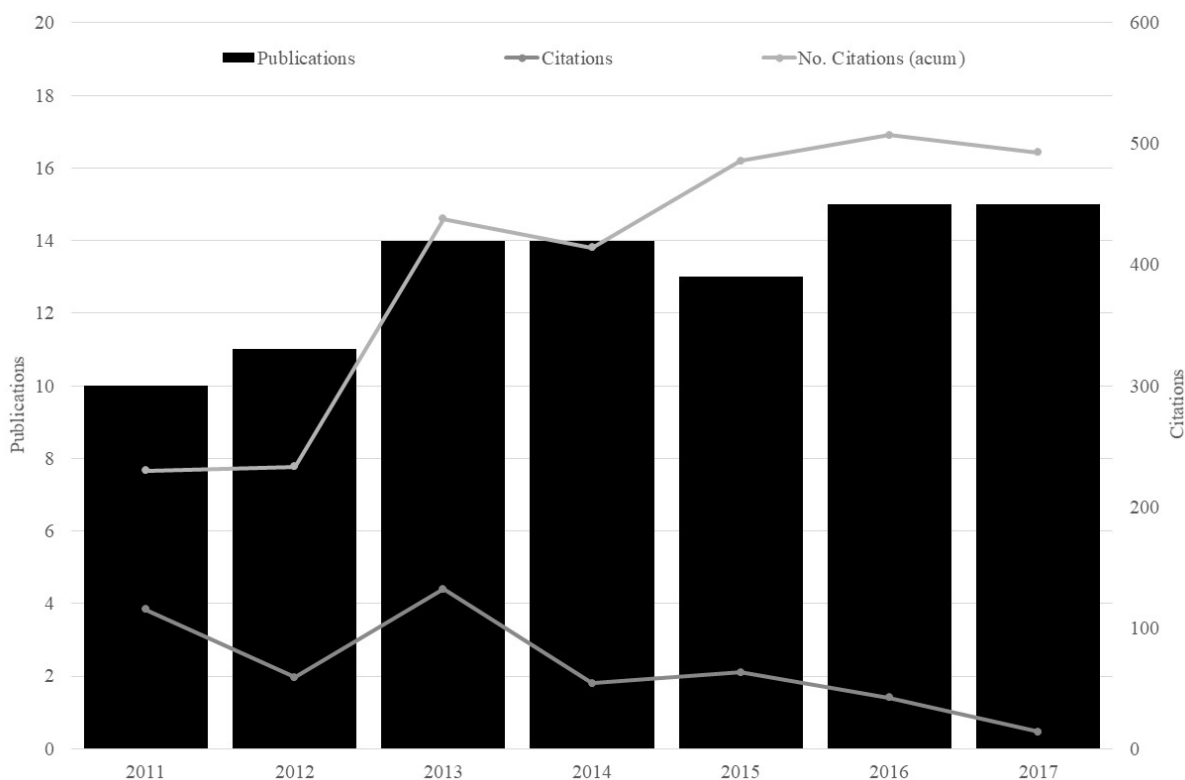d. *Basic and transversal themes (lower right quadrant – Q4):* The themes

Figure 2 Distribution of publications and citations by year and period (2011-2017). This figure shows the distribution of publications and citations included in JISIB per year. The bars represent the publications by year and are related to the left axis. The continuous lines represent the citations corresponding to each year (nominal and accumulated) and are related to the right axis.

within this quadrant are not well-developed, but are relevant for the research field.

Finally, the second diagram is a longitudinal framework, which allows us to analyze and track the evolution of a research field throughout consecutive time periods. In addition, a performance analysis of a thematic area using the main bibliometric indicators was developed.

This analysis focused on the documents published in the *Journal of Intelligence Studies in Business (JISIB)*. The publications and their citations included in this analysis were collected on May 1st, 2018.

The publications belonging to the intelligence research field were retrieved from two different sources: *JISIB* (official web page) and *Web of Science*. The publications were manually downloaded and included in the knowledge base. The publications available on the *Web of Science* were retrieved using the following advance query: *IS=("2001-015X")*. These publications were compared with the publications obtained from the official website to guarantee that the publications are consistent in both sources. Finally, the knowledge base was further refined and

limited to *Articles, Proceedings, Opinion* and *Reviews* published in English.

This process retrieved a total of 92 publications from 2011 to 2017. According to methodology used for this research (Cobo et al., 2011a), to evaluate the evolution and to avoid smoothing the data, the best option was to choose comparable periods in terms of duration and characteristics. In the case of the journal JISIB, the entire time period analyzed was divided in seven comparable periods: *Period 1: 2011, Period 2: 2012, Period 3: 2013, Period 4: 2014, Period 5: 2015, Period 6: 2016 and Period 7: 2017*. The analysis provides a good input to the strategic diagrams and thematic evolution map (co-word analysis) to detect the main themes.

3. PERFORMANCE OF THE BIBLIOMETRIC ANALYSIS OF JISIB

To understand how the *JISIB* has progressed in terms of publications, citations and relevance, its performance was evaluated through the analysis of the main bibliometric indicators: *publications, citations, most cited articles, most cited authors* and *h-index*.

For this purpose, the bibliometric performance analysis was structured in two parts. Firstly, all the publications and their

citations were evaluated with the objective of testing and evaluating the scientific development. Secondly, the main authors and publications were analyzed to assess the impact of these in the field of research.

Table 1 Top 10 most productive authors (2011-2017). When a tie is recorded between authors all are listed in alphabetical order. Pub = publications. N=92.

Authors	Pub	%
Søilen, K. S.	16	17.39
Rodríguez Salvador, M.	6	6.52
Calof, J.	4	4.35
Du Toit, A. S. A., Erickson, G. S., Quoniam, L. and Rothberg, H. N.	3	13.04
Baaziz, A., Barnea, A., Bisson, C., Bleoju, G., Capatina, A., Dousset, B., El Haddadi, A., Hoppe, M., Oubrich, M., Paletta, F. C., Richards, G., Vriens, D. and Xinzhou, X.	2	28.26

Table 2 Top 10 most cited authors (2011-2017). This table is completed with the information of each author in terms of production. When a tie is recorded between authors all are listed in alphabetical order. C = Citations. % is given out of N=479. Docs = documents.

Author	C	%	Docs	%
Søilen, K. S.	83	17.33	16	17.39
Adamala, S.	56	11.69	1	1.09
Cidrin, L.	56	11.69	1	1.09
Du Toit, A. S. A.	45	9.39	3	3.26
Carayannis, E.	29	6.05	1	1.09
Kabir, N.	29	6.05	1	1.09
Hoppe, M.	23	4.80	2	6.52
Rodríguez Salvador, M.	23	4.80	6	2.17
Calof, J.	15	3.13	4	4.35
Oubrich, M.	15	3.13	2	2.17

3.1 Performance and impact indicators

The distribution of publications and citations included in *JISIB* per year is shown in Figure 2. From the first publication in December 2011, the number of publications remains constant, with the exception of 2015, when there was a slight decrease. It is important to highlight that during the last years there has been a constant increase in the number of publications, which can be understood as a growing interest in the intelligence and consolidation of the journal.

In addition, it is important to highlight that *JISIB* is one of the few active intelligence journals indexed in the most important academic and scientific sources (*Web of Science* and *Scopus*), an aspect that has allowed it to grow in terms of publications and adherents.

Considering these results and the previous analysis of the state of the art, it is possible to expect that the positive trend will continue. However, it is important to note that in recent years there was a false negative trend in the number of citations. According to Wang there is a window period between the publication of an article and the moment when it begins to be cited, ranging from 3 to 7 years (Wang, 2013). Furthermore, it must be borne in mind that the evolution of the citations also depends on where journals are indexed and in how many sources they are indexed.

3.2 Most Productive and Cited Authors

To complete the bibliometric performance analysis of the *Journal of Intelligence Studies in Business (JISIB)* and to assess the main actors in the development of this field of knowledge, the most productive and cited authors are shown in Table 1 and Table 2, respectively. In both tables a tie was recorded between different authors, so all are listed in alphabetical order.

It is important to highlight that all most productive authors are among the most cited authors during the evaluated period. Furthermore, the authors' correspondence in terms of country of origin are: *Sweden, France, Iran, South Africa, USA, Canada, Mexico, Brazil* and *Spain*.
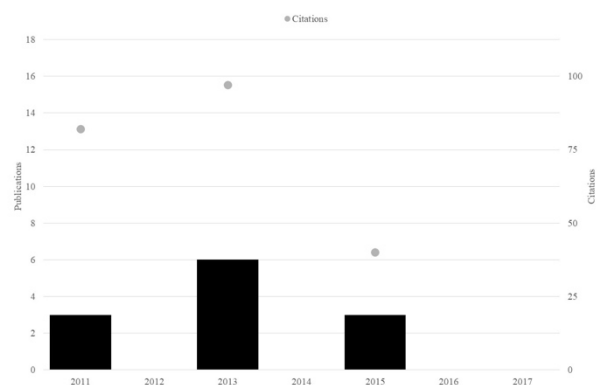

Figure 3 JISIB h-index publications (2011-2017). The distribution of the most cited publications and their citations according to the h-index and H-Classics. The bars represent the publications by year and are related to the left axis. The points represent the citations corresponding to each year (nominal) and are related to the right axis.

Table 3 H-Classics of JISIB (2011-2017). This table shows the citation classic papers identified by means of the H-classics concept. These publications are considered the main reference base within the journal. Percentage of citations is indicated out of N=479.

Rank	Title	#Citations (%)
1	Key Success Factors in Business Intelligence (Adamala and Cidrin, 2011)	56 (11.69)
2	Big Data, Tacit Knowledge and Organizational Competitiveness (Kabir and Carayannis, 2013)	29 (6.05)
3	Comparative Study of Competitive Intelligence Practices between Two Retail Banks in Brazil and South Africa (Du Toit, 2013)	18 (3.76)
4	Competitive intelligence research: an investigation of trends in the literature (Du Toit, 2015)	14 (2.92)
5	Intelligence as a discipline, not just a practice (Hoppe, 2015)	14 (2.92)
6	Competitive Intelligence and Knowledge Creation - Outward insights from an empirical survey (Oubrich, 2011)	14 (2.92)
7	Competitive intelligence in the South African pharmaceutical industry (Fatti, 2013)	13 (2.71)
8	Competitive Intelligence and Information Technology Adoption of SMEs in Turkey: Diagnosing Current Performance and Identifying Barriers (Wright et al., 2013)	13 (2.71)
9	A place for intelligence studies as a scientific discipline (Søilen, 2015)	12 (2.51)
10	The Relationship between Strategic Planning and Company Performance – A Chinese perspective (Jenster and Søilen, 2013)	12 (2.51)
11	A Risk and Benefits Behavioral Model to Assess Intentions to Adopt Big Data (Esteves and Curto, 2013)	12 (2.51)
12	Information Design for "Weak Signal" detection and processing in Economic Intelligence: A case study on Health resources (Sidhom and Lambert, 2011)	12 (2.51)

The main other journals related to intelligence in business are: *Marketing Intelligence & Planning, South African Journal of Information Management, European Journal of Marketing, Aslib Proceedings* and *Interdisciplinary Journal of Contemporary Research in Business*.

3.3 Citation Classics

To understand the productivity and impact of a group of publications a summary analysis of *h-index* and *H-Classics* is presented (De la Flor-Martinez et al., 2016).

The *JISIB* has an *h-index* value of 12. This means that relevant publications have more than twelve citations. The results of the publications retrieved for each period are shown in Figure 3.

According to Figure 3, the relevant publications are concentrated in 2013, 2011 and 2015. This coincides with the fact that 2013 and 2011 are also the most frequently cited years.

Table 4 Authors with the highest number of publications and their citations according to the H-Classics (2011-2017).

Name	Citations	% N=219	Documents	% N=12
Du Toit, A. S. A.	45	20.55	3	25.00
Søilen, K. S.	24	10.96	2	16.67
Adamala, S.	56	25.57	1	8.33
Alistair Duffy, C. B.	13	5.94	1	8.33
Carayannis, E.	29	13.24	1	8.33
Cidrin, L.	56	25.57	1	8.33
Curto, J.	12	5.48	1	8.33
Esteves, J.	12	5.48	1	8.33
Fatti, A.	13	5.94	1	8.33
Hoppe, M.	14	6.39	1	8.33
Jenster, P.	12	5.48	1	8.33
Kabir, N.	29	13.24	1	8.33
Lambert, P.	12	5.48	1	8.33
Oubrich, M.	14	6.39	1	8.33
Sidhom, S.	12	5.48	1	8.33
Wright, S.	13	5.94	1	8.33

Table 3 shows the "citation classic" papers identified by means of the *H-Classics* concept. The authors with the highest number of publications and their citations are shown in Table 4.To compliment the results described above, the evolution of *JISIB* is analyzed below, using *SciMAT*.

4. SCIENCE MAPPING ANALYSIS OF JISIB

Following the methodology described above, an overview of the science mapping and the relations between core themes in *JISIB* is provided. This section is organized in two sections: (i) analysis of the content of the publications and (ii) a thematic evolution map.

4.1 Analysis of the Content of the Articles Published

In connection with the previous sections, the research themes were set out in a strategic diagram, in order to analyze the main themes published in *JISIB* in the seven periods defined.

First period (2011): Four research themes can be identified (Figure 4). Three themes can be highlighted as key themes (*motor theme and basic and transversal themes*) of the knowledge field: competitive-intelligence, data-warehouse and competitive-technical-intelligence. The significant features of the *motor themes*
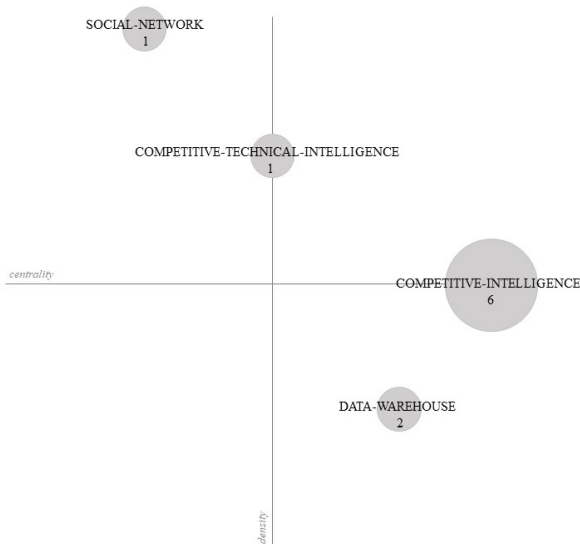

Figure 5 Strategic diagram for 2011. This figure sets out the research themes in four categories according to their relevance. These themes are related to intelligence within JISIB for a specific period of time. The four categories are: Themes included in Quadrant Q1 (Motor themes), Themes included in Quadrant Q2 (Highly developed and isolated themes), Themes included in Quadrant Q3 (Emerging or declining themes) and Themes included in Quadrant Q4 (Basic and transversal themes).

Figure 4 Strategic diagram for 2012. This figure sets out the research themes in four categories according to their relevance. These themes are related to Intelligence within JISIB for a specific period of time. The four categories are: Themes included in Quadrant Q1 (Motor themes), Themes included in Quadrant Q2 (Highly developed and isolated themes), Themes included in Quadrant Q3 (Emerging or declining themes) and Themes included in Quadrant Q4 (Basic and transversal themes).
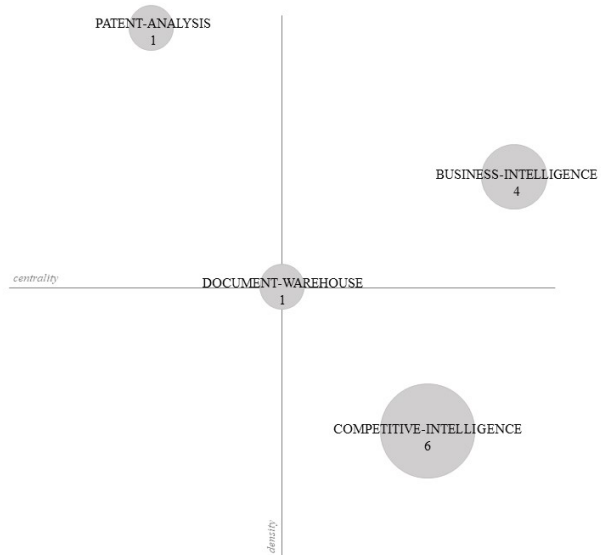
identified in this period and their main research areas are below:

- Competitive-intelligence: Competitive intelligence system, economic intelligence, text mining, weak signal, real-time business intelligence, semantic network and continuous evolution

- Competitive-technical-intelligence: Blue ocean strategy and knowledge transfer

Second period (2012): Continuing with the analysis, four themes are identified in Figure 5. Three themes can be highlighted as key themes of the knowledge field: business-intelligence, document-warehouse and competitive-intelligence. The first two themes identified as key themes are new in the analysis and the last one changed quadrant. The significant features of the *motor themes* identified in this period and their main research areas are below:

- Business-intelligence: Customer expectative, visualization, strategic early warning system, pet model, pricing strategies, security issues and
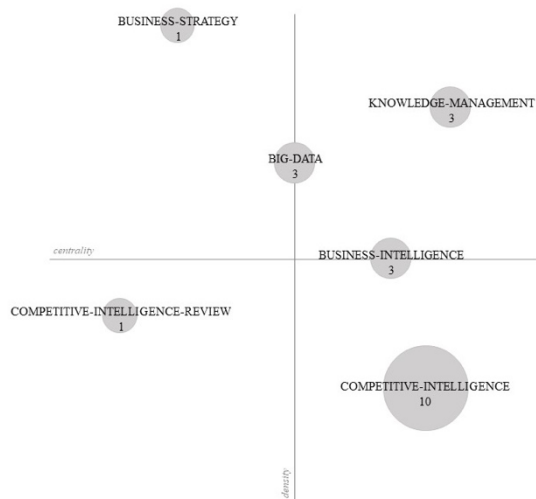
Figure 6 Strategic diagram for 2013. This figure sets out the research themes in four categories according to their relevance. These themes are related to Intelligence within JISIB for a specific period of time. The four categories are: Themes included in Quadrant Q1 (Motor themes), Themes included in Quadrant Q2 (Highly developed and isolated themes), Themes included in Quadrant Q3 (Emerging or declining themes) and Themes included *in Quadrant Q4 (Basic and transversal themes).*

> software (design, production and evaluation)

- Document-warehouse: Multiversion documents and multidimensional analysis

Third period (2013): According to the strategic diagram showed in Figure 6, six themes research themes were identified and four of these are considered key themes knowledge-management, big-data, business-intelligence and competitive-intelligence. In this period two new key themes appear and maintain business-intelligence and competitive-intelligence. The significant features of the *motor themes* identified in this period and their main research areas are below:

- Knowledge-management: Knowledge activism, knowledge creation, knowledge strategy, organizational change, strategy, tacit knowledge, analytical conversation and big data strategy

- Business-intelligence: Data management, business analytics software and cloud computing

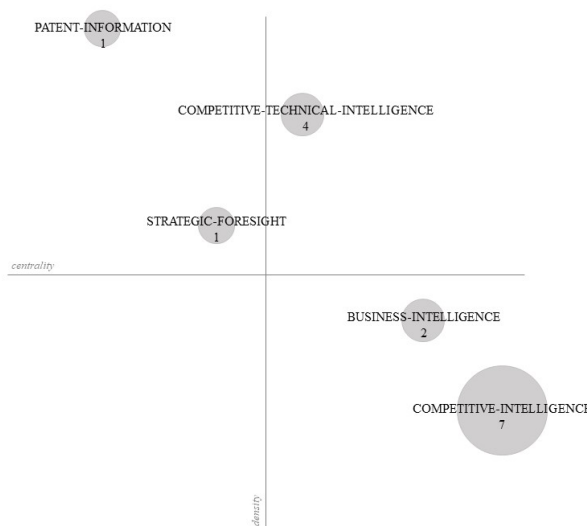- Big-data: Organizational knowledge, risk management and data benefits

Figure 7 Strategic diagram for 2014. This figure sets out the research themes in four categories according to their relevance. These themes are related to Intelligence within JISIB for a specific period of time. The four categories are: Themes included in Quadrant Q1 (Motor themes), Themes included in Quadrant Q2 (Highly developed and isolated themes), Themes included in Quadrant Q3 (Emerging or declining themes) and Themes included in Quadrant Q4 (Basic and transversal themes).

Fourth period (2014): According to the strategic diagram shown in Figure 7, five research themes can be identified for this period and the following themes could be considered key themes: competitive-technical-intelligence, business-intelligence and competitive-intelligence. In this period, one new main research theme was identified but the *motor themes* just include one theme. The significant features of the *motor themes* identified in this period and their main research areas are below:

- Competitive-technical-intelligence: Evaluating intelligence, intelligence impact, patent analysis, technical intelligence, citation analysis and CTI impact

Fifth period (2015): Seven themes were identified in this period (Figure 8). Four themes can be highlighted as key themes: social-network, business-intelligence, erp-system and competitive-intelligence. In this period two new key themes appear and others are maintained: business-intelligence and competitive-intelligence. The significant features of the *motor themes* identified in this period and their main research areas are below:
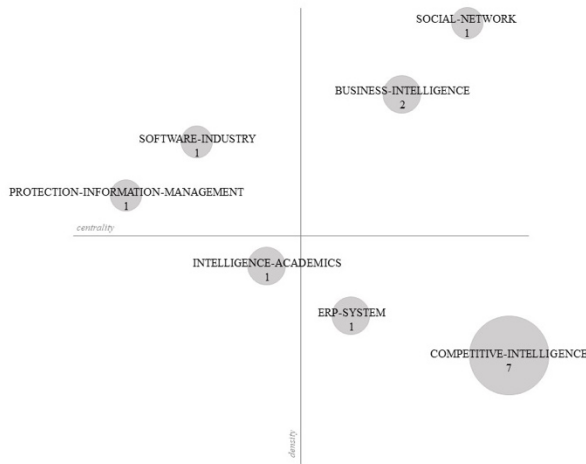
Figure 8 Strategic diagram for 2015. This figure sets out the research themes in four categories according to their relevance. These themes are related to Intelligence within JISIB for a specific period of time. The four categories are: Themes included in Quadrant Q1 (Motor themes), Themes included in Quadrant Q2 (Highly developed and isolated themes), Themes included in Quadrant Q3 (Emerging or declining themes) and Themes included in Quadrant Q4 (Basic and transversal themes).

- Social-network: Enterprise 2.0, information systems, networking organization, social computing, social learning, social medial, social organization, strategic management, competitive advantage and computer supported collaboration

- Business-intelligence: Enterprise resource planning, e-word of mouth, internet discussion, unstructured data and custom relation management
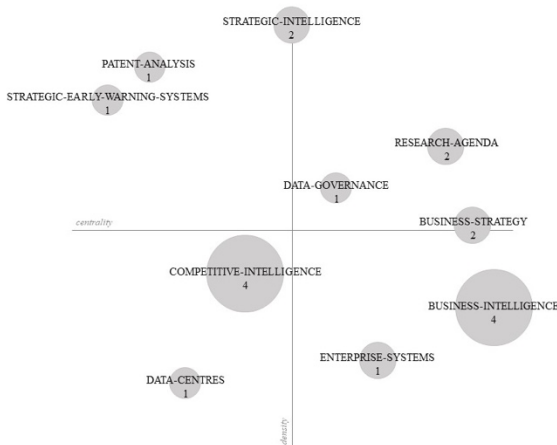

Figure 9 Strategic diagram for 2016. This figure sets out the research themes in four categories according to their relevance. These themes are related to Intelligence within JISIB for a specific period of time. The four categories are: Themes included in Quadrant Q1 (Motor themes), Themes included in Quadrant Q2 (Highly developed and isolated themes), Themes included in Quadrant Q3 (Emerging or declining themes) and Themes included in Quadrant Q4 (Basic and transversal themes).

Sixth period (2016): According to the strategic diagram shown in Figure 9, ten themes can be identified and six of them are considered key themes: strategic-intelligence, research-agenda, data-governance, business-strategy, business-intelligence and enterprise-systems. In this period five new key themes appear and one is maintained: business-intelligence. The significant features of the *motor themes* identified in this period and their main research areas are below:

- Strategic-intelligence: Disruptive intelligence, open innovation, perspective, technology management and technology brokers

- Research-agenda: HHRR management, intelligence studies, market intelligence, predictive analytics, talent management, competitive advantage and employee engagement

- Data-governance: Intelligence as a service, data management and ethics

- Strategy: Organizational performance, organizational level competencies and organization systems research

Seventh period (2017): According to the strategic diagram showed in Figure 10, ten themes are identified and six of them are considered key themes for the knowledge field: open-innovation, business-intelligence-projects, technology-intelligence, strategic-intelligence, decision-making and social-media. In this period five new key themes appear and one is maintained: strategic-intelligence. The significant features of the *motor themes* identified in this period and their main research areas are below:

- OPEN-INNOVATION: Organizational performance, knowledge, big data, big data analytics, emerging technology and competitive intelligence

- TECHNOLOGY-INTELLIGENCE: Technology monitoring, patent bibliometrics, patent indicators, patent information, patent statics and strategy

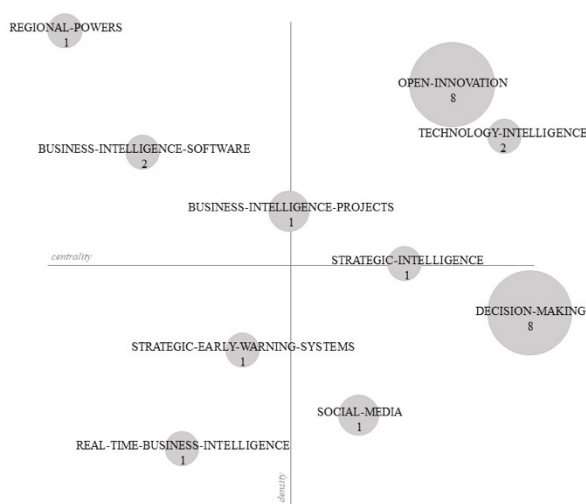- Bi-projects: Key success factors, BI success and data saturation

Figure 10 Strategic diagram for 2017. This figure sets out the research themes in four categories according to their relevance. These themes are related to Intelligence within JISIB for a specific period of time. The four categories are: Themes included in Quadrant Q1 (Motor themes), Themes included in Quadrant Q2 (Highly developed and isolated themes), Themes included in Quadrant Q3 (Emerging or declining themes) and Themes included in Quadrant Q4 (Basic and transversal themes).

- Strategic intelligence: Knowledge discovery, balanced scorecard, corporate performance management and corporate strategic management

It is important to highlight that business-intelligence, competitive-intelligence and strategic-intelligence are considered key themes in most of the periods, and the rest of themes are closely linked to patents, technology, innovation, information management and social networks.

4.2 Conceptual Evolution Map

In light of these pictures, Figure 11 shows the pattern of development within the knowledge area throughout the periods analyzed and the relationships among research themes. The characteristics of the line define the quality of the relation.

In the *JISIB* thematic evolution map three kinds of main thematic areas can be identified: strategic intelligence, competitive intelligence and business intelligence. These thematic areas consolidate the main themes and research areas covered in *JISIB*.

In relation to the evolution of the *JISIB*, competitive intelligence (green area) is the most strongly representative research thematic area in the period evaluated. This thematic area has 52 documents and 319 citations. The intellectual structure is composed mainly by motor themes and basic

and transversal themes in all periods evaluated (Q1: 6 themes; Q2: 4 themes; Q3: 3 themes; Q4: 6 themes).

Business intelligence (red area) is the second thematic area within the thematic evolution map. This thematic area has 24 documents and 127 citations. The intellectual structure is composed mainly of motor themes in all periods evaluated (Q1: 6 themes; Q2: 1 themes; Q3: 2 themes; Q4: 4 themes).

Strategic management (blue area) is the last representative thematic area within the thematic evolution map in terms of production. This thematic area has 16 documents and 39 citations. The intellectual structure is composed mainly of motor themes and highly developed and isolated themes (Q1: 6 themes; Q2: 6 themes; Q3: 1 themes; Q4: 1 themes).

Finally, business intelligence, competitive intelligence and strategic intelligence could be considered the most representative intelligence terms developed in *JISIB*. It is important to highlight that other intelligence terms are also identified in the thematic areas and these support the growth of this research field and complement each other's development.

5. CONCLUSIONS

This research presents the first bibliometric analysis of the *Journal of Intelligence Studies in Business (JISIB)*. It covers 92 original research articles and it identifies the main themes and related research areas developed from 2011 to 2017.

In bibliometric performance terms, the amount of literature covered by *JISIB* shows a noticeable increase in the last years. This increase coincides with the growth of the research field in other knowledge areas, such as computer and information, business management, marketing and education. Considering phenomena external to *JISIB* but related to the concept of intelligence such as big data, smart industry and regional intelligence, it is expected that their use will be synergistic for the growth of this field of knowledge.

Another significant aspect of bibliometric analysis is the fact that the main authors in terms of production and citations are also referent in other knowledge fields. It reconfirms the growing interest around intelligence and its multiple approaches.

Based on the results of the bibliometric analysis, the main themes used in the *JISIB* literature are the following: business intelligence, big data, competitive intelligence, information management, social network
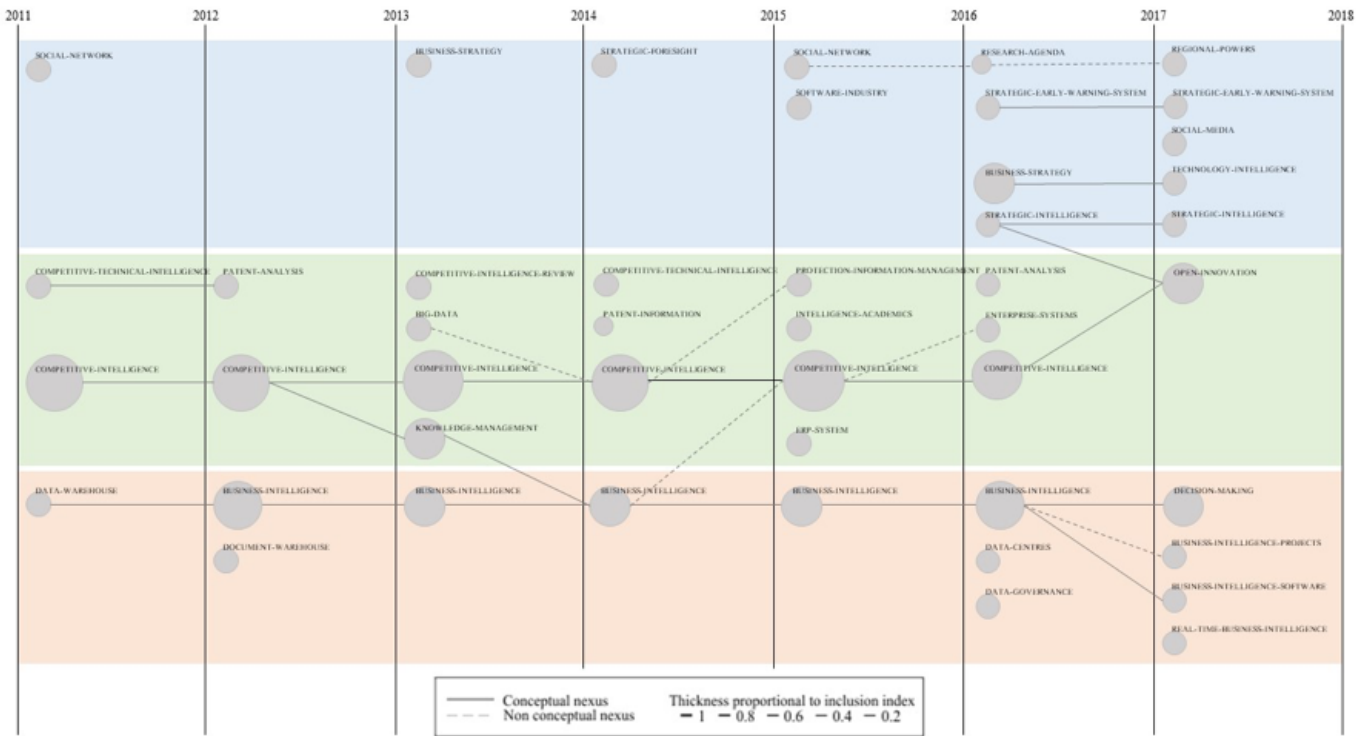
Figure 11 JISIB conceptual evolution map (2011-2017). This figure shows the pattern of development within the knowledge areas throughout the periods analyzed and the relationship between each research theme. Furthermore, the characteristics of the line define the quality of the relation. In JISIB, conceptual evolution can identify three kinds of main thematic areas: business intelligence, competitive intelligence and strategic intelligence. These thematic areas form the main themes and research areas covered in JISIB.

analysis, innovation, technology intelligence, strategic intelligence and intelligence maturity models.

Furthermore, the *JISIB* evolution map reveals that it has two different main approaches. The first is about competitive intelligence (competitive intelligence system, knowledge management, competitive advantage, innovation, knowledge strategy, organizational change, decision making and strategic planning) and the second is close to business intelligence (reporting and visualization technologies, software evolution, security issues, data warehouse, data management, analytics, cloud computing, OLAP, processing, architectures, algorithms and WEB 2.0).

Finally, it is important to highlight that this analysis allows for the identification of common themes that can be used to reach the research lines related to *JISIB*'s aim and objectives. In this way, the following themes could attract the interest of the academic, scientific and business communities: social media and networks, internet, artificial intelligence, machine learning, open innovation and collaborative intelligence. In addition, these research lines should be focused on all kind of organization, particularly small

and medium-sized enterprises, which by volume and capabilities can serve as a driving force for the consolidation of this area of knowledge.

Finally, it is important to highlight that the main research themes are aligned with *JISIB*'s objectives and its community but these could not be confirmed as trends in the intelligence field study. A further research opportunity could be to compare the main research themes in the intelligence journals and intelligence literature. Moreover, it could include a detailed analysis of the authors and research groups and their research themes.

6. ACKNOWLEDGMENTS

7. REFERENCES

Batagelj, V., and Cerinšek, M. (2013). On bibliographic networks. Scientometrics, 96(3), 845-864.

Bjork, B.-C., Roos, A., and Lauri, M. (2009). Scientific journal publishing: yearly volume and open access availability. Information Research: An International Electronic Journal, 14(1).

Börner, K., Chen, C., and Boyack, K. W. (2003). Visualizing knowledge domains. Annual Review of Information Science and Technology, 37(1), 179-255.

Calof, J., and Dishman, P. (2007). Competitive intelligence and the global SME. Cheltenham: Edward Elgar Publishing Ltd.

Castellanos, O. F., and Torres, L. M. (2010). Technology Intelligence: Methods and Capabilities for Generation of Knowledge and Decision Making. New York: IEEE.

Cobo, M. J., Lopez-Herrera, A. G., Herrera-Viedma, E., and Herrera, F. (2011a). An approach for detecting, quantifying, and visualizing the evolution of a research field: A practical application to the Fuzzy Sets Theory field. Journal of Informetrics, 5(1), 146-166.

Cobo, M. J., Lopez-Herrera, A. G., Herrera-Viedma, E., and Herrera, F. (2011b). Science Mapping Software Tools: Review, Analysis, and Cooperative Study Among Tools. Journal of the American Society for Information Science and Technology, 62(7), 1382-1402.

Cobo, M. J., Lopez-Herrera, A. G., Herrera-Viedma, E., and Herrera, F. (2012). SciMAT: A new science mapping analysis software tool. Journal of the American Society for Information Science and Technology, 63(8), 1609-1630.

Chang, H., Gausemeier, J., Ihmels, S., Wenzelmann, C., and Iaeng. (2007). Technology intelligence with bibliometrics Imecs 2007: International Multiconference of Engineers and Computer Scientists, Vols I and Ii (pp. 796-+). Hong Kong: Int Assoc Engineers-Iaeng.

Davenport, E., and Cronin, B. (1994). Competitive intelligence and social advantage. Library Trends, 43(2), 239-252.

de' Rossi, S. (2005). Marketing intelligence system to forecast telecommunications competitive landscape. In A. Zanasi (Ed.), Text Mining and Its Applications to Intelligence, Crm and Knowledge Management (Vol. 2, pp. 219-225). Southampton: Wit Press/Computational Mechanics Publications.

De Coster, R., Phillips, S., Szopa, A., Karwowski, W., and DePablos, P. O. (2013). Technology Intelligence Systems in Industry and Academic Networks. Hersey: IGI Global.

De la Flor-Martinez, M., Galindo-Moreno, P., Sanchez-Fernandez, E., Piattelli, A., Cobo, M. J., and Herrera-Viedma, E. (2016). H-classic: a new method to identify classic articles in Implant Dentistry, Periodontics, and Oral Surgery. Clinical Oral Implants Research, 27(10), 1317-1330.

Devouard, F. (2011). Collective Intelligence and Business Enterprise 2.0. Lausanne: Epfl Press.

Dewatripont, M., Ginsburgh, V., Legros, P., Walckiers, A., Devroey, J.-P., Dujardin, M., Ivaldi, M. (2006). Study on the economic and technical evolution of the scientific publication markets in Europe.

Du Toit, A. S. A. (2003). Competitive intelligence in the knowledge economy: What is in it for South African manufacturing enterprises? International Journal of Information Management, 23(2), 111-120.

Du Toit, A. S. A., and Sewdass, N. (2014). Competitive intelligence (CI) in Morocco. African Journal of Library Archives and Information Science, 24(1), 3-13.

Du Toit, A. S. A. (2015). Competitive intelligence research: An investigation of trends in the literature. Journal of Intelligence Studies in Business, 5(2), 14-21.

Gilad, B., and Gilad, T. (1985). A Systems-Approach to Business Intelligence. Business Horizons, 28(5), 65-70.

Gutiérrez-Salcedo, M., Martínez, M. A., Moral-Munoz, J. A., Herrera-Viedma, E., and Cobo, M. J. (2017). Some bibliometric procedures for analyzing and evaluating research fields. Applied Intelligence, 1-13.

Hirsch, J. E. (2005). An index to quantify an individual's scientific research output. Proceedings of the National Academy of Sciences of the United States of America, 102(46), 16569.

James, D. (2014). 3D ICs in the Real World 2014 25th Annual Semi Advanced Semiconductor Manufacturing Conference (pp. 113-119). New York: IEEE.

Kelley, W. T. (1965). Marketing Intelligence for Top Management. Journal of Marketing, 29(4), 19-24.

Larivet, S. (2009). Economic Intelligence in Small and Medium Businesses in France: a survey. Vasteras-Eskilstina: Malardalen Univ Sweden.

Luhn, H. P. (1958). A Business Intelligence System. IBM Journal of Research and Development, 2(4), 314-319.

Maltz, E., and Kohli, A. K. (1996). Market intelligence dissemination across functional boundaries. Journal of Marketing Research, 33(1), 47-61.

Martínez, M. A., Herrera, M., López-Gijón, J., and Herrera-Viedma, E. (2014). H-Classics: Characterizing the concept of citation classics through H-index. Scientometrics, 98(3), 1971-1983.

McCormick, K., Creeth, R., Mutchler, S., Azevedo, A., and Santos, M. F. (2015). 3rd Order Analytics Demand Planning: A Collaboration of BI and Predictive Analytics Tools. Hersey: IGI Global.

Menychtas, A., Vogel, J., Giessmann, A., Gatzioura, A., Gomez, S. G., Moulos, V., Varvarigou, T. (2014). 4CaaSt marketplace: An advanced business environment for trading cloud services. Future Generation Computer Systems-the International Journal of Grid Computing and Escience, 41, 104-120.

Moral-Munoz, J. A., Cobo, M. J., Chiclana, F., Collop, A., and Herrera-Viedma, E. (2016). Analyzing Highly Cited Papers in Intelligent Transportation Systems. Ieee Transactions on Intelligent Transportation Systems, 17(4), 993-1001.

Mortara, L., Kerr, C. I. V., Phaal, R., and Probert, D. R. (2009). Technology Intelligence practice in UK technology-based companies. International Journal of Technology Management, 48(1), 115-135.

Navarro-Garcia, A., Peris-Oritz, M., and Barrera-Barrera, R. (2016). Market intelligence effect on perceived psychic distance, strategic behaviours and export performance in industrial SMEs. Journal of Business & Industrial Marketing, 31(3), 365-380.

Perrine, S. (2004). Economic intelligence: How to process useful information? Orlando: Int Inst Informatics & Systemics.

Prescott, J. E., and Gibbons, P. T. (1993). Global competitive intelligence: an overview. Global Perspectives on Competitive Intelligence. Alexandria, VA: Society of Competitive Intelligence Professionals, 66.

Prescott, J. E., and Bharadwaj, G. (1995). Competitive intelligence practices: A survey. Competitive Intelligence Review, 6 (2), pp. 4-14.

Seiglie, C., Coissard, S., and Echinard, Y. (2008). Economic Intelligence and National Security. In J. Fontanel and M. Chatterji (Eds.), War, Peace and Security (Vol. 6, pp. 235-248). Bingley: Emerald Group Publishing Limited.

Sheremetov, L., and Rocha-Mier, L. (2004). Collective intelligence as a framework for supply chain management. New York: IEEE.

Shimbel, A. (1975). Collective Intelligence. General Systems, 20, 205-208.

Smith, A. H. (1953). Economic Intelligence Work in a Bank. Journal of Documentation, 9(1), 42-47.

Søilen, K. S. (2013). An overview of articles on Competitive Intelligence in JCIM and CIR. Journal of Intelligence Studies in Business, 3(1).

Søilen, K.S. (2015) A place for intelligence studies as a scientific discipline. Journal of Intelligence Studies in Business. Vol 5, No 3. Pages 35-46.

Søilen, K.S. (2016) A research agenda for intelligence studies in business. Journal of Intelligence Studies in Business. Vol 6, No 1. Pages 21-36.

Søilen, K. S. (2017). Business intelligence, big data and theory. Journal of Intelligence Studies in Business, 7(1), 4-4.

Tuta, M., Zara, I. A., Orzan, G., Purcarea, V. L., and Orzan, O. A. (2014). Competitive Intelligence - An Enhancement to Business Intelligence. Economic Computation and Economic Cybernetics Studies and Research, 48(2), 151-161.

Wang, J. (2013). Citation time window choice for research impact evaluation. Scientometrics, 94(3), 851-872.

Zhou, F., and Lai, K. K. (2009). Marketing Intelligence on Customer Experiential Values: An Structural Equation Model Approach. Los Alamitos: IEEE Computer Soc.