

## One Decade Research in the Field of Business Ecosystem: A Bibliometric Analysis

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### ABSTRACT

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*business ecosystem, bibliometric analysis, google scholar, publish or perish, VOSviewer*

The business ecosystem is a new paradigm, highly popular among researchers and practitioners. Systematic literature reviews based on bibliometric analysis of business ecosystem studies are still difficult to find. This paper aims to conduct bibliometric and visualization analyses with VOSviewer in business ecosystems. The evaluation involved 44 scientific articles on business ecosystem studies indexed by Scopus quartile Q1 – Q4 from the Google Scholar database in the last decade, namely 2010-2020. Bibliometric analysis has found the most productive publishers, the development of scientific articles, and the number of citations. While visualization with VOSviewer has found the most common terms in titles and abstracts, author collaboration, and makes it easier for researchers to find new and rarely researched topics in the business ecosystem.

## 1. INTRODUCTION

The concept of a business ecosystem was first introduced by James F. Moore in 1993 in an article published by the *Harvard Business Review* for the May-June period with the title “*Predators And Prey: A New Ecology Of Competition.*” The business ecosystem is defined as a *perspective* to understand how the economic community works. The economic community is referred to as a business ecosystem to replace the term industry [1]. As a new perspective in research, the business ecosystem has several advantages over other perspectives, including a new paradigm in innovation [2, 3] and a new concept in the field of business collaboration [4, 5].

Bibliometrics is a quantitative analysis of documents to analyze scientific publications, get an overview of the research field, obtain collaborations or co-authorship with other researchers [6], and evaluate research [7]. The bibliometric analysis provides information on measuring the productivity and quality of articles in the form of citations and is also available to support decision-making in research management. The most common types of information and studies carried out in bibliometric analysis include the number of scientific articles [8], number of citations [7], researchers or authors [9], keyword co-occurrence relations, co-authorship networks [10, 11], and journal titles [12]. In addition, this information usually does not provide exact measurements but is only an estimate. Therefore, decision-making cannot only rely on bibliometric information as the only basis [6] and still requires expert judgment from researchers.

As a new and essential stream in strategic management [13, 14], the business ecosystem has high popularity among researchers and practitioners [15, 16]. Several scientific articles have conducted a systematic literature review on the development of the business ecosystem concept [17-20].

Makinen and Dedeheyir [17] explain the role of actors, evolution, change dynamics, and companies' participation in the business ecosystem. Bonamigo et al. [18] support that applying the concept of a business ecosystem can reduce potential risks in the dairy sector. At the same time, Järvi and Kortelainen [19] underlined the unit of analysis, theoretical perspectives, and methodological approaches in empirical research on business ecosystems, and Faber et al. [20] presented types of business ecosystems.

However, systematic literature reviews based on bibliometric analysis and visualization with VOSviewer in business ecosystems are rarely carried out. Bibliometric analysis needs to be done to measure output and observe developments of science and technology through the production of scientific literature in specific studies [8]. While visualization with VOSviewer is crucial because it makes it easier for researchers to build a state-of-the-art and find new research topics that are still rarely studied [21]. The application of network analysis and visualization helps make it easier to understand the interconnections and interdependencies in the business ecosystem [19].

This paper aims to perform bibliometric analysis, visualization with VOSviewer, and systematic literature reviews on 44 scientific articles indexed by Scopus quartile Q1, Q2, Q3, and Q4 (then we call quartile Q1-Q4), which were retrieved from the Google Scholar database. Evaluation involves the number of scientific articles, journal titles, citation analysis, keywords analysis, and co-authorship analysis. VOSviewer is suitable for creating and viewing bibliometric maps, author maps based on co-authorship, and keyword maps based on co-occurrence data and is free for the research community [22]. In the discussion section, we also conducted a systematic literature review (SLR) of 44 articles indexed by Scopus quartile Q1-Q4.

## 2. METHOD

Bibliometric analysis and visualization with VOSviewer in this paper use Harzing's Publish or Perish (PoP), a database of scientific articles Google Scholar (GS), Mendeley Desktop, Scimago Journal & Country Rank (SJR), and VOSviewer, which we do through three steps (Figure 1). The first step is to retrieve reputable scientific articles using Publish or Perish, where we use queries related to the focus of this paper, which is "business ecosystem" in the title and keywords. We only take journal articles and limit the year of publication to the last decade of 2010 – 2020. Publish or Perish provides an alternative scientific article database: Crossref, Google Scholar, PubMed, Microsoft Academic, Scopus, and Web of Science. We chose the Google Scholar database because it is freely accessible, open to all researchers and the general public, covers most scientific fields, and is the most popular source of scientific information [23]. The search for scientific articles in the first step succeeded in retrieving 137 scientific articles, and then we saved them in RIS format.

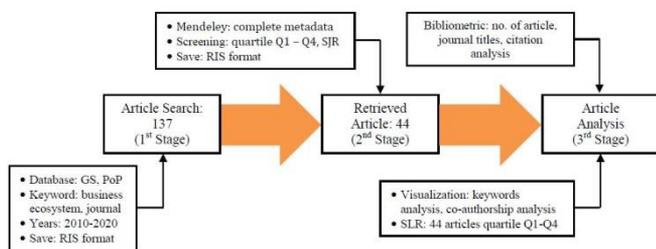


Figure 1. Research method and strategy

Table 1. Criteria screening scientific articles

Criteria	Number of articles
Not relevant (digital business ecosystem, business model ecosystem, industrial ecosystem, business transfer ecosystem, entrepreneurial ecosystem)	22
Not in English (China, Japan, Korea, Indonesia, Thailand)	12
Double	3
Journals not indexed by Scopus, not in Scimago JR	56
Journals indexed by Scopus quartiles Q3, Q4	17
Journals indexed by Scopus quartiles Q1, Q2	27
<b>Total</b>	<b>137</b>

We will open the RIS format file in the second step using Mendeley Desktop. In this second step, we have done two things: (1) complete the metadata on each scientific article file using the menu update details from Mendeley. The most important thing to complete in types of metadata is the title and abstract because VOSviewer will read two metadata; (2) conduct a selection process for 137 scientific articles using the six criteria we have set (Table 1). We use SJR journal rankings for selection in both Scopus-indexed scientific articles, namely quartiles Q1-Q4, and not indexed. Based on the selection results, 44 scientific papers were indexed by Scopus Q1-Q4 and stored in RIS format.

The third step, perform a bibliometric analysis, visualization with VOSviewer version 1.6.18, and systematic literature review (SLR) on 44 scientific articles indexed by Scopus quartiles Q1-Q4. We chose the Scopus-indexed scientific articles quartile Q1-Q4 because they had the most

significant impact on research citations [24] compared to those not indexed, provide the capability for citation analysis [23], commonly used in the bibliometric analysis [6], and the primary source for citation data [7]. The bibliometric analysis and visualization of the VOSviewer involve the number of scientific articles, journal titles, citation analysis, keywords co-occurrence analysis, and co-authorship analysis. We also conducted a systematic literature review in the discussion section.

## 3. RESULTS

Figure 2 shows the development of the number of scientific articles in the field of business ecosystems in 2010-2020, where the growth fluctuated greatly. The figure shows that the Q3 and Q4 quartile papers show a downward trend. Still, on the contrary, the Q1 and Q2 quartile papers have an increasing trend, wherein in 2018, the number of publications increased the most, with a growth of 400.0%, higher than the average growth over the last ten years, which is 88.33%.

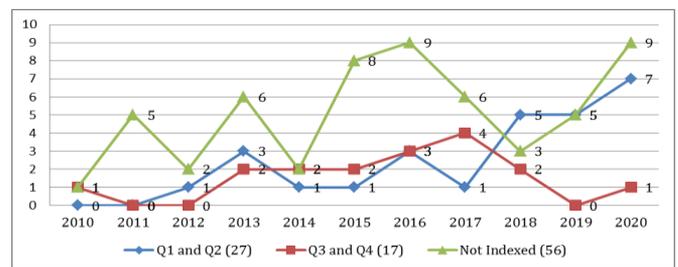


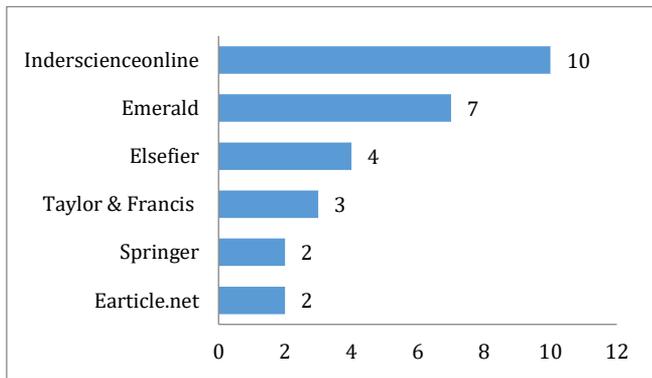
Figure 2. Trends in scientific articles

The comparison of citation metrics (Table 2) in Publish or Perish shows cites/paper metrics scientific papers quartiles Q1 and Q2 (36.07) higher than the initial search (14.41), scientific papers quartile Q3 and Q4 (7.29), and scientific papers not indexed by Scopus (5.93). This finding means that the Q1 and Q2 quartile papers have the most significant impact on research citations when compared to other quartile scientific articles. The same thing also happened to the authors/paper metrics, where the results of the Q1 and Q2 (3.15) quartile screening papers were greater than the initial search (2.61), Q3 and Q4 (2.29) quartile papers and not indexed by Scopus (2.64).

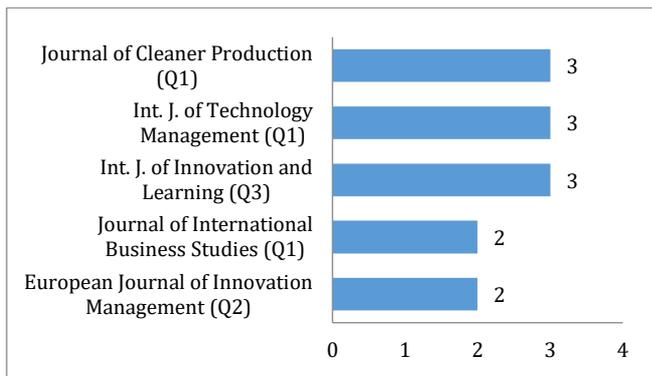
There are 19 publishers who publish scientific articles, of which the TOP 6 publishers (Figure 3) that produce the most scientific articles in Scopus quartile Q1-Q4 are Inderscienceonline.com with ten articles (22.73%), followed by Emerald with seven articles (15.91%), Elsevier with four articles (9.09%), Taylor & Francis with three articles (6.82%), and Springer and Earticle.net each with two articles (4.55%). Further, based on author keywords, the articles in the TOP 6 discuss the field of business ecosystems, including the internet of things, innovation, platform strategy, ICT, collaboration, co-evolution, and business ecosystem identity. Meanwhile, the publishers who only produced one article (2.27%) were jitm.ubalt.edu, jmir.org, journal.sagepub.com, journalsk.bupt.edu.cn, papers.ssrn.com, pertanika.upm.edu.my, ripublication.com, publications.waset.org, TAPPI press, usm.my, Wiley Online Library, and World Scientific. Overall, each publisher has produced an average of two shortest scientific articles in the last decade, Scopus quartile Q1-Q4.

**Table 2.** Comparison metrics

Citation metrics	Initial search	After screening		
		Q1 and Q2	Q3 and Q4	Not indexed by Scopus, Not in SJR
Source:	Google Scholar	Google Scholar	Google Scholar	Google Scholar
Query:	journal, business ecosystem	journal, business ecosystem	journal, business ecosystem	journal, business ecosystem
Publication years:	2010-2020	2010-2020	2010-2020	2010-2020
Citation years:	12(2010-2022)	12(2010-2022)	12(2010-2022)	12(2010-2022)
Papers:	137 (all)	27 (Q1, Q2)	17 (Q3, Q4)	56 (not indexed)
Citations:	1974	974	124	332
Cites/year:	164.50	97.40	10.33	27.67
Cites/paper:	14.41	36.07	7.29	5.93
Authors/paper:	2.61	3.15	2.29	2.64
h-Index:	24	14	6	10
g-Index:	42	27	11	16
hI-norm:	14	9	3	6
hI,annual:	1.17	0.90	0.25	0.50
Paper with ACC:	1,2,5,10,20:59,41,19,10,6	1,2,5,10,20:22,20,11,7,4	1,2,5,10,20:6,4,1,0,0	1,2,5,10,20:15,7,1,0,0



**Figure 3.** TOP 6 publishers that publish articles in business ecosystems



**Figure 4.** TOP 5 journals that publish scientific articles in business ecosystems

The TOP 5 (Figure 4) journals that publish the most scientific articles are the Journal of Cleaner Production (Elsevier), the Int. J. of Technology Management (Inderscienceonline), and the Int. J. of Innovation and Learning (Inderscienceonline) every three scientific articles, followed by the Journal of International Business Studies (Springer) and the European Journal of Innovation Management (Emerald) with two scientific articles each.

In contrast, the journals that only publish one scientific article are the Asian Academy of Management Journal (Q3), British Food Journal (Q1), Business Process Management Journal (Q1), Innovation (Q2), Int. J. of Applied Engineering Research (Q2), Int. J. of Business Environment (Q2), Int. J. of

Control and Automation (Q4), Int. J. of Entrepreneurship and Innovation Management (Q3), Int. J. of Industrial and Systems Engineering (Q2), Int. J. of Innovation and Technology Management (Q3), Int. J. of Logistics Research and Applications (Q1), Int. J. of Operation and Production Management (Q1), Int. J. of Organizational Analysis (Q2), Int. J. of Production Economics (Q1), Int. J. of Public Sector Performance Management (Q3), Int. J. of Services, Economics and Management (Q4), Int. J. of u- and e-Service, Science and Technology (Q4), J. of Advanced Oxidation Technologies (Q4), J. of Beijing University of Posts (Q4), J. of Economics and Business (Q2), J. of Heritage Tourism (Q1), J. of Information Technology Management (Q4), J. of Medical Internet Research (Q1), J. of Nanjing University of Posts (Q4), J. of Product Innovation Management (Q1), J. of Rural Development (Q4), Pertanika J. of Social Sciences and Humanities (Q3), Project Management Journal (Q1), Qualitative Research in Organization and Management: An Int. J. (Q2), J. of Hydroelectric Engineering (Q3), and Tappi Journal (Q2).

### 3.1 Citation analysis

The TOP 11 (Table 3) articles that generated the most citations over the past decade come from publisher Elsevier with 311 citations from articles written by Rong et al. [25] entitled "*Understanding Business Ecosystem Using a 6C Framework in Internet-Of-Things-Based Sectors*", and this scientific article is also the most superior in citations per year, which is 44.43. It is followed by an article written by Rong et al. [26] entitled "*Linking Business Ecosystem Lifecycle with Platform Strategy: A Triple View of Technology, Application, and Organization*," with 112 citations and 12.44 citations per year. The third rank is the article entitled "*Co-Evolution Between Urban Sustainability and Business Ecosystem Innovation: Evidence from the Sharing Mobility Sector in Shanghai*," written by Ma et al. [27], with 90 citations and 22.50 citations per year from publisher Elsevier. In these TOP 10, publisher Elsevier also contributed the most to the number of articles, consisting of three scientific papers with a total of 442 citations, followed by publishers Inderscienceonline and Springer, each with two scientific articles with a total of 143 citations and 107 citations respectively. Meanwhile, publishers Wiley Online Library, Taylor & Francis, Earticle.net, and Emerald each have one scientific article indexed by the Scopus quartile Q1-Q4.

**Table 3.** TOP 11 citation papers in the field of business ecosystems indexed by Scopus quartiles Q1-Q4

Rank	Citation	Per_Year	Author	Title	Journal	Quartile	Year	Publisher
#1	311	44.43	Rong, K., Hu, G., Lin, Y., Shi, Y., & Guo, L.	Understanding business ecosystem using a 6C framework in Internet-of-Things-based sectors.	<i>Int. J. of Production Economics</i> , 159, 41-55.	Q1	2015	Elsevier
#2	112	12.44	Rong, K., Lin, Y., Shi, Y., & Yu, J.	Linking business ecosystem lifecycle with platform strategy: A triple view of technology, application, and organization.	<i>Int. J. of Technology Management</i> , 62(1), 75-94.	Q1	2013	Inderscienceonline
#3	90	22.50	Ma, Y., Rong, K., Mangalagiu, D., Thornton, TF, & Zhu, D.	Co-evolution between urban sustainability and business ecosystem innovation: Evidence from the sharing mobility sector in Shanghai.	<i>Journal of Cleaner Production</i> , 188, 942-953.	Q1	2018	Elsevier
#4	62	20.67	Parente, R., Rong, K., Geleilate, JMG, & Misati, E.	Adapting and sustaining operations in weak institutional environments: A business ecosystem assessment of a Chinese MNE in Central Africa.	<i>Journal of International Business Studies</i> , 50(2), 275-291.	Q1	2019	Springer
#5	54	6.75	Mäkinen, SJ, Kanniainen, J., & Peltola, I.	Investigating the adoption of free beta applications in a platform-based business ecosystem.	<i>Journal of Product Innovation Management</i> , 31(3), 451-465.	Q1	2014	Wiley Online Library
#6	50	12.50	Rinkinen, S., & Harmaakorpi, V.	The business ecosystem concept in innovation policy context: building a conceptual framework.	<i>Innovation</i> , 31(3), 333-349.	Q2	2018	Taylor & Francis
#7	45	22.50	Hult, GTM, Gonzalez-Perez, MA, & Lagerström, K.	The theoretical evolution and use of the Uppsala Model of internationalization in the international business ecosystem.	<i>Journal of International Business Studies</i> , 51(1), 38-49.	Q1	2020	Springer
#8	43	5.38	Zhang, X., Ding, L., & Chen, X.	Interaction of Open Innovation and Business Ecosystem.	<i>Int. J. of u- and e-Service, Science and Technology</i> , 7(1), 51-64	Q4	2014	Earticle.net
#9	41	10.25	Sun, Q., Wang, C., Zuo, L. shui, & Lu, F. hua.	Digital empowerment in a WEEE collection business ecosystem: A comparative study of two typical cases in China.	<i>Journal of Cleaner Production</i> , 184, 414-422.	Q1	2018	Elsevier
#10	34	5.67	Majava, J., Leviäkangas, P., Kinnunen, T., Kess, P., & Foit, D.	Spatial health and life sciences business ecosystem: a case study of San Diego.	<i>European Journal of Innovation Management</i> , 19(1), 26-46.	Q2	2016	Emerald
#11	31	3.44	Rong, K., Hu, G., Hou, J., Ma, R., & Shi, Y.	Business ecosystem extension: Facilitating the technology substitution.	<i>International Journal of Technology Management</i> , 63(3-4), 268-294.	Q1	2013	Inderscienceonline

### 3.2 Keywords analysis (Co-occurrence)

Based on visualization analysis, we used VOSviewer 1.6.18 on 44 scientific articles of business ecosystem indexed by Scopus quartile Q1-Q4 using the 'author keyword' containing 1.088 keywords. With a minimum number of co-occurrence 5, we found that during the last decade, research in the field of business ecosystems is related to roles, actors, collaboration,

and dominant platform capability. We found 56 keywords divided into seven clusters (Figure 5). Cluster 1 (in red) consists of 13 research topics, where the topic 'role' is the dominant topic discussed in this cluster. The topic 'customer' and 'identity', respectively, are the dominant ones discussed in Cluster 2 (in green) with 13 research topics and Cluster 3 (in blue) with nine research topics.

Based on the results of the VOSviewer visualization (Figure 6), there are several research topics in the field of business ecosystems that are still rarely discussed, including platform strategy in the business ecosystem, blockchain in the business ecosystem, business ecosystem identity, operation in the business ecosystem, originality value in the business ecosystem, and dominant platform capability in the business ecosystem. According to van Eck and Waltman [21], the colour in the map in Figure 6 showed the density of the research themes; blue indicated the lowest density and yellowed the highest density. In other words, the lowest density indicates new research themes that are still rarely studied in the study of the business ecosystem, where these topics of this research only began to be discussed in 2019, highlighted in yellow (Figure 7).

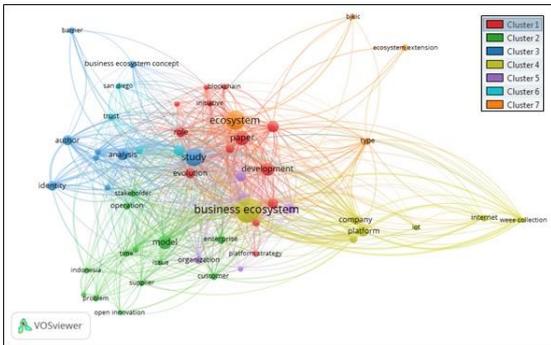


Figure 5. Keywords co-occurrence network in the field of business ecosystems

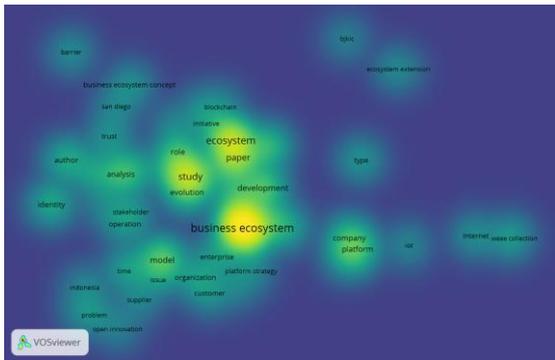


Figure 6. Keyword density visualization in the field of business ecosystems

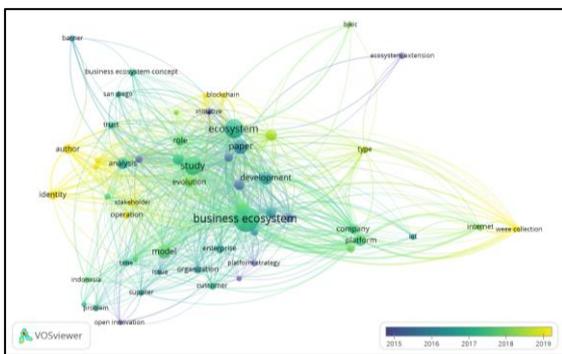


Figure 7. Top keywords visualization in the field of business ecosystems

Furthermore, Cluster 4 (in yellow) consists of eight research topics, where the topic of 'business ecosystem studies' is the

most discussed, indicated by the largest node. In other words, the bigger the node, the more popular nodes, the more connections [10], and the more frequently discussed than other research themes in the same cluster. Cluster 5 (in purple) consists of five research topics, where the topic of 'service' is the dominant one being discussed. The research topics 'innovation' and 'ecosystem' are the dominant ones discussed in Cluster 6 (in light blue) and Cluster 7 (in orange), which consist of four research topics each. Overall, of the 56 keywords, the 'business ecosystem' term was the most commonly found in the title and abstract (Table 4), followed by the keywords 'ecosystem' and 'platform', respectively.

Table 4. TOP 11 terms in business ecosystem used in titles and abstracts

Keywords	Occurrences
Business Ecosystem	106
Ecosystem	58
Platform	21
Innovation	19
Role	17
Technology	16
Service	16
Evolution	16
Identity	15
Actor	11
China	10

### 3.3 Co-authorship analysis

Based on visualization analysis with VOSviewer (Figure 8), there are 107 researchers in the field of business ecosystems who collaborate to produce scientific articles indexed by Scopus quartile Q1-Q4, and there are 15 co-authorships divided into 4 clusters over the past decade. Rong, K. from Cluster 3 (in blue) is the author who produces the most scientific articles in the field of business ecosystems, consisting of five documents, followed by Shi, Y. from Cluster 1 (in red) with four documents. Both of which are from the University of Cambridge, UK and Tsinghua University, China, respectively. Rong, K. and Shi, Y. also had the most significant nodes, indicating that they had the strongest relationship between authors and the most scientific articles. The node's size indicates the number of researchers' scientific publications [6].

Next is Majava, J., from the Department of Industrial Engineering and Management, University of Oulu, Finland, the author who produced three scientific articles and 15 authors produced two scientific articles each (Table 5). While the rest 89 authors only published one document.

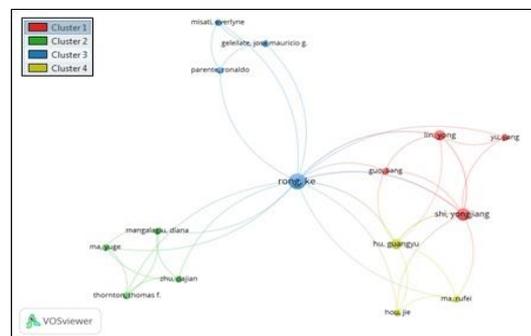


Figure 8. Network visualization of authors collaborating to produce articles entitled 'business ecosystem'

**Table 5.** TOP 18 authors in the field of business ecosystems indexed Scopus quartiles Q1-Q4

Author	Number of Documents
Rong, K.	5
Shi, Y.	4
Majava, J.	3
Hu, G.	2
Foit, D.	2
Kess, P.	2
Kinnunen, T.	2
Lin, Y.	2
Hellstrom, M.	2
Sun, Q.	2
Wang, C.	2
Wikstrom, K.	2
Panda, D. K.	2
Annapera, E.	2
Liukkunen, K.	2
Markkula, J.	2
Harmaakorpi, V.	2
Rinkinen, S.	2

#### 4. DISCUSSION

According to a systematic literature review of 44 scientific articles indexed by Scopus quartile Q1-Q4 (Table 6), we found most research locations in the field of business ecosystems were carried out in China (12 articles), followed by Finland (6 articles), Korea (4 articles), Indonesia and United State (3 articles each). Especially for research in Indonesia, there is only one study Scopus indexed quartile Q1, which was on a large business in the tourism resort sector in Bali conducted by Liu et al. [28]. The author from The Open University, Milton Keynes, UK, with the title “*A Business Ecosystem Perspective of Supply Chain Justice Practices: A Study of a Marina Resort Supply Chain Ecosystem in Indonesia.*” Business ecosystem research is mostly conducted on MNC/MNE (30 articles) [14, 25]. While a small part was done on SMEs (7 articles) [29].

Based on the industry sector, the research field in the business ecosystem is dominated by the information and communication sector (9 articles) [30]. Followed by trade sector (7 articles) and health sector (6 articles). While the transportation and tourism sectors each have four articles. Specifically for the agricultural sector, there were two articles carried out on fisheries and animal husbandry by Yang et al. and Bonamigo et al. [5, 31], and there is no research on business ecosystems in the plantation or forestry sector.

The research method applied mostly used case studies with interview data collection techniques (36 articles) [3, 26]. Some of these scientific articles (10 articles) tested the validity of the data using data triangulation [27, 32], while the rest (4 articles) were literature reviews of reputable scientific articles based on the focus of certain studies from researchers.

Business ecosystem researchers used different data analyses to describe and explain the roles and relationships of actors in the business ecosystem, most of which used descriptive narratives (22 articles) [27, 32]. Other data analysis methods used by researchers are value networks (6 articles) [33, 34]. In addition, the researchers also used various data analysis methods, including factor analysis, content analysis, 6C framework, SWOT analysis, SEM, tested tools, ethnographic/phenomenology, NBE, SPSS, 4P3S, and STATA, and this is in accordance with the explanation of former studies [1, 33, 35], stating that researchers use different methods in business

ecosystem research.

**Table 6.** Review of scientific articles in the field of business ecosystem indexed by Scopus quartile Q1-Q4

Review	% of scientific articles Q1-Q4
Research locations	
a. China	27.27%
b. Finland	13.64%
c. Korea	9.09%
d. Indonesia	6.82%
e. United States	6.82%
f. Europe	4.55%
g. India	4.55%
h. Others (Brazil, Spain, Greece: 1 article each)	6.82%
i. No location explanation	20.45%
Company size	
a. MNC/MNE	68.18%
b. SME's	15.91%
Industry sector	
a. Information Communication	20.45%
Technology	
b. Automotive, Transport	9.09%
c. Tourism	9.09%
d. Trade	15.01%
e. Health	13.64%
f. Livestock (Agriculture – Fisheries)	4.55%
g. Craft	4.55%
h. Financial, Education, Hydrology: 1 article each	6.82%
Method	
a. Case study, interviews (in-depth, semi-structured, unstructured, open-ended), observation, documentation, questionnaire, FGD	81.82%
b. Literature review	9.09%
Data analysis	
a. Descriptive-narrative	50.00%
b. Value network	13.64%
c. Factor analysis	4.55%
d. Others (Content analysis, 6C framework, SWOT analysis, SEM, Tesbed tools, Ethnographic/phenomenology, NBE, SPSS, 4P3S, STATA: 1 article each)	22.73%

#### 5. CONCLUSION

In this paper, we carry out a bibliometric analysis and visualization analysis with VOSviewer in the field of *business ecosystems* involving 44 scientific articles indexed by Scopus quartile Q1-Q4 from the Google Scholar database in the last decade. The bibliometric analysis found that scientific articles in the business ecosystem field increased in 2018, where publisher Emerald produced the most articles and publisher Elsevier was cited the most. Scientific articles quartile Q1 – Q4 became the highest cite/paper compared to other scientific articles. At the same time, visualization with VOSviewer has found the keyword 'business ecosystem' was found the most as a term in the title and abstract, compared to other terms. Rong, K. was the author who produced the most scientific articles in the business ecosystem. Visualization also found several new research topics that are still rarely researched, including platform strategy, blockchain, identity, operation, originality value, and dominant platform capability in the business

ecosystem.

A literature review has found that research in business ecosystems is mostly carried out in China on large enterprises. The research method mainly uses case studies and interviews with descriptive narratives, and there is no research on business ecosystems in the plantation or forestry sector. The limitation of this research is that the use of the Google Scholar database retrieves less specific scientific articles. In the future, we need to conduct research using more powerful databases, including Scopus, Web of Science, and PubMed, to retrieve more specific and high-quality scientific articles from reputable journals.

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