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Bibliometrics and Scientometrics of the Business Agility

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Abstract

Bibliometric analysis is an important tool in scientific research designed to explore and analyse a range of scientific data. The purpose of this paper is to highlight the growing importance and relevance of business agility issues in the scientific community. The aim is to provide a brief insight into business agility through bibliometric analysis of articles included in the WOS and Scopus databases. As a result, a comparison of these databases is presented along with a description of the resulting clusters using the software tools VOSviewer and SciMAT. The area of interest in the databases is Business, Economics, Management and Finance in the publication years 1994-2023. The results show that although the databases overlap to some extent, there are some slight differences in terms of bibliometrics or scientometrics. Although the Scopus database had a higher number of publications, the number of keyword occurrences is higher in the database WOS. There are also slight differences in the most numerous keywords. In terms of clusters, the number is the same, but slight differences are also observed. Based on the analysis of the occurrence of keywords, it is possible to note an increased interest in the issue of agility, which is linked to a number of other areas of management. The Scopus database is recommended to study business agility.

Keywords: *Bibliometric Analysis; Scientometrics; Business Agility; Keywords; Clusters.*

1. Introduction

Bibliometric analysis is an important tool in scientific research designed to explore and analyze large amounts of scientific data, including developments and trends in certain fields (Donthu et al., 2021). At the same time, it is used in various contexts ranging from information science, medicine and business and management. From the current perspective, the two main subjects of bibliometric interest are Information Science & Library Science and Computer Science (Lyu et al., 2023). According to Godin (2006, p. 109), "Among the many statistics on science, called scientometrics, bibliometrics holds a privileged place." Descriptive bibliometrics mainly focuses on tracking the number of articles (for possible comparisons); evaluative bibliometrics looks at how articles have influenced the subsequent research of others (McBurney & Novak, 2002). Science mapping is an analytical technique that is effective at mapping the strength of associations between information items, while it allows to highlight potentially significant patterns or trends of scientific change that can guide the exploration and interpretation of visualised structures (Chen, 2017). Bibliometric analysis can make use of a rather broad methodological apparatus, which has been clearly elaborated by Donthu et al. (2021). The primary techniques of bibliographic analysis include performance analysis and scholarly mapping, which include common word analysis, co-authorship analysis, citation analysis, co-citation analysis, or bibliographic linkage. Software tools for performing bibliometric analysis of scientific mapping include BibExcel, Biblioshiny, BiblioMaps, CiteSpace, CitNetExplorer, SciMAT, Sci^2 Tool, and VOSviewer (Moral-Muñoz et al., 2020).

The term scientometrics is often used in connection with bibliometric analysis. Scientometrics is commonly referred to synonymously in the literature as bibliometrics, infometrics or scientific mapping. According to Yang & Yuan (2017), bibliometric, scientometric and infometric "differ in the degrees of utilization and recognition but are similar in the general direction". Examples of publication metrics used to assess scholarly productivity, impact and relevance are Impact factor, h-index, Journal impact quartile, Article Influence Score, CiteScore. Publication metrics are not only important for the careers of individuals, but also influence the progress of science as a whole through their role in the award process (Myers & Kahn, 2021).

Bibliometric and scientometric are also applicable in the fields of Management, Business and Economics. There are concepts that are gaining importance in the field at different times. This also applies to the concept of business agility. In terms of the essence of the concept, business agility is understood as an organization's capacity to adapt quickly to changing market dynamics, customer demands, and industry standards profitably and cost-effectively without compromising on quality (Yusuf et al., 2023). Business agility is more than just flexibility or adaptability. According to Van Oosterhout et al. (2006) it is the ability to quickly and easily change businesses and business processes beyond the normal level of flexibility to effectively

manage unpredictable external and internal changes. The Business Agility Institute (2023), based on a survey of businesses, listed the most significant organisational benefits of business agility, namely business outcomes and value, customer satisfaction, adaptability to change, employee satisfaction, process improvements and others.

2. Methodology

Bibliometrics and scientometrics have a wide range of potential applications in various fields. The aim of this article is to provide a brief insight into business agility through bibliometric analysis of articles included in the WOS and Scopus databases. As a result, a comparison of these databases is presented along with a brief description of the resulting clusters using the software tools VOSviewer and SciMAT. The area of interest in the WOS database was Business & Economics; Management; Finance (WOS categories), Business agility (topic, keyword), years 1994-2023 (publication years). A similar procedure was followed for the Scopus database: Business agility (article title, abstract, keywords), Business, Management and Accounting; Economics, Econometrics and Finance (subject area) and years 1993-2023 (publication years).

After obtaining the datasets, a results analysis (types of documents, publication years, countries/regions) and performance analysis (number of documents, number of citations) was performed. Science mapping was performed using VOSviewer. The map was created using co-occurrence analysis of keywords and the full count method. A minimum number of keyword occurrences at level of 10 was chosen. According to Van Eck & Waltman (2022), the attributes Links and Total link strength indicate the number of links of an article with other articles and the total strength of the links of an article with other articles. The result is a cluster map that can be analyzed from multiple perspectives (in our case only network visualization is used). The minimum cluster size was chosen to be 10 items. Subsequently, the SciMAT program was used, which represents an open-source software tool, to perform longitudinal scientific mapping developed by Cobo et al. (2012). Through this program, it was used only a partial analysis, of keywords occurrence. The conclusion briefly discusses publication metrics and a comparison of relevant databases.

3. Results

3.1 Brief view of business agility from publications of WOS database

After document selection (Methodology section), the sample consisted of 1,283 publications from the Web of Science Core Collection. In terms of WOS categories, the most represented areas are Management (823; 64.15%) and Business (314; 24.47%). The total number of publications includes 867 articles (67.58%) and 372 proceedings papers (29%). Slight fluctuations are shown over the years. Basically, there is an increase in publications in four

waves (2002-2005), (2006-2009), (2012-2015) and (2018-2023), with the highest number of publications in 2023 (139). The largest number of publications are from USA (267; 20.81%), People R China (155;12.08%) and England (147; 11.46%).

Based on keywords occurrence analysis, 4,082 keywords were recorded, of which 175 meet the threshold (minimum number of occurrences is 10). The network visualization of these keywords is shown in Figure 1.

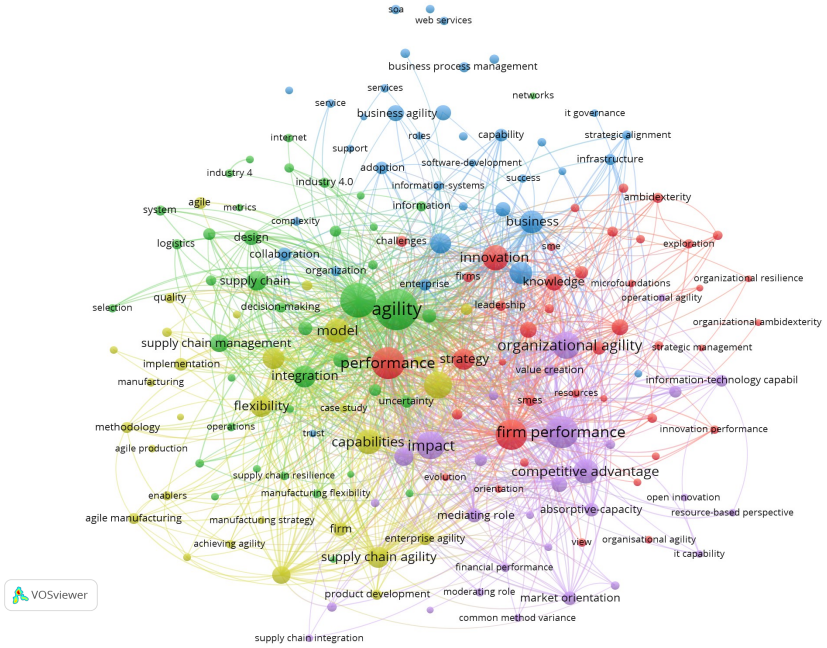


Figure 1. Network visualization of keywords in topic of business agility (WOS). Source: own processing.

From the figure, the keyword with the highest frequency is clearly the word agility (319 occurrences; 173 links, 1,971 total link strenght). The 175 items are divided into 5 clusters. Cluster 1 (red colour; 41 items) is composed of keywords mostly strategically oriented. It includes concepts such as dynamic capabilities, performance, strategy, strategic agility, innovation. Cluster 2 (green colour; 40 items) focuses mainly on agility in the general sense in connection with industry (also industry 4.0) and supply chain management. Cluster 3 (blue colour; 36 items) focuses on business agility, processes, infrastructure and technology. Cluster 4 (yellow colour; 29 items) includes concepts oriented towards agile manufacturing and production. In this context, business performance and IT are also linked. Cluster 5 (purple colour; 29 items) mainly focuses on organisational agility, operational agility in the context of firm performance and resource based view. This shows that there are slight differences between the clusters, while it is just interesting to look at the existing word linkages between the clusters.

Business agility in particular has links with the keywords performance, organizational agility, IT, and capabilities.

3.2 Brief view of business agility from Scopus database

The sample of publications from the Scopus database consisted of 1,586 publications. The most represented subject area (similar to WOS categories) is Business, Management, Accounting (1,532). The total number of publications includes 951 articles (59.96%) and 271 conference papers (17.09%). More frequent fluctuations are shown over the years studied than in the case of the WOS database, but with the exception of the fluctuations mentioned above, there is still a gradual increase in publications. There is also a slight change from the WOS database in the countries from where the increase in publications comes from, namely USA (297; 18.73%), United Kingdom (164; 10.34%) and India (143; 9.02%). China is reported in only 80 cases (5.04%). From the perspective of keywords occurrence analysis, of 5,860 keywords, 135 meet the threshold. As in the case of the WOS database, 5 clusters emerged (Figure 2).

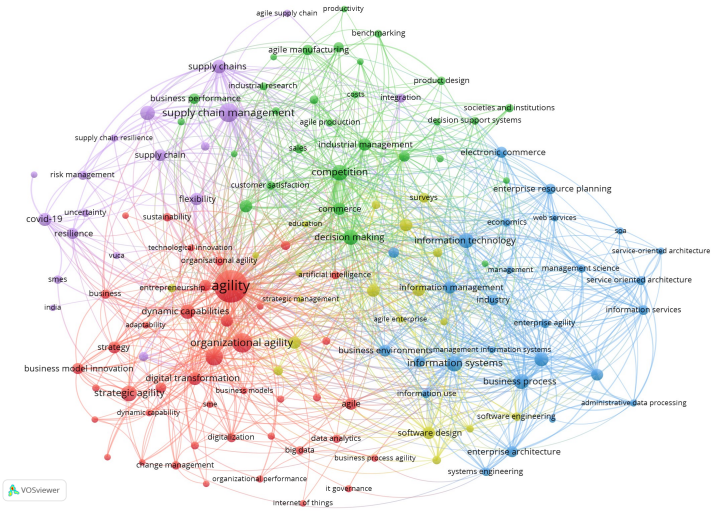


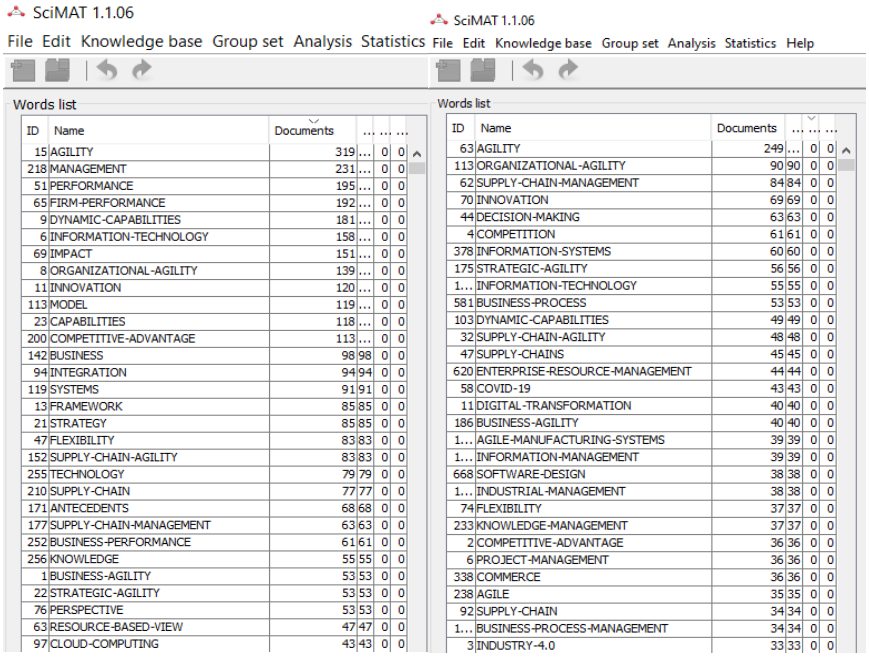
Figure 2. Network visualization of keywords in topic of business agility (Scopus). Source: own processing.

The keyword with the highest frequency is the word agility (249 occurrences; 125 links, 575 total link strenght). Cluster 1 (red colour; 42 items) is composed of keywords mostly of a broader and more general nature. It includes terms such as agility, organisational agility, strategic agility, performance, business model, or dynamic capabilities. Cluster 2 (green colour; 29 items) focuses mainly on manufacturing and industry (industrial management, agile manufacturing, etc.). Cluster 3 (blue colour; 27 items) focuses on the systems aspect, in the form of infrastructure systems, IT, systems engineering, etc. Cluster 4 (yellow colour; 19 items) is close to the previous cluster and includes agile enterprise concepts related to software. These are in

particular software design, software engineering and process management. The cluster also includes business agility with 39 occurrences, and has more links than the previous one. Cluster 5 (purple colour; 18 items) focuses on supply chain management (other keywords are e.g. flexibility, resilience, covid-19).

3.3 Comparison of WOS and Scopus database results

To complete the keyword occurrence analysis, Figure 3 shows a comparative overview of the 30 keywords with the highest number of occurrences from both databases. The given overview is generated by SciMAT, and the keywords were kept original, i.e., we did not group them.


SciMAT 1.1.06

File Edit Knowledge base Group set Analysis Statistics

Words list

ID	Name	Documents	...	...	...
15	AGILITY	319	...	0	0
218	MANAGEMENT	231	...	0	0
51	PERFORMANCE	195	...	0	0
65	FIRM-PERFORMANCE	192	...	0	0
9	DYNAMIC-CAPABILITIES	181	...	0	0
6	INFORMATION-TECHNOLOGY	158	...	0	0
69	IMPACT	151	...	0	0
8	ORGANIZATIONAL-AGILITY	139	...	0	0
11	INNOVATION	120	...	0	0
113	MODEL	119	...	0	0
23	CAPABILITIES	118	...	0	0
200	COMPETITIVE-ADVANTAGE	113	...	0	0
142	BUSINESS	98	98	0	0
94	INTEGRATION	94	94	0	0
119	SYSTEMS	91	91	0	0
13	FRAMEWORK	85	85	0	0
21	STRATEGY	85	85	0	0
47	FLEXIBILITY	83	83	0	0
152	SUPPLY-CHAIN-AGILITY	83	83	0	0
255	TECHNOLOGY	79	79	0	0
210	SUPPLY-CHAIN	77	77	0	0
171	ANTECEDENTS	68	68	0	0
177	SUPPLY-CHAIN-MANAGEMENT	63	63	0	0
252	BUSINESS-PERFORMANCE	61	61	0	0
256	KNOWLEDGE	55	55	0	0
1	BUSINESS-AGILITY	53	53	0	0
22	STRATEGIC-AGILITY	53	53	0	0
76	PERSPECTIVE	53	53	0	0
63	RESOURCE-BASED-VIEW	47	47	0	0
97	CLOUD-COMPUTING	43	43	0	0

SciMAT 1.1.06

File Edit Knowledge base Group set Analysis Statistics Help

Words list

ID	Name	Documents	...	...	...
63	AGILITY	249	...	0	0
113	ORGANIZATIONAL-AGILITY	90	90	0	0
62	SUPPLY-CHAIN-MANAGEMENT	84	84	0	0
70	INNOVATION	69	69	0	0
44	DECISION-MAKING	63	63	0	0
4	COMPETITION	61	61	0	0
378	INFORMATION-SYSTEMS	60	60	0	0
175	STRATEGIC-AGILITY	56	56	0	0
1...	INFORMATION-TECHNOLOGY	55	55	0	0
581	BUSINESS-PROCESS	53	53	0	0
103	DYNAMIC-CAPABILITIES	49	49	0	0
32	SUPPLY-CHAIN-AGILITY	48	48	0	0
47	SUPPLY-CHAINS	45	45	0	0
620	ENTERPRISE-RESOURCE-MANAGEMENT	44	44	0	0
58	COVID-19	43	43	0	0
11	DIGITAL-TRANSFORMATION	40	40	0	0
186	BUSINESS-AGILITY	40	40	0	0
1...	AGILE-MANUFACTURING-SYSTEMS	39	39	0	0
1...	INFORMATION-MANAGEMENT	39	39	0	0
668	SOFTWARE-DESIGN	38	38	0	0
1...	INDUSTRIAL-MANAGEMENT	38	38	0	0
74	FLEXIBILITY	37	37	0	0
233	KNOWLEDGE-MANAGEMENT	37	37	0	0
2	COMPETITIVE-ADVANTAGE	36	36	0	0
6	PROJECT-MANAGEMENT	36	36	0	0
338	COMMERCE	36	36	0	0
238	AGILE	35	35	0	0
92	SUPPLY-CHAIN	34	34	0	0
1...	BUSINESS-PROCESS-MANAGEMENT	34	34	0	0
3	INDUSTRY-4.0	33	33	0	0

Figure 3. Top 30 keywords of business agility from WOS database (left) and Scopus database (right). Source: own processing

The keyword comparison shows that despite the fact that fewer publications remained from the WOS database after filtering (1,283) compared to the Scopus database (1,586) - the same applies to the number of keywords (4,082 keywords in the case of WOS, 5,860 keywords in the case of Scopus) - the number of occurrences is higher in the case of WOS . The number of occurrences for the word agility is 319. The nature of the first keywords in this case is rather more general - management, performance, dynamic capabilities, information technology. It is only on the lower rungs that terms such as organizational agility or strategic agility appear. In the case of keywords from the Scopus database, the situation is different. The word agility appears in 249 documents and the second most frequently mentioned word has only 90 occurrences. Another difference is

that the keywords are already rather more specific (organizational agility, supply chain agility, etc.), while keywords such as (financial) performance occur 30 times, management (science) has only 18 occurrences (not shown in the figure). A comparison of the obtained dataset results according to the selected characteristics is presented in Table 1.

Table 1. Comparison of datasets in bibliometric analysis. Source: own processing

Characteristics	WOS database	Scopus database
Number of publications	1,283	1,586
Sum of times cited	37,633	40,146
Average citations per item	29.33	25.31
H-index	93	93
Fluctuations in the number of publications/years	slightly	more often
Countries with the highest number of publications	USA, China, UK	USA, UK, India
Number of total keywords	4,082	5,860
Number of analysed keywords	175	135
The highest number of keyword occurrences	319	249
Characteristic of the most numerous clusters	strategy/agility in general/industry	agility in general/industry

In terms of publication metrics, the most cited article in the WOS database is a 2003 article (1,614 citations) in MIS Quarterly (7.3 journal Impact Factor (2022); Q1). This also agrees with the Scopus database (the number of citations is 2,346). Of the WOS database examined, most articles are published in the International Journal of Production Economics (35) with journal metrics 19.3 CiteScore, 12 Impact Factor; International Journal of Production Research (31) with journal metrics 9.2 (2022) Impact Factor; Q1) and Benchmarking - An International Journal (23) (5.6 Impact Factor (2024); CiteScore 9.7 (2022)). In the Scopus database, most publications are in Lecture Notes In Business Information Processing (book series of Springer Nature; 101), International Journal of Production Research (23) and International Journal of Production Economics (18).

4. Conclusion

Bibliometric analysis is a useful tool in processing and detecting trends and patterns. The aim of this paper was to provide a brief insight into business agility through bibliometric analysis of articles included in WOS and Scopus as the most commonly used databases by scholars. As a result, a comparison of these databases shows that, although the databases overlap to some extent, there are some slight differences, either in terms of bibliometrics or scientometrics. Based on the keyword analysis, it is possible to note an increased interest in the issue of agility, which is linked to a number of other areas of management. To study business agility, we recommend the Scopus database.

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