Ekonomik ve Sosyal Araştırmalar Dergisi

The International Journal of Economic and Social Research

2024, 20(2)

Open Innovation: A Bibliometric Analysis During The Period 2003-2024[1]

Açık İnovasyon: 2003-2024 Döneminde Bibliyometrik Bir Analiz

Derya YÜCEL[2], Muhsin HALİS[3]

Geliş Tarihi (*Received*): 07.10.2024 **Kabul Tarihi (*Accepted*):** 26.12.2024 **Yayın Tarihi (*Published*):** 30.12.2024

Abstract: The open innovation paradigm refers to a multi-dimensional and multi-stakeholder process that has emerged especially in the last quarter century and includes efforts to use knowledge inputs and outputs to accelerate internal innovation and expand markets to enable external use of innovation. Innovation has become more important day by day, innovation times have increased day by day in all sectors and all products, and the increase in costs caused by this has gradually increased the need for open innovation and the efforts in this field. As a natural result of this process, academic studies on open innovation have increased gradually in the last quarter century and have shown rapid development, especially in the last decade.

In this study, publications related to Web of Science (WOS) were examined through a bibliometric analysis. In order to examine the structure of the literature in the study, studies published in the field of business and management related to the keyword open innovation in the Web of Science (WoS) database were examined and according to these criteria, 3260 publications covering the period 2003-2024 were obtained and analyzed in the Bibliometrix R package. The findings reveal that the number of studies conducted especially in 2010 and later exceeded single-digit numbers and this increase doubled in 2016 and later, showing a rapid increase trend. Approximately 71% (2315) of the 3260 studies examined in the analysis period were published in 2016 and later. The findings reveal that academic interest in the subject is increasing day by day. In addition, analyses were conducted using various criteria such as the journal in which the publications were published, index, country, citation level, year of publication, authors and number of authors.

Keywords: Open Innovation, Bibliometric Analysis, Bibliometrix R, Business, Management.

&

Özet: Açık inovasyon paradigması özellikle son çeyrek asırda ortaya çıkan ve dahili yeniliği hızlandırmak ve yeniliğin harici kullanımını sağlamak için pazarları genişletmek amacıyla bilgi girişlerinin ve çıkışlarının kullanılmasına dönük çabaları içeren çok boyutlu ve çok paydaşlı bir süreci ifade etmektedir. İnovasyonun her geçen gün daha önemli hale gelmesi, yenilik sürelerinin tüm sektör ve tüm ürünlerde her geçen gün artması ve bunun doğurduğu maliyetlerdeki artış açık inovasyona olan ihtiyaç ve bu alandaki çabaları giderek artırmıştır. Bu sürecin doğal bir sonucu olarak son çeyrek asırda açık inovasyonla ilgili akademik çalışmalar da giderek artmış ve özellikle son on yıllık dönemde hızlı bir gelişme göstermiştir.

Bu kapsamda hazırlanan çalışmada Web Of Science (WOS) kapsamındaki yayınlar üzerinden bibliyometrik bir analizle ilgili yayınlar incelenmiştir. Çalışmada alan yazının yapısını incelemek için Web of Science (WoS) veri tabanında "açık inovasyon" anahtar kelimesiyle ilgili işletme ve yönetim alanında yayınlanan çalışmalar ele alınmış ve bu kriterlere göre 2003-2024 dönemini kapsayan 3260 yayın bilgisi elde edilerek Bibliometrix R paketinde analize tabi tutulmuştur. Bulgular özellikle 2010 ve sonrasında yapılan çalışma sayısının tek haneli sayıları aştığını ve 2016 ve sonrasında bu artışın ikiye katlanarak hızlı bir artış trendi gösterdiğini ortaya koymaktadır. Analiz döneminde ele alınan 3260 çalışmanın yaklaşık %71'i (2315 adet) 2016 ve sonrasında yayınlanmıştır. Bulgular konuya olan akademik ilgilinin her geçen gün giderek arttığını ortaya koymaktadır. Araştırmada ayrıca, yayınların yayınlandığı dergi, indeks, ülke, atıf düzeyi, yayınlanma yılı, yazarlar ve yazar sayısı gibi çeşitli kıstaslar kullanılarak analizler yapılmıştır.

Anahtar Kelimeler: Açık İnovasyon, Bibliyometrik Analiz, Bibliometrix R, İşletme, Yönetim.

Atıf/Cite as: Yücel, D. ve Halis, M. (2024). Open Innovation: A Bibliometric Analysis During The Period 2003-2024. *Ekonomik ve Sosyal Araştırmalar Dergisi*, 20(2), 539- 553.

İntihal-Plagiarism/Etik-Ethic: Bu makale, en az iki hakem tarafından incelenmiş ve intihal içermediği, araştırma ve yayın etiğine uyulduğu teyit edilmiştir. / This article has been reviewed by at least two referees and it has been confirmed that it is plagiarism-free and complies with research and publication ethics. https://dergipark.org.tr/tr/pub/ijaws

[1] This study includes an expanded version of the paper titled "Open Innovation: A Bibliometric Analysis in the Period 2003-2023" presented by the authors at the 2nd Abant International Current Academic Studies Symposium on 28-30/12/2023.

[2] Assist. Prof. Dr., Department of Management and Organization, Mudurnu Süreyya Astarcı Vocational School, Bolu Abant İzzet Baysal University, Bolu, Türkiye, deryayucel@ibu.edu.tr, Orcid: 0000-0003-1853-2673 (Corresponding Author)

[3] Prof. Dr., Department of Business Administration, Faculty of Business Administration, Kocaeli University, Kocaeli, Türkiye, muhsin.halis@kocaeli.edu.tr, Orcid: 0000-0001-9495-5083

1. Introduction and Literature

Innovation is one of the most critical determinants of a company's organisational success, high performance, and survival; this is true regardless of the company's size or industry. Innovation is often driven by pressures from the external environment; in particular, factors such as competition, resource scarcity, and customer demand play important roles. In response to these factors, a company adjusts its behaviour and, thus, its organisation to develop appropriate innovation strategies to maintain or improve its performance (Bigliardia and Galati, 2013).

Company innovation strategies have shown a trend toward openness, with companies increasingly needing external knowledge and research collaborations to develop new products, services, and processes. Over time, companies have become more active in licensing and selling internally developed technologies to external parties, and the combination of these changes has given rise to open innovation (Spithoven et al., 2012).

The concept of open innovation, introduced by Chesbrough (2003), is expressed as a set of practices for evaluating innovation and a cognitive model for creating, interpreting, and investigating these practices. Chesbrough et al. (2006) defined the open innovation model as the use of purposeful knowledge flows and outflows to accelerate internal innovation and expand markets for external use of innovation.

Open innovation is classified into three different levels: inbound, outbound, and coupled. Through inbound open innovation activities, companies can enrich their capabilities and knowledge by integrating suppliers, customers, or other actors into their internal innovation processes. Alternatively, in outbound open innovation, the company can focus on making profits by offering ideas, patents, and other intellectual property rights to the market through outbound activities such as technology licensing. In the coupled open innovation model, firms can adopt an integrated open innovation process with complementary partners by combining the above-mentioned inbound and outbound open innovation (Chesbrough, 2006; Chesbrough, 2011; Dahlander and Gann, 2010; Gassmann et al., 2010).

According to Chesbrough (2024), open innovation enables businesses to create more value through innovation, allowing them to move into a more competitive position instead of being trapped in the "product trap" and stuck in product costs. Businesses make innovation more cost-effective by sharing the costs and risks associated with research and development (R&D) through open innovation. Innovation carried out in collaboration can also attract external financing and investment and provide organizations with additional resources to support innovation initiatives (Gripp, 2024). Research shows that open innovation can contribute to business performance, especially by reducing R&D costs, increasing operational efficiency and competitive advantage (Lee & Yoo, 2019; Krstić & Vujatović, 2022; Galabova, 2022; Yücel & Yücel, 2023). This situation has particularly increased interest in open innovation at both academic and practical levels in the last 20 years.

However, the benefits provided by open innovation are not limited to this. Knowledge-based management argues that the basic task of a business is to acquire, integrate and use knowledge. Knowledge is a fundamental resource for the long-term competitiveness of enterprises (Grant, 1996). Therefore, the open innovation process is an important tool that expands the knowledge base of the enterprise regarding innovation and increases its competitiveness (Zhang et.al., 2023). It is difficult for large enterprises with bureaucratic processes to move quickly in innovation. On the other hand, small organizations often do not have the resources to move projects forward at the speed they want. Establishing open innovation partnerships can reduce costs for the smaller partner while reducing time and risk for the larger partner (Thirlway, 2024).

Open innovation offers the advantage of solving problems through collaboration and reduces risks by using the collective intelligence and expertise of external partners, thus enabling the enterprise to deal with challenges more effectively (Gripp, 2024).

By enabling small businesses with a good idea but lacking the facilities or funds to develop it to connect with larger businesses or universities, can facilitate R&D efforts and help bring the product to market quickly and efficiently (Thirlway, 2024). Businesses that access external resources and expertise using open innovation can accelerate the commercialization of their ideas and gain a competitive advantage in the market (Gripp, 2024). Open innovation can also help companies enter new markets using the knowledge and networks of their external partners (Lloyd, 2024). These partnerships can also open doors to co-marketing and co-branding opportunities by leveraging the partners' brand reputation (Gripp, 2024).

Involving the customer community in the ideation phase of product or service development broadens the innovation horizon and allows the business to focus on issues that matter to its key stakeholders (Thirlway, 2024). Open innovation encourages continuous learning and enables innovation leaders by introducing organizations to new ideas, technologies, and market trends. Collaborating with external partners allows organizations to access knowledge, experience, and best practices, thereby enhancing their own capabilities and organizational learning. By accessing external resources, organizations can gain flexibility and agility and adjust their strategies in response to market dynamics (Gripp, 2024).

Open innovation is as much about developing ideas internally as it is about sending them out of the organization. Establishing an open innovation network provides the opportunity to develop ideas or projects that are generated internally but do not fit the organization's core business model externally. This provides the potential to create new revenue streams without jeopardizing the core business model (Thirlway, 2024).

Open innovation engages with external innovators, such as universities, startups, and other organizations, expanding the pool of ideas and technologies available to a company. This gives businesses access to a wider range of solutions and perspectives. This diversity can lead to more creative and effective innovations (Lloyd, 2024).

Open innovation acts as a bridge between internal teams and external networks, communities and organizations, bringing new ideas and solutions to the business while sharing internal talents and skills with a wider network. In this way, talent or skill deficiencies are eliminated and developed, preventing the business's innovation capabilities from being negatively affected (Thirlway, 2024).

Despite all these benefits, Galabova (2022) summarizes the challenges that businesses may face during the implementation of open innovation under five headings. These challenges are classified as follows:

- Economic challenges: The open innovation process requires the provision of various resources, which entails expenses related to the timely acquisition of resources. This increases financial and economic challenges. Securing sufficient resources, determining the role of one or more players, and allocating the costs they will spend as well as the common benefits they will gain are critical steps in the innovation process.

- Management, strategy planning and administration challenges: Open innovation requires the participation of various actors throughout the innovation process. This allows for the emergence and increase of various management, strategic and administrative challenges. Problems such as conflicts of interest, conflicts of expectations, visions and decisions, strategies and goals, and guiding principles for management and resource allocation may occur.

- Legal challenges and uncertainties: The increasing demand for goods and services leads to an increase in technological complexity and sophistication, which brings about various intellectual property rights. Industrial companies increasingly need third-party intellectual property rights to innovate. The cooperation and collaboration of various actors are necessary to produce new solutions, which increases concerns about intellectual property.

- **Technological challenges:** Open innovation has a significantly higher technological complexity due to the simultaneous activity of multiple actors in the process. Many autonomous organizations work individually, while at the same time working in coordination and cooperation to achieve a common goal of creating an innovative product. In this context, a unified innovation strategy is of critical importance and should bring these actors together. The critical role of technology in industrial enterprises indicates that innovation also plays a critical role, since innovation is not possible without technology.

- **Social, cultural and psychological challenges:** It is essential to ensure end-to-end communication between all actors involved in the innovation process. This brings to the agenda the social, cultural and psychological elements that are often overlooked in the success or failure of innovation.

This study, conducted within this framework, includes a bibliometric analysis of articles, books, book chapters, and conference papers published on the Web of Science (WOS) from 2003 to 2024. Through this analysis, it will be possible to understand the development trajectory of the concept of open innovation, which has gained increasing importance in recent years and is becoming the subject of more academic studies each day. Thus, this study is expected to fill an important gap by examining how open innovation is addressed in conjunction with other concepts and identifying potential areas for further development.

2. Method

In the scope of the research, publications published in the field of "open innovation" in the Web of Science (WOS) database between the years 2003 and 2024 were surveyed and analysed. To this end, as of October 2024, publications found in the main categories of the Web of Science (WOS) database were scanned. The keyword "open innovation" was used, and publications in the "business" and "management" categories that were published in WOS covering the years 2003-2024 were filtered without any language restrictions, resulting in a total of 3,260 documents. General information about the data can be seen in Table 1.

The dataset consisting of the obtained 3,260 studies was analyzed using the Bibliometrix R program to reach findings. The acquired data were examined for performance analysis based on criteria such as publication year, country of publication, journal in which it was published, citation index, publishing organization, author, and co-word analysis. Subsequently, the scientific mapping of the analyses was conducted.

3. Findings

In this study, a performance analysis of the literature on open innovation has been conducted with respect to the fields of "business" and "management." In this scope, the findings related to the publication year, publishing organization, country of the publications, authors of the publications, and keywords have been examined. Figure 1 presents the distribution of 3,260 studies published in open innovation from 2003 to 2024, categorized by year.

As seen in the table, out of the 3,260 studies published between 2003 and 2024, 2,946 are articles, 13 are books, 272 are book chapters, and 29 are conference proceedings. A total of 5923 authors took part in 3,260 published studies. Among these studies, 472 are single-author works and written by 371 authors. In the other works the average number of authors per study is 2.84. The average annual growth rate of studies related to the topic is 25.17%, and the average publication age is measured as low as 6.2 years. These values indicate that studies on open innovation have concentrated in recent years and are relatively new.

Table 1: Main Information About Data

Description	Results
Timespan	2003:2024
Sources (Journals, Books, etc)	473
Documents	3260
Annual Growth Rate %	25,17
Document Average Age	6,2
Average citations per doc	37,69
References	103006
DOCUMENT CONTENTS	
Keywords Plus (ID)	2842
Author's Keywords (DE)	6292
AUTHORS	
Authors	5923
Authors of single-authored docs	371
AUTHORS COLLABORATION	
Single-authored docs	472
Co-Authors per Doc	2,84
International co-authorships %	36,66
DOCUMENT TYPES	
article	2946
book	13
book chapter	272
proceedings paper	29

The data shown in the figure illustrates how the topic of open innovation has developed over the years and highlights the increasing trend in research activities in this area. Such an analysis provides a significant foundation for future research and helps in understanding academic trends within the field.

Year	Articles	Cum. Articles
2003	2	2
2004	1	3
2005	4	7
2006	13	20
2007	15	35
2008	28	63
2009	53	116
2010	106	222
2011	110	332
2012	133	465
2013	190	655
2014	150	805
2015	140	945
2016	212	1157
2017	239	1396
2018	257	1653
2019	263	1916
2020	264	2180
2021	264	2444
2022	299	2743
2023	294	3037
2024	223	3260

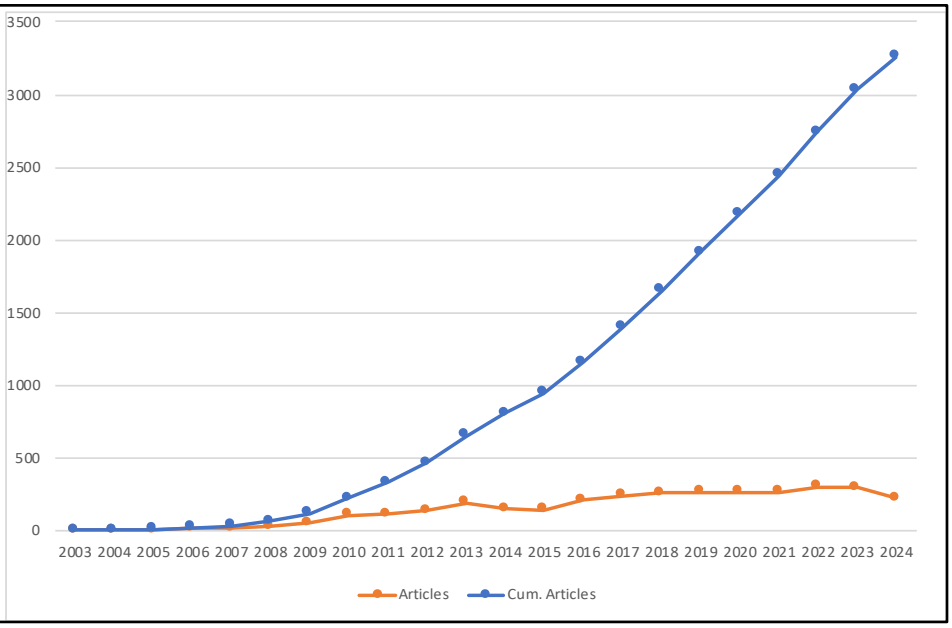

Figure 1: Annual Scientific Production

A total of 3,260 publications were identified in the review, of which approximately 86% were published after 2013, indicating that they are part of the last decade's research activities. Although the number of publications in this field decreased in 2014 compared to the previous year, a general upward trend has been observed since 2008. This trend demonstrates that academic interest in open innovation has increased over the past twenty years. When examining Figure 1, it is evident that more than 2,315 studies, accounting for 71% of the publications, have been conducted in the last eight years since 2016.

In the analysis of the countries where the corresponding authors of the published works are based, Italy, China, and the United States rank as the top three. When looking at the details in Table 2, it is found that approximately 50.4% of the published studies originate from Italy, China, the United States, Germany, the United Kingdom, and Spain. Turkey ranks 38th in this list, with 9 published studies.

Table 2: Corresponding Author's Countries

Country	Articles	Articles %	SCP[1]	MCP[2]	MCP %[3]
ITALY	359	11	224	135	37,6
CHINA	292	9	204	88	30,1
USA	280	8,6	185	95	33,9
GERMANY	265	8,1	182	83	31,3
UNITED KINGDOM	260	8	136	124	47,7
SPAIN	186	5,7	131	55	29,6
FRANCE	135	4,1	79	56	41,5
KOREA	120	3,7	91	29	24,2
SWEDEN	106	3,3	69	37	34,9
BRAZIL	99	3	71	28	28,3
NETHERLANDS	99	3	66	33	33,3
DENMARK	96	2,9	45	51	53,1
FINLAND	82	2,5	55	27	32,9
AUSTRALIA	78	2,4	40	38	48,7
SWITZERLAND	56	1,7	35	21	37,5
AUSTRIA	52	1,6	28	24	46,2
BELGIUM	52	1,6	21	31	59,6
CANADA	51	1,6	25	26	51
PORTUGAL	41	1,3	31	10	24,4
IRELAND	39	1,2	10	29	74,4
NORWAY	29	0,9	16	13	44,8
POLAND	28	0,9	24	4	14,3
INDIA	27	0,8	23	4	14,8
JAPAN	26	0,8	19	7	26,9
RUSSIA	24	0,7	13	11	45,8
SCP[1]: Single Country Publications					
MCP[2]: Multiple Country Publications					
MCP %[3]: Percentage of Multiple Country Publications					

In Figure 2, the distribution of publications by countries is shown based on whether the authors are from a single country or multiple countries. Considering this figure, it can be stated that the majority of the studies are authored by researchers from the same country. This situation also highlights the need for international collaboration on the subject.

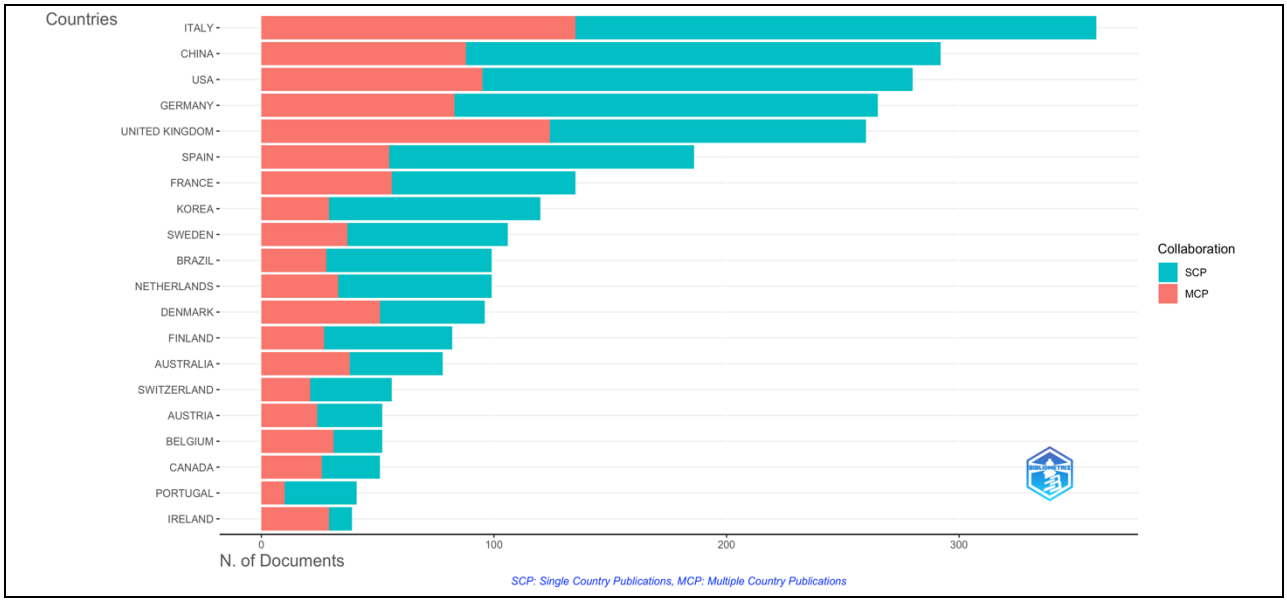

Figure 2: Corresponding Author's Countries

When the development of publications by country over the years is examined, it is seen that the studies on the subject have increased rapidly since 2010. When the last ten years are considered, it is observed that the pace of research on the subject has grown faster in all countries. The development in the first five of these countries is shown in Figure 3.

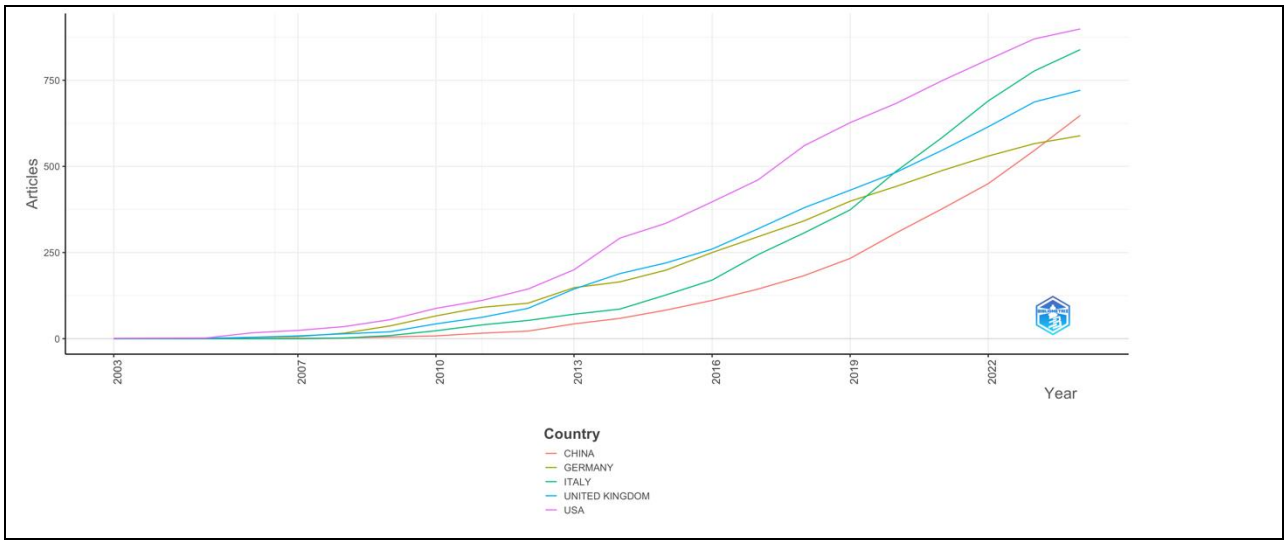

Figure 3: The First Five Countries' Production Over Time

The distribution of publications by authors is presented in Table 3. When examining the publications in the field of open innovation by the number of works, it is observed that the most publications come from Chesbrough and Vanhaverbeke, with 39 studies. According to the Table 3, Chesbrough and Vanhaverbeke are followed by Frattini with 31 studies, Bogers with 29 studies, and Lichtenthaler with 27 studies.

Table 3: Most Relevant Authors

Authors	Articles	Articles Fractionalized*
CHESBROUGH H	39	19,40
VANHAVERBEKE W	39	19,10
FRATTINI F	31	8,32
BOGERS M	29	9,63
LICHTENTHALER U	27	23,33
LAZZAROTTI V	24	7,90
YUN JJ	24	8,38
DI MININ A	23	5,64
MANZINI R	22	6,90
SANTORO G	20	5,53
GRIMALDI M	17	4,48
BREM A	16	6,15
PELLEGRINI L	16	4,65
PETRUZZELLI AM	16	4,52
WEST J	16	8,12
CHEN J	15	4,21
MAJCHRZAK A	15	5,38
MEISSNER D	15	5,70
FERRARIS A	14	3,87
GRECO M	14	3,87
VON KROGH G	14	5,50
CRICELLI L	13	3,53
FRISHAMMAR J	13	4,45
GASSMANN O	13	4,37
MORTARA L	13	3,63

*Fractional authorship quantifies an individual author's contributions to a published set of papers and indicates the unique contribution of each author to the study.

When examining the changes in the authors' publications over the years, it is observed that publications related to the topic have intensified in the period after 2010. As shown in Figure 4, which illustrates the development of publications by the top ten authors over the years, the authors' studies on the subject have concentrated in the last decade. This situation highlights the relevance of the topic.

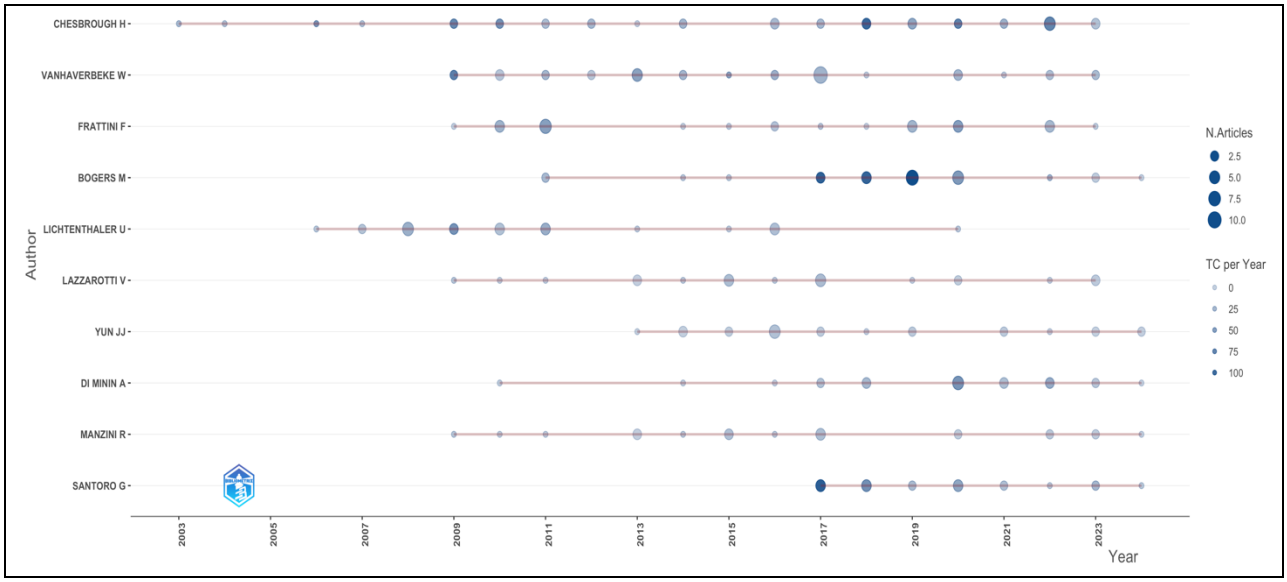

Figure 4: Authors' Production Over Time

The findings from the citation analysis regarding the impact of the authors' publications are presented in Table 4. As shown in Table 4, the top 10 authors who have contributed the most to the literature in the field

are Chesbrough, Vanhaverbeke, Bogers, Lichtenthaler, Dahlander, Gassmann, Enkel, Frattini, and Gann. The citations of these authors' works account for 12,045 of the total 83,319 citations across all works, representing a significant 14.45% of the total citations in the field.

Table 4: Most Local Cited Authors

Author	LocalCitations
CHESBROUGH H	2669
VANHAVERBEKE W	1530
BOGERS M	1201
LICHTENTHALER U	1122
DAHLANDER L	1089
GASSMANN O	1076
ENKEL E	1036
FRATTINI F	812
CHESBROUGH HW	774
GANN DM	736
BRUNSWICKER S	649
WEST J	631
HUIZINGH EKRE	612
LAURSEN K	611
CHIESA V	555
CHIARONI D	531
DE JONG JPJ	518
PILLER FT	507
VAN DE VRANDE V	507
DE ROCHEMONT M	500
CROWTHER AK	490
ALMIRALL E	455
ZOBEL AK	455
MAJCHRZAK A	443
SPITHOVEN A	439

Considering the analysis period, it is observed that the three most influential authors regarding local effects on the subject are Chesbrough, Lichtenthaler, and Vanhaverbeke (Table 5). The local effect is expressed through the citation counts of the authors concerning the studies analyzed.

Table 5: Authors' Local Impact

Author	h_index	g_index	m_index	TC	NP	PY_start
CHESBROUGH H	28	39	1,273	7331	39	2003
LICHTENTHALER U	23	27	1,211	2924	27	2006
VANHAVERBEKE W	23	39	1,438	3957	39	2009
BOGERS M	21	29	1,5	3242	29	2011
FRATTINI F	20	31	1,25	1997	31	2009
SANTORO G	17	20	2,125	1820	20	2017
DI MININ A	15	23	1	927	23	2010
LAZZAROTTI V	15	24	0,938	808	24	2009
MANZINI R	13	22	0,813	760	22	2009
MEISSNER D	13	15	1	774	15	2012
PETRUZZELLI AM	13	16	1,083	813	16	2013
FRISHAMMAR J	12	13	0,8	1148	13	2010
GASSMANN O	12	13	0,632	2895	13	2006
GRIMALDI M	12	17	0,923	712	17	2012
BRESCIANI S	11	12	1,222	1291	12	2016
CHEN J	11	15	0,786	712	15	2011
CHIESA V	11	12	0,688	1272	12	2009
DELL'ERA C	11	12	0,786	363	12	2011
ENKEL E	11	11	0,688	2779	11	2009
FERRARIS A	11	14	1,222	1115	14	2016

PELLEGRINI L	11	16	0,733	477	16	2010
WEST J	11	16	0,579	1676	16	2006
BOGERS MLAM	10	11	2	364	11	2020
CAMMARANO A	10	12	1	376	12	2015
CAPUTO M	10	12	1	376	12	2015

In the bibliometric analysis that includes all citations related to the topic in the global citation analysis, the top five studies with the most global citations are ranked as follows: Dahlander (2010), Chesbrough (2003), Van De Vrande (2009), Enkel (2009), and Chesbrough (2006). Detailed information about other studies can be found in Table 6. A total of 123,878 citations were made during the analysis period. The citations made to the top five studies account for 5.27% of the total citations.

Table 6: Most Global Cited Documents

Paper	Total Citations	TC per Year	Normalized TC
DAHLANDER L, 2010, RES POLICY	1546	103,07	21,92
CHESBROUGH HW, 2003, MIT SLOAN MANAGE REV	1535	69,77	1,50
VAN DE VRANDE V, 2009, TECHNOVATION	1226	76,63	13,66
ENKEL E, 2009, R&D MANAGE	1138	71,13	12,68
CHESBROUGH H, 2006, R&D MANAGE	1083	57,00	4,82
HUIZINGH EKRE, 2011, TECHNOVATION	1035	73,93	17,04
GASSMANN O, 2010, R&D MANAGE	904	60,27	12,82
LEE S, 2010, RES POLICY	837	55,80	11,87
GRETZEL U, 2015, ELECTRON MARK	799	79,90	22,24
JEPPESEN LB, 2010, ORGAN SCI	687	45,80	9,74
COOPER RG, 2008, J PROD INNOVAT MANAG	682	40,12	9,35
LAURSEN K, 2014, RES POLICY	663	60,27	16,13
CHESBROUGH HW, 2007, CALIF MANAGE REV	648	36,00	106,04
BALDWIN C, 2011, ORGAN SCI	640	45,71	10,54
LICHTENTHALER U, 2009, J MANAGE STUD	586	36,63	6,53
BOGERS M, 2017, IND INNOV	581	72,63	15,26
WEST J, 2006, R&D MANAGE	563	29,63	2,50
TERWIESCH C, 2008, MANAGE SCI	562	33,06	7,70
AGRAWAL A, 2015, J ECON MANAGE STRAT	510	51,00	14,19
CHESBROUGH H, 2003, CALIF MANAGE REV	505	22,95	0,50
PARIDA V, 2012, J SMALL BUS MANAGE	504	38,77	14,20
LEE JH, 2014, TECHNOL FORECAST SOC	474	43,09	11,53
BERCHICCI L, 2013, RES POLICY	445	37,08	12,43
DODGSON M, 2006, R&D MANAGE	437	23,00	1,94
HENKEL J, 2006, RES POLICY	434	22,84	1,93

In the examination of the sources in which the studies were published, it is observed that the journal with the highest number of publications is the International Journal of Innovation Management, with 154 articles, followed by Technological Forecasting and Social Change with 152 articles, and R&D Management with 123 articles. Among the 473 publication sources related to open innovation, detailed information about the top 25 publication sources in terms of their relevance to the topic and the citations they received can be found in Table 7.

Table 7: Most Relevant and Most Local Cited Sources

Most Relevant Sources		Most Local Cited Sources	
Sources	Articles	Sources	Articles
INTERNATIONAL JOURNAL OF INNOVATION MANAGEMENT	154	RES POLICY	13918
TECHNOLOGICAL FORECASTING AND SOCIAL CHANGE	152	STRATEGIC MANAGE J	9578
R & D MANAGEMENT	123	R&D MANAGE	6599
TECHNOVATION	114	TECHNOVATION	6132
EUROPEAN JOURNAL OF INNOVATION MANAGEMENT	91	J PROD INNOVAT MANAG	5924
RESEARCH POLICY	88	ORGAN SCI	5173
TECHNOLOGY ANALYSIS & STRATEGIC MANAGEMENT	88	ACAD MANAGE REV	4098
JOURNAL OF KNOWLEDGE MANAGEMENT	81	ACAD MANAGE J	3913

IEEE TRANSACTIONS ON ENGINEERING MANAGEMENT	77	MANAGE SCI	3648
JOURNAL OF BUSINESS RESEARCH	75	J BUS RES	3328
INTERNATIONAL JOURNAL OF TECHNOLOGY MANAGEMENT	73	TECHNOL FORECAST SOC	3287
CREATIVITY AND INNOVATION MANAGEMENT	63	ADMIN SCI QUART	3068
MANAGEMENT DECISION	63	CALIF MANAGE REV	2542
RESEARCH-TECHNOLOGY MANAGEMENT	60	IND MARKET MANAG	2347
JOURNAL OF PRODUCT INNOVATION MANAGEMENT	56	HARVARD BUS REV	2217
TECHNOLOGY INNOVATION MANAGEMENT REVIEW	49	J MANAGE	2166
CALIFORNIA MANAGEMENT REVIEW	48	J KNOWL MANAG	1824
INDUSTRIAL MARKETING MANAGEMENT	45	INT J INNOV MANAG	1690
INDUSTRY AND INNOVATION	45	J MANAGE STUD	1642
INT. JOURNAL OF INNOVATION AND TECHNOLOGY MANAGEMENT	44	J MARKETING	1617
BUSINESS PROCESS MANAGEMENT JOURNAL	33	RES TECHNOL MANAGE	1562
JOURNAL OF ENGINEERING AND TECHNOLOGY MANAGEMENT	33	LONG RANGE PLANN	1557
INNOVATION-ORGANIZATION & MANAGEMENT	31	EUR J INNOV MANAG	1509
JOURNAL OF INNOVATION ECONOMICS & MANAGEMENT	31	MIT SLOAN MANAGE REV	1471
SCIENCE TECHNOLOGY AND SOCIETY	28	TECHNOL ANAL STRATEG	1380

As shown in Table 7, the top five sources most utilized by researchers working on the topic are ranked as follows: Research Policy, Strategic Management Journal, R&D Management, Technovation, and Journal of Product Innovation Management.

An examination of the keywords addressed in the published studies reveals that the ten most frequently used keywords are: open innovation, innovation, crowdsourcing, absorptive capacity, SMEs, collaboration, innovation performance, entrepreneurship, innovation management, and technological innovation. Information about other keywords can be found in Figure 5.

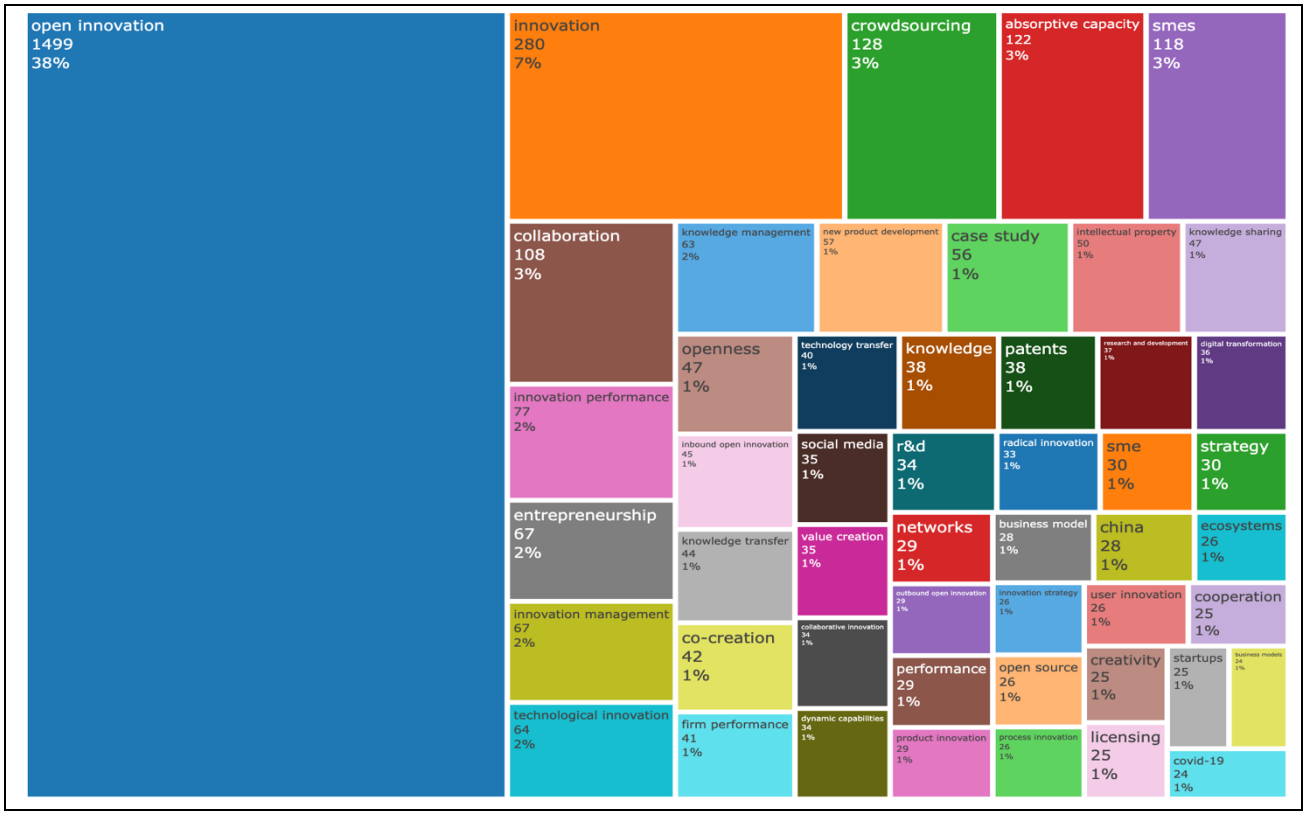

Figure 5: Keywords TreeMap

In the literature, the temporal analysis of the main topics addressed in publications on open innovation has been conducted through a co-occurrence analysis of author keywords (Figure 6).

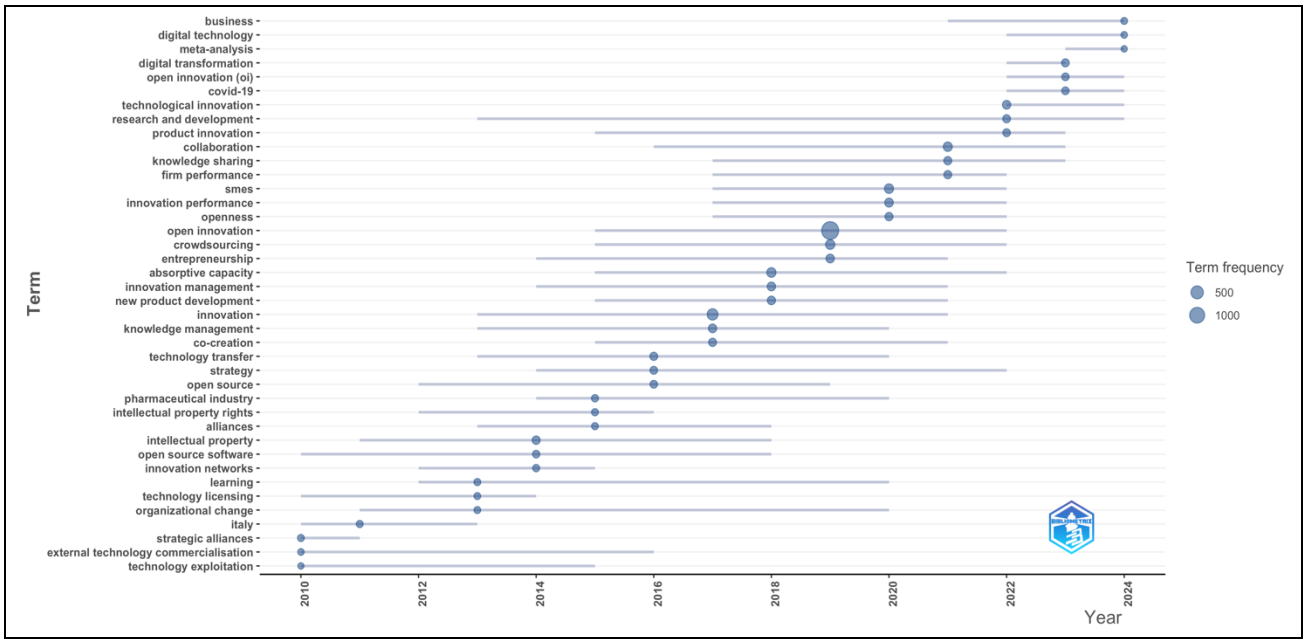

Figure 6: Keywords Trend Topics

When conducting a temporal analysis on keywords, it is observed that over the last five years, concepts such as digital technology, meta-analysis, digital transformation, COVID-19, technological innovation, product innovation, collaboration, knowledge sharing, firm performance, SMEs, innovation performance, openness, crowdsourcing, and entrepreneurship have emerged prominently alongside open innovation. The findings from the keyword network analysis conducted using the Bibliometrix R package with a limit of 50 keywords are presented in Figure 7.

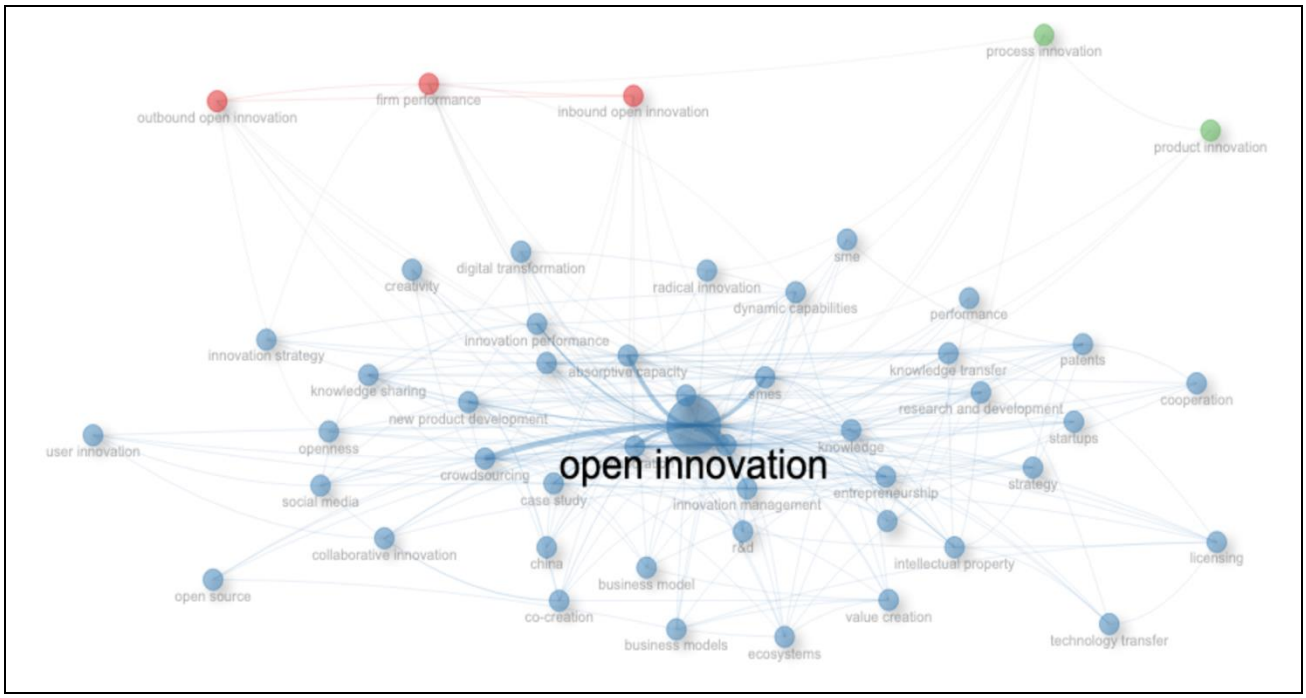

Figure 7: Co-occurrence Network Analysis

Upon examining Figure 7, it can be seen that open innovation forms a common network structure with other concepts, clustering with notions such as innovation, openness, collaboration, crowdsourcing, SMEs, absorptive capacity, knowledge and knowledge sharing, knowledge transfer, innovation performance, innovation management, and technological innovation. Additionally, open innovation establishes a second common cluster with inbound open innovation, firm performance, and outbound open innovation, as well as a third cluster with product innovation and process innovation.

Table 8: Co-Occurrence Network

Node	Cluster	Betweenness	Closeness	PageRank
inbound open innovation	1	0,312	0,011	0,013
firm performance	1	0,556	0,012	0,012
outbound open innovation	1	0,506	0,011	0,011
open innovation	2	828,054	0,021	0,267
innovation	2	33,223	0,018	0,071
crowdsourcing	2	2,41	0,013	0,033
absorptive capacity	2	3,825	0,013	0,033
smes	2	5,571	0,014	0,035
collaboration	2	9,512	0,015	0,042
innovation performance	2	0,985	0,012	0,02
entrepreneurship	2	0,523	0,012	0,019
innovation management	2	1,286	0,013	0,024
technological innovation	2	1,909	0,013	0,024
knowledge management	2	0,866	0,013	0,017
new product development	2	0,404	0,012	0,016
case study	2	0,296	0,012	0,018
intellectual property	2	0,344	0,012	0,017
knowledge sharing	2	0,268	0,012	0,013
openness	2	0,042	0,011	0,01
knowledge transfer	2	0,146	0,012	0,011
co-creation	2	0,132	0,011	0,015
technology transfer	2	0,029	0,011	0,009
knowledge	2	0,331	0,012	0,014
patents	2	0,466	0,012	0,014
research and development	2	0,275	0,012	0,015
digital transformation	2	0,022	0,011	0,008
social media	2	0,081	0,011	0,01
value creation	2	0,209	0,011	0,011
collaborative innovation	2	0,014	0,011	0,01
dynamic capabilities	2	0,214	0,012	0,012
r&d	2	0,043	0,012	0,013
radical innovation	2	0	0,011	0,008
sme	2	0,007	0,011	0,008
strategy	2	0,189	0,011	0,01
networks	2	0,087	0,011	0,01
performance	2	0	0,011	0,008
business model	2	0,102	0,011	0,01
china	2	0,002	0,011	0,009
ecosystems	2	0,19	0,012	0,011
innovation strategy	2	0,014	0,011	0,007
open source	2	0,007	0,011	0,007
user innovation	2	0,017	0,011	0,009
cooperation	2	0,003	0,011	0,008
creativity	2	0	0,011	0,008
licensing	2	0,101	0,011	0,01
startups	2	0	0,011	0,008
business models	2	0,156	0,011	0,009
product innovation	3	0	0,011	0,01
process innovation	3	0,271	0,011	0,012

4. Conclusion

As a result of the bibliometric research conducted on open innovation, it has been observed that interest in the topic has significantly increased, especially after 2016, except for a decline in 2014. In this study covering the years 2003-2024 in the field of business and management within the WOS databases, a total of 3,260 academic works related to open innovation were identified, with approximately 86% of these works published after 2013.

The journals where articles on this topic are published include leading publications such as the International Journal of Innovation Management, Technological Forecasting and Social Change, and R&D Management. The three journals with the highest number of publications on the subject are the International Journal of Innovation Management with 154 articles, followed by Technological Forecasting and Social Change with 152 articles, and R&D Management with 123 articles.

The top three countries with the most publications on open innovation are Italy, China, and the United States. Articles published in these three countries account for approximately 28.6% of the literature. Türkiye ranks 38th in terms of publication numbers, representing only nine studies.

Additionally, Chesbrough and Vanhaverbeke are the most prolific authors on the topic, with 39 publications, followed by Frattini with 31, Bogers with 29, and Lichtenthaler with 27 published works. In citation analysis, influential authors such as Chesbrough, Vanhaverbeke, and Lichtenthaler have made significant contributions; their works account for about 14% of all citations.

According to the information obtained from the common keyword analysis, it is evident that most studies conducted on open innovation cluster around concepts such as innovation, openness, collaboration, crowdsourcing, SMEs, absorptive capacity, knowledge and knowledge sharing, knowledge transfer, innovation performance, innovation management, and technological innovation.

Although it has been observed that the number of studies related to the topic in the field of business and management has steadily increased over the last decade, it is notable that the number of studies originating from Türkiye is very limited (only 9 articles), indicating a need for new research on the subject.

Reference

Bigliardi, B., & Galati, F. (2013). Models of adoption of open innovation within the food industry. Trends in Food Science & Technology, 30(1), 16–26. https://doi.org/https://doi.org/10.1016/j.tifs.2012.11.001

Chesbrough, H. (2006). Open innovation: a new paradigm for understanding industrial innovation. In H. Chesbrough, W. Vanhaverbeke, & J. West (Eds.), Open innovation: researching a new paradigm. Oxford: Oxford University Press, pp. 1–12.

Chesbrough, H. (2011). Open services innovation: Rethinking your business to grow and compete in a new era. San Francisco: Jossey-Bass.

Chesbrough, H. (2024). Open Innovation: Accomplishments and Prospects for the Next 20 Years. California Management Review, 67(1), 164-180. https://doi.org/10.1177/00081256241273964

Dahlander, L., & Gann, D. M. (2010). How open is innovation? Research Policy, 39(6), 699–709. https://doi.org/https://doi.org/10.1016/j.respol.2010.01.013

Galabova, B.B. (2022). Benefits and Disadvantages Of Using Open Innovation In Industry. Globus, 7/2(67), 57-62.

Gassmann, O., Enkel, E., & Chesbrough, H. (2010). The future of open innovation. R&D Management, 40(3), 213–221.

Grant, R. M. (1996). Toward a Knowledge-Based Theory of the Firm. Strategic Management Journal, 17, 109-122. https://doi.org/10.1002/smj.4250171110

Gripp, M. (2024). Open Innovation Explained: Models, Benefits, and Examples. https://www.futurize.studio/blog/open-innovation-benefits-and-models (Erişim Tarihi: 15/10/2024)

Krstić, B., & Vujatović, M.J. (2022). Open Innovation Strategy As A Determinant Of Sustainable Enterprise Competitiveness. Economics Of Sustainable Development, Vol. 6, January-June, № 1, 25-34.

Lee, K., & Yoo, J. (2019). How does open innovation lead competitive advantage? A dynamic capability view perspective. PLOS ONE 14(11), 1-18. https://doi.org/10.1371/journal. pone.0223405

Lloyd, C. (2024). What is Open Innovation? Benefits & Best Practices. https://www. qmarkets.net/resources/article/what-is-open-innovation/ (Erişim Tarihi: 15/10/2024)

Spithoven, A., Vanhaverbeke, W., and Roijakkers, N. (2012). Open Innovation Practices in SMEs and Large Enterprises (October 7, 2012). Small Business Economics Forthcoming, Available at SSRN: https://ssrn.com/abstract=1940704

Thirlway, C. (2024). The benefits of open innovation. https://www.sopheon.com/blog/the-benefits-of-open-innovation (Erişim Tarihi: 15/10/2024)

Yücel, D., & Yücel, R. (2023). Açık İnovasyonun Ar-Ge Maliyetlerine Etkisi. International Journal Of Social And Humanities Sciences Research (Jshsr), 10(92), 271–278. https://doi.org/10.26450/jshsr.3489

Zhang, X., Chu, Z., Ren, L., and Xing, J. (2023). Open innovation and sustainable competitive advantage: The role of organizational learning. Technological Forecasting and Social Change, Volume 186, Part A, 122114. https://doi.org/10.1016/j.techfore.2022.122114.