Economia Aziendale Online

Business and Management Sciences
International Quarterly Review

Innovation in Banking: A Bibliometric Lens on Open Innovation

Alberto Francesconi, Alessandra Tanda

Pavia, September 30, 2025
Volume 16 – N. 3/2025

DOI: 10.13132/2038-5498/16.3.1009-1030

www.ea2000.it
www.economiaaziendale.it

PaviaUniversityPress

Electronic ISSN 2038-5498
Reg. Trib. Pavia n. 685/2007 R.S.P.

Economia Aziendale Online – Business and Management Sciences International Quarterly Review
Vol. 16-3/2025 - DOI: 10.13132/2038-5498/16.3.1009-1030

Innovation in Banking: A Bibliometric Lens on Open Innovation

Alberto Francesconi

Associate Professor

of Business Organisation. Department of Economics and Management, University of Pavia. Pavia, Italy.

Alessandra Tanda

Associate Professor

of Banking and Finance, Department of Economics and Management, University of Pavia. Pavia, Italy.

Corresponding Author:

Alberto Francesconi
alberto.francesconi@unipv.it

Cite as:

Francesconi, A., & Tanda, A. (2025). Innovation in Banking: A Bibliometric Lens on Open Innovation. *Economia Aziendale Online, 16*(3), 1009-1030.

Section:
Refereed Paper

Received: June 2025
Published: 30/09/2025

ABSTRACT

The purpose of this study is to explore the academic literature on open innovation in banking, mapping its volume, growth, and geographic spread, identifying influential authors, journals, and publications, analysing its intellectual structure, and outlining emerging research themes. We employ VOSviewer and Bibliometrix to analyse 96 publications available in Scopus, published between 2008 and 2024. The analysis reveals distinct research streams and highlights gaps for future exploration. The literature shows limited integration between open innovation theory and innovation studies in banking. Empirical research in banking often lacks theoretical grounding, while innovation studies overlook the sector's specificities. Bridging these fields through interdisciplinary work could offer deeper insights and practical value for managers in the area of open innovation in banking.

Lo scopo di questo studio è di esplorare la letteratura accademica sull'innovazione aperta nel settore bancario, mappandone il volume, la crescita e la diffusione geografica, identificando autori, riviste e pubblicazioni influenti, analizzandone la struttura intellettuale e delineando i temi di ricerca emergenti. Utilizziamo VOSviewer e Bibliometrix per analizzare 96 pubblicazioni disponibili su Scopus, pubblicate tra il 2008 e il 2024. L'analisi rivela diversi filoni di ricerca ed evidenzia possibili aree rimaste inesplorate che meriterebbero un maggior approfondimento. Infatti, la letteratura mostra una scarsa integrazione tra il filone teorico dell'open innovation e i contributi in ambito bancario. Gli studi empirici sul sistema bancario, inoltre, spesso mancano di un framework teorico forte, mentre gli studi nell'area scientifica dell'innovazione non considerano le specificità del settore bancario. Integrando le teorie e le evidenze di questi due distinti filoni di ricerca e portando a sintesi quanto sinora emerso in letteratura, si potrebbe offrire agli studiosi e all'industria un più chiaro quadro delle opportunità di sviluppo dell'open innovation nel settore bancario.

Keywords: open innovation, banking, bibliometric review, fintech, partnership

1 – Introduction

Open innovation (OI) is defined as "a distributed innovation process based on purposively managed knowledge flows across organisational boundaries, using pecuniary and non-

pecuniary mechanisms in line with the organisation's business model" (Chesbrough and Bogers 2014; p. 17) and it has recently received much attention in the banking literature and industry (Schueffel and Vadana, 2016).

The relationship between innovation and banking has its roots in the late 1950s, but it has become stronger in the last 15 years. The disruption introduced by digitalisation of financial and banking markets (Fintech) attracted much interest from the academia, policymakers and the industry (Tanda and Schena, 2019; FSB, 2021). Nowadays, financial products and services are offered by traditional regulated financial intermediaries, fintech companies and bigtech companies (e.g., Google and Amazon) (Locatelli & Tanda, 2021; Ghisotti, 2023).

Consistent with the definition of open innovation, fintech and banks engage in partnerships to introduce innovation in financial products and services. In cooperative, flexible and open-minded environments, knowledge is exchanged to improve efficiency and create value for the partners (Dahlander and Gann, 2010; Gianiodis *et al*., 2014; Chesbrough, 2017). This occurs only when companies commit to research and development (R&D), establish business accelerators and fintech hubs, and share talented human resources.

Open innovation is studied by two academic disciplines: the banking and the innovation literature. But these areas of research have developed separately. Chen and Peng (2020) contribute to the banking stream with a short review and study on the financial performance of Taiwanese banks. Interesting case studies also emerge in the literature, not only in the academic literature, but also by policymakers and national and supranational authorities (e.g., OECD, 2023). Within the innovation studies, several bibliometric reviews have been conducted in the past on open innovation (e.g., Kovacs *et al*., 2015; Randhawa *et al*., 2016; Ale Ebrahim and Bong, 2017), but they fail to address the banking sector.

The European Payment Services Directive (PSD2) recognised open innovation (Polasik *et al*., 2020) as a "vital" driver of strategic change in the financial sector: it increases market shares and addresses shareholders concerns even in times of crises (Fasnacht, 2018). Open innovation is also considered extremely relevant when developing financial solutions for social needs, contributing to new collaborations and social relationships (Altuna *et al*., 2015). Successful case studies envision the exploitation of innovation networks in a collaborative way not only internally, but also among external stakeholders, e.g., partners or clients (Carbone *et al*., 2012). Open innovation can be beneficial for the banking and financial industry, but remained scarcely applied (Schueffel and Vadana, 2016) until recently (Al-Naimi *et al*., 2023; Bouteraa *et al*., 2024). Despite a growing interest by the industry, fostered by regulatory innovations (Omarini, 2018; Stefanelli & Manta, 2023) the potential disrupting innovation of open innovation in banking is not fully understood by the literature, and this represents an important research gap (Niankara *et al*., 2025). The aim of this paper is to contribute to our understanding of the current state of research on open innovation in banking. By studying the number of studies, their growth and the geographic spread of the field, we will identify influential authors, publishing outlets and publications. Finally, we will outline emerging research themes. To achieve this, we conducted a bibliometric review. Evidence shows that the literature on open innovation in banking is growing, but there is no established group of researchers dealing with the issue. Furthermore, an analysis of the content of the papers reveals that those dealing specifically with open innovation in banking are few and mostly present case studies. Often, they fail to provide a tangible contribution to the literature on innovation. Future research should overcome these

silos and integrate the theories of innovation with those of banking. This integration could be beneficial for both areas of study.

The paper is structured as follows: the second section presents the literature on open innovation; the third section presents the methodology; the fourth section presents the results; and the last sections conclude and discuss some potential avenues for future research.

2 – Literature review on open innovation

The literature has deeply investigated innovation and the use of external knowledge for innovation: to perform technical innovation, information must flow between the firm and those surrounding it (Utterback, 1971), giving relevance to "lead users" in providing valuable insights for innovation (Von Hippel, 1976; 1986). External factors are found relevant for the organisation's ability to benefit from innovations (Teece, 1986) and developing an "absorptive capacity" enables organisations to recognise, assimilate and apply external knowledge (Cohen and Levinthal, 1990).

The concept of open innovation was introduced in 2003 by Chesbrough: companies can and should use both external and internal ideas, as well as internal and external routes to market their innovation. Open innovation has recently been redefined by Chesbrough and Bogers (2014; p. 17) as "a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with the organization's business model". Three types of open innovation exist: inbound open innovation means incorporating external knowledge and ideas into a company's innovation processes; outbound open innovation involves sharing a company's innovation processes with external parties; coupled open innovation is the simultaneous use of both approaches.

Inbound open innovation received more attention by the literature compared to coupled and outbound open innovation (Bogers *et al*., 2018). The human aspect of open innovation, project-level attributes, platforms and ecosystems, public administration, and societal issues are the most studied aspects of open innovation.

Business models are used to define the requirements for these architectures and systems. Thus they use external and internal knowledge and ideas to create value, while establishing internal mechanisms to claim a portion of that value (Bogers *et al*., 2018; Bogers *et al*., 2019).

Open innovation is imperative in today's world due to the dispersion of knowledge and ideas sources and the changing geographic location of innovation (Bogers *et al*., 2019). Since the 1990s, investment in R&D have declined, and open innovation has increased. Shareholder activism, short-term focus, and research-intensive start-ups contributed to these trends. But open innovation should be conceived as complementary – and not a substitute – to in-house R&D. Indeed, the absorptive capacity required to recognise, comprehend, and transfer advanced knowledge from external sources is rooted in deep internal knowledge and know-how. Additionally, the diffusion of digital convergence and digital platforms make open innovation even more imperative.

Empirical studies on open innovation have first and mainly focused on product-related open innovations (West and Bogers, 2017). Limited empirical research is available on open innovation in the service sectors and, especially, the practical challenges of managing, designing, and developing open service innovation (West and Bogers, 2017).

Open innovation works differently for service companies: often due to the intangible nature of services, service innovation lacks a formal R&D entry. And it requires customer involvement in an iterative process that results in a customer experience (Chesbrough, 2011).

Banks can implement open innovation to integrate internal and external ideas and capabilities into organisational systems, enabling them to participate in the innovation process with third parties and stakeholders in general, instead of working in silos and relying solely on internal resources and knowledge. Banks can experiment new solutions through open innovation, which can be launched in alternate markets in partnership with other institutions or by offering custom products that meet the requirements of niche markets.

Although in the past adoption of open innovation in banking has been slow, it has now become more pressing: the shift to a digital economy, the 2008 financial crisis, new technologies and techniques, such as machine learning (ML) and artificial intelligence (AI), the growth of fintech companies, and the growth in data available have all contributed to the adoption of open innovation in banking. The data surge from the digital business has accelerated this transition. The financial industry, and banks in particular, are prime examples of data-driven businesses (Zillner *et al*., 2016). Collecting customer data for business transformation, creating new revenue streams, managing risks, and improving customer loyalty (Ali *et al*., 2021) are all examples of how banks can use big data analytics to simplify their open innovation processes.

An open innovation approach helps traditional banks collaborate with fintech firms to co-innovate and meet rapidly changing customer needs. It facilitates the exchange of ideas, technical expertise, experience, and data between banks and fintech firms, often involving an extended network of partners. Banks need to manage investments and partnerships by deciding whether to invest internally in fintech projects and compete with fintech start-ups / firms, or to invest directly in them, including through mergers and acquisitions (Lee and Shin, 2018; Cappa *et al*., 2022), although further research is needed on the 'cost-benefit ratio' of such operations from an economic, strategic and organisational perspective.

Further strategies may also be possible. For example, Stefanelli and Manta (2023) reported that banks may choose to partner with external fintech companies that offer ready-made white-labelled solutions. In this case, the bank purchases a pre-made solution from a fintech and implements it under its own brand, with the advantage of reducing time-to-market. Another possible collaboration model is to integrate new in-house solutions or to adopt software-as-a-service solutions. Lee and Shin (2018) argue that banks must manage their increasingly digital and demanding customers, and must face high costs in managing regulations and integrating new technology with existing legacy banking information systems. However, these steps are essential for providing a consistent consumer experience across different channels, as well as ensuring the security and management of sensitive customer data. According to Stefanelli and Manta (2023), to maintain their leadership, established companies should adopt the right combination of an internal technology structure based on an API (or Application Programming Interface)-driven platform and a portfolio of partnerships with innovative external partners that ensure the development of new products or services with greater value for the end customer, towards a logic of customer centricity. Furthermore, the emergence of the open banking model and relevant regulations such as PSD2 have compelled banks to reassess their business models and pursue collaborative strategies with various players in the digital financial ecosystem (Ali and Rangone, 2023).

In brief, key drivers of openness in financial services include open banking regulations requiring data sharing, open architecture models using third-party products/services, open platforms and marketplaces, open APIs enabling third-party access, and new open business models like banking-as-a-service.

Open innovation allows banks to gain speed-to-market advantage by leveraging diverse capabilities while focusing on core competencies. Effective implementation requires fully integrating the inbound flow of external ideas, outbound flow of underutilised internal ideas, and coupled processes combining internal and external knowledge. Banks can white-label fintech solutions and leverage open banking APIs to share data and develop innovative services with partners. Open innovation promotes agility, continuous learning, accelerated growth and an enhanced customer experience for banks.

3. Methodology

The topic of interest of this paper lies in the intersection of two established streams of studies: banking and innovation. To select the most appropriate and relevant studies to be reviewed in this paper, we performed a search on Scopus at the end of March 2024 using the following search query: "open innovation*" AND ("bank*" OR "financial institut*" OR "financial intermed*" OR "financial serv*"). The search returned 147 papers. The search included manuscripts published in all the years or type of publication (book chapters, book reviews, or conference proceedings). To avoid the inclusion of irrelevant papers mentioning "bank" as the facility where samples or items (e.g., blood or seeds) are collected, we filter the results to include only relevant research areas, thereby excluding areas such as Environmental Science, Energy, Agricultural and Biological Sciences, Psychology and Medicine. Additionally, we limited the search to papers written in English.

We manually checked the results and removed any irrelevant studies. The final sample comprises 96 documents (Figure 1).

We selected Scopus because it has wider coverage than Web of Science and it is commonly used in bibliometric studies (e.g., Secinaro *et al.*, 2021; De Giuli *et al.*, 2024; Francesconi and Tanda, 2024). Previous studies and reviews in management claim that Scopus is the preferable database option because it includes a wider range of relevant journals (Ahmed *et al.*, 2022; Hallinger and Kovačević, 2019; Mongeon and Paul-Hus, 2016).

Fig. 1 – Process of sample construction (Source: authors' elaboration)

After identifying the sample, we analysed the key figures, the most relevant journals, and the leading institutions.

Using methods such as co-citation analysis, bibliographic coupling and keyword analysis, we described the conceptual and intellectual framework of the research area, employing the Bibliometrix package in R and the VOSviewer software.

Finally, we discussed the main articles based on their cumulative number of citations to delineate the different research streams and research gaps that remain uncovered by the literature.

4 – Results

4.1 – *Bibliometric citation analysis*

The studies included in the analysis have been published in journals between 2008 and 2024 (Table 1).

Table 1 – Key information on the documents in the sample (*Source*: Bibliometrix output)

Description	Results
Documents	
Timespan	2008-2024
Sources (Journals, Books, etc)	67
Documents	96
Annual Growth Rate %	2.57
Document Average Age	6.26
Average citations per doc	11.17
References	4599
Authors	
Authors	242
Authors of single-authored docs	11
Authors collaboration	
Single-authored docs	17
Co-Authors per Doc	2.78
International co-authorships %	15.62

Figure 2 displays the number of articles per year and the cumulative number of documents in the sample. The Figure highlights the rising academic attention given to the subject. A total of 242 authors published 96 documents in 67 different sources (81% of contributions are published as articles in journals). They received 11.17 citations on average and have overall more than 4,500 references. Moreover 15.62% of the papers are published by authors cooperating internationally and 17.7% of the studies are single-authored.

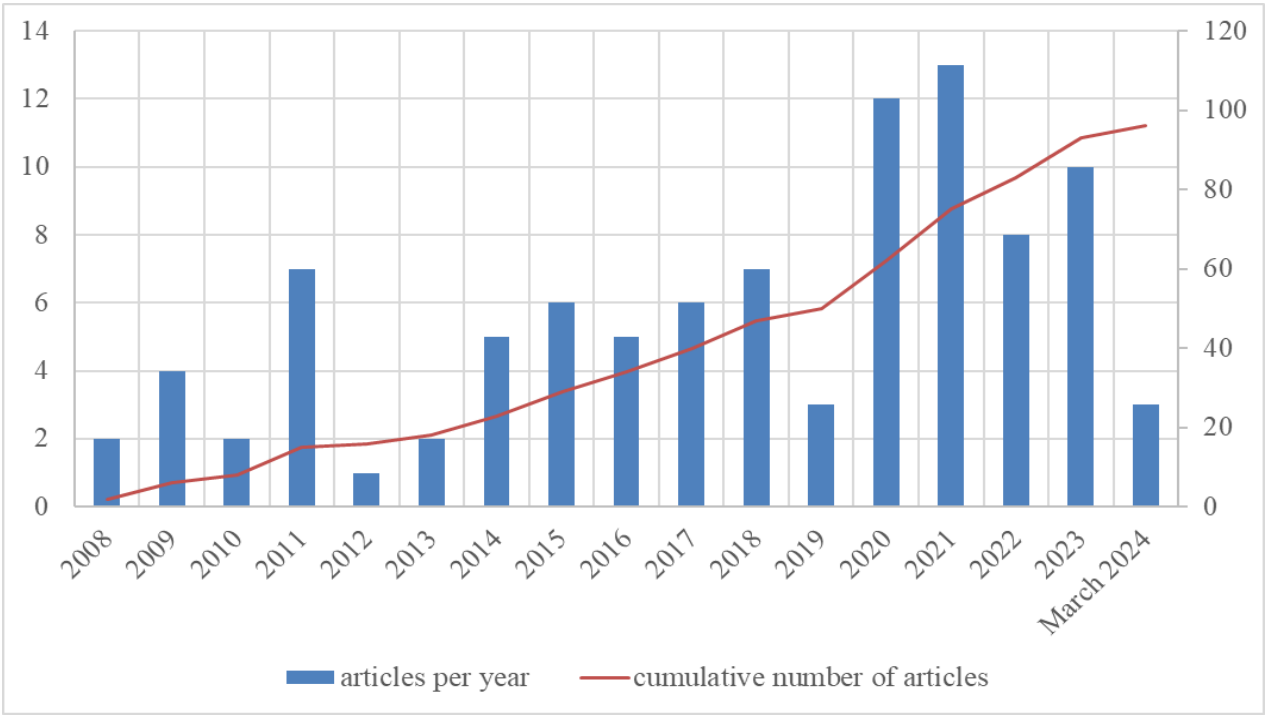

Fig. 2 – Dstribution of articles per year and cumulative growth (Source: authors' elaboration)

The most influential authors, journals and institutions in the field are identified through bibliometric citation analysis. Table 2 shows the top-5 authors per document published. We limit to 5 authors because, based on the evidence on the sample, most of the authors are present with 1 or 2 publications.

Table 2 – Most productive authors. (Source: authors' elaboration)

Author	Number of documents	Total citations
Fasnacht D.	5	66
Mention A-L.	4	38
Cooke P.	3	31
Martovoy A.	3	25
Torkkeli M.	3	25

Figure 3 shows the most relevant sources in terms of total publications (left axis) and citations (right axis) on the topic of open innovation in banking. Except the *Journal of open innovation: technology, market, and complexity*, that has 17 total documents and more than 300 citations, the rest of the journals have 4 or fewer documents and a lower number of total citations.

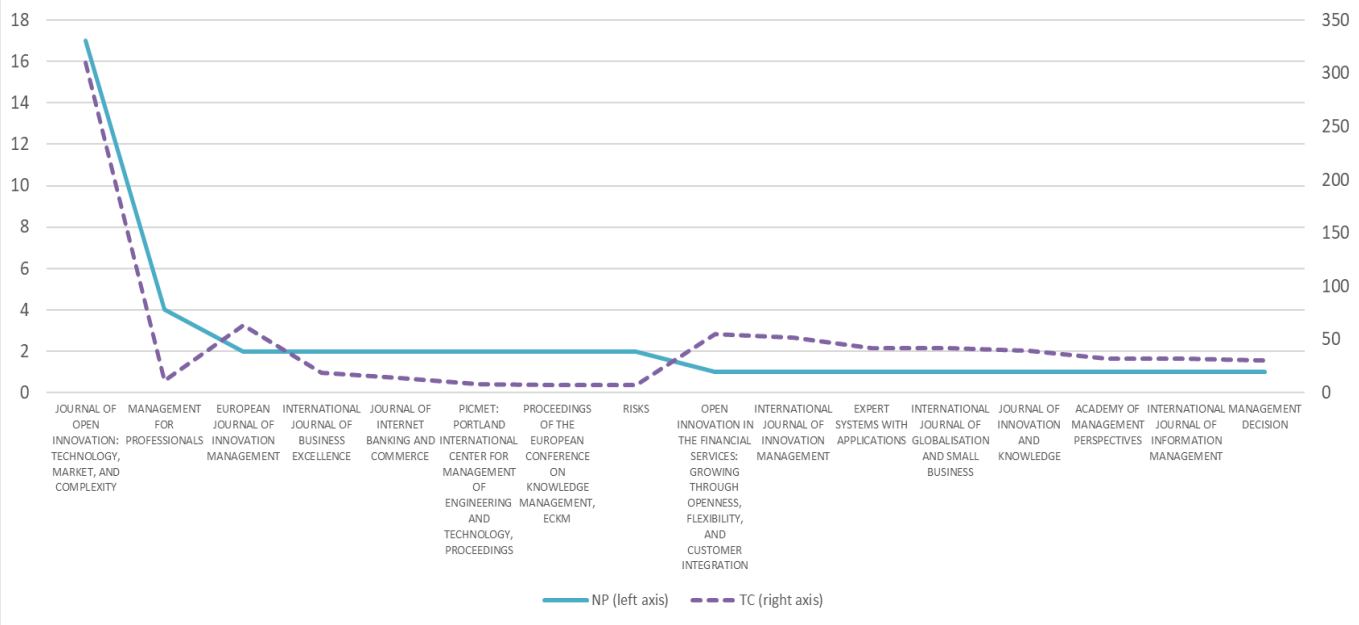

Fig. 3 – Sources number of publications (left axis) and total citations (right axis)
(*Source*: authors' elaboration on Bibliometrix output)

The countries with the most prolific scientific production as of 2024 are reported in Table 3, where we also show total production as at 2020 and 2010 for the same countries. Italy, Indonesia and Switzerland are leading with the highest number of publications (respectively 24, 21 and 20 publications). Additionally, it is worth noting that Indonesia has experienced a strong growth in the last years. In terms of citations, the countries most cited are Italy, Switzerland and Spain (Table 4).

Table 3 – Top-5 countries for total number of publications over time.

Country	Total number of publications as of 2024	Total number of publications as of 2020	Total number of publications as of 2010
Italy	24	14	0
Indonesia	21	6	0
Switzerland	20	20	1
USA	17	17	0
China	16	6	3

VOSviewer co-citation analysis allows us to identify the articles that serve as foundational pillars for research on open innovation and banking, highlighting joint appearances. Results for the co-citation of documents is reported in Figure 4. We set the minimum number of references for the document at 3 otherwise the analysis would become too restrictive. By doing so, we end

up with the visualisation of 25 documents. We identify three main clusters (and a fourth made of just one document).

Table 4 – Top-5 countries for total citations.

Country	Total number of citations as of 2024	Average citations as of 2024
Italy	115	19,2
Switzerland	107	35,7
Spain	91	30,3
United Arab Emirates	83	83
Bahrain	63	63

The *first* cluster (red) comprises papers on open innovation in banking and the evaluation of advantages of innovations (e.g., De Brentani, 1993; Fasnacht, 2018).

The *second* cluster (green) includes more dated papers that set the ground for innovation and economic rationale of innovation adoption (e.g., Von Hippel, 1988; Cohen & Levinthal, 1990). The *third* cluster is focused on open innovation (e.g., Laursen & Salter, 2006; Enkel *et al*., 2009).

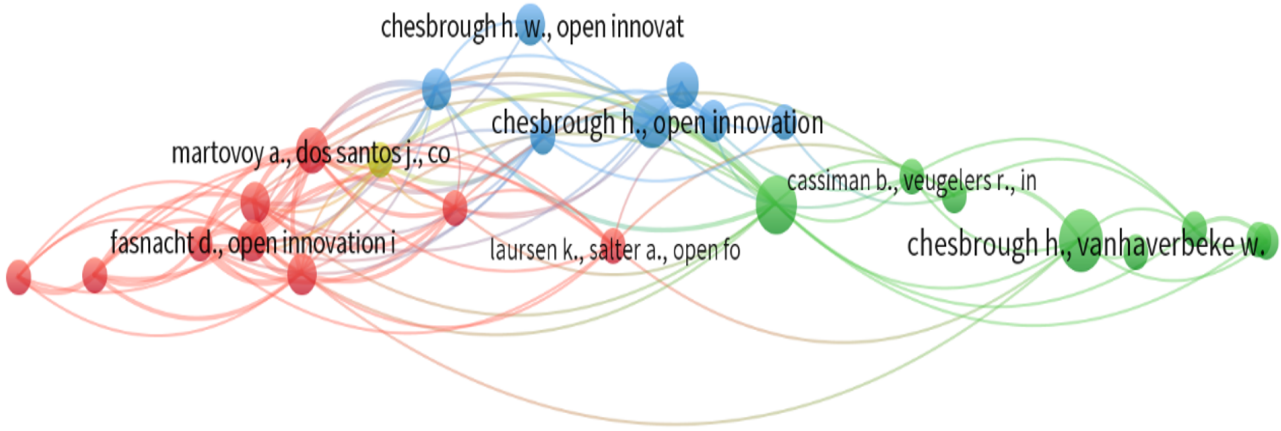

Fig. 4 – Documents co-citation (*Source*: VOSviewer output)

Keywords are also generally analysed within the framework of bibliometric reviews. These analyses can unveil the main topic of interest in the field of open innovation and banking in the published studies and pave the way for future investigations.

Open innovation is the most frequent keyword and the one with the strongest growth (Figure 5). The literature dealing with open innovation seems to be especially focused on this type of innovation, while other keywords appear to be a complement to the main topic of the studies.

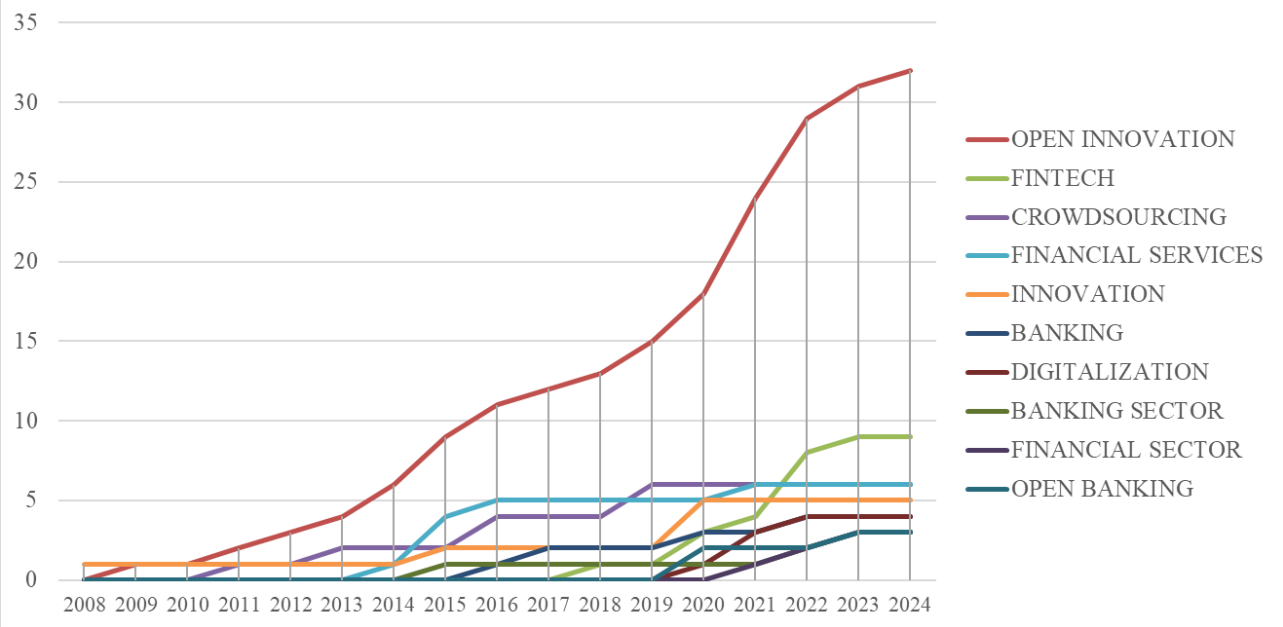

Fig. 5 – Top-10 keywords evolution over time
(*Source*: authors' elaboration on Bibliometrix output)

The trending topic also shows a relatively more recent diffusion of the keyword "fintech" that, together with "open innovation", seems to be one of the core topic for the next set of researches published in this field (Figure 6).

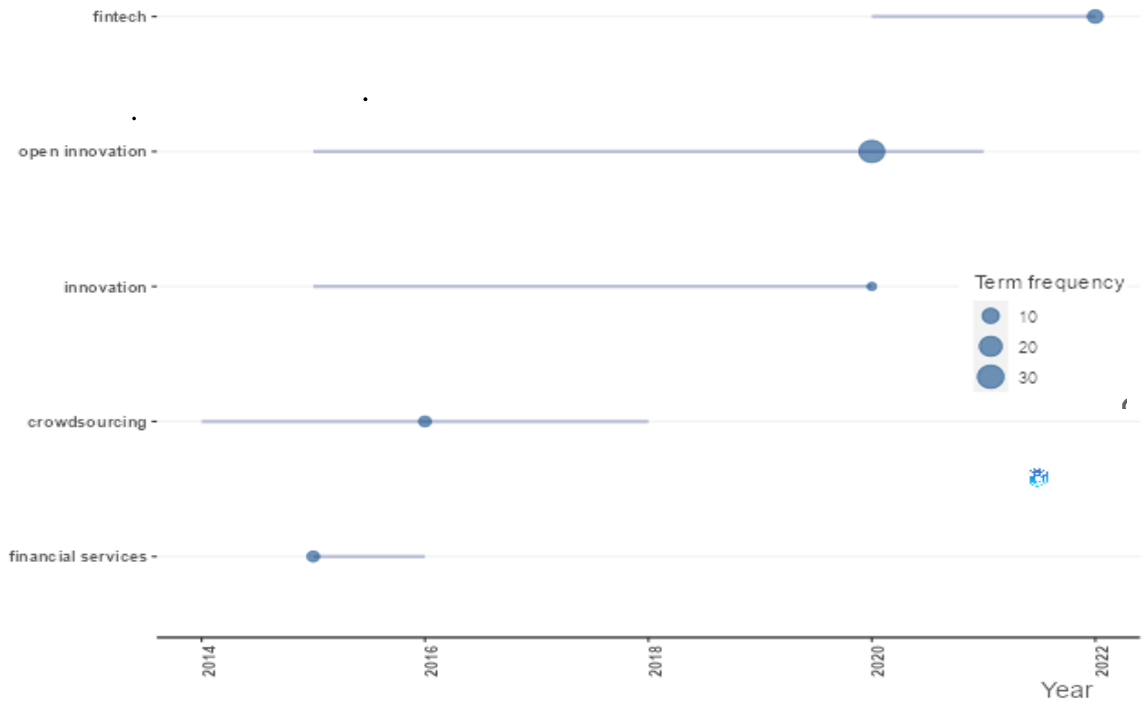

Fig. 6 – Trending topics (Source: Bibliometrix output)

Through the graphical representation of VOSviewer networks we highlight different features: the size of the dots is determined by the occurrence of the keyword, and the thickness and proximity of the lines indicate the frequency of occurrence.

We present the keyword co-occurrences for the full sample (Figure 7) and represent the keywords with at least 3 co-occurrences. We identify 5 different clusters. The main cluster (more central and with higher weight) is the cluster dealing with open innovation and crowdsourcing (purple). Open innovation has 44 links with the other clusters, which comprise the following: i) digitalisation, fintech and open banking (yellow); ii) artificial intelligence, machine learning and big data (blue); iii) banking and financial services (green); iv) innovation and management of innovation (red).

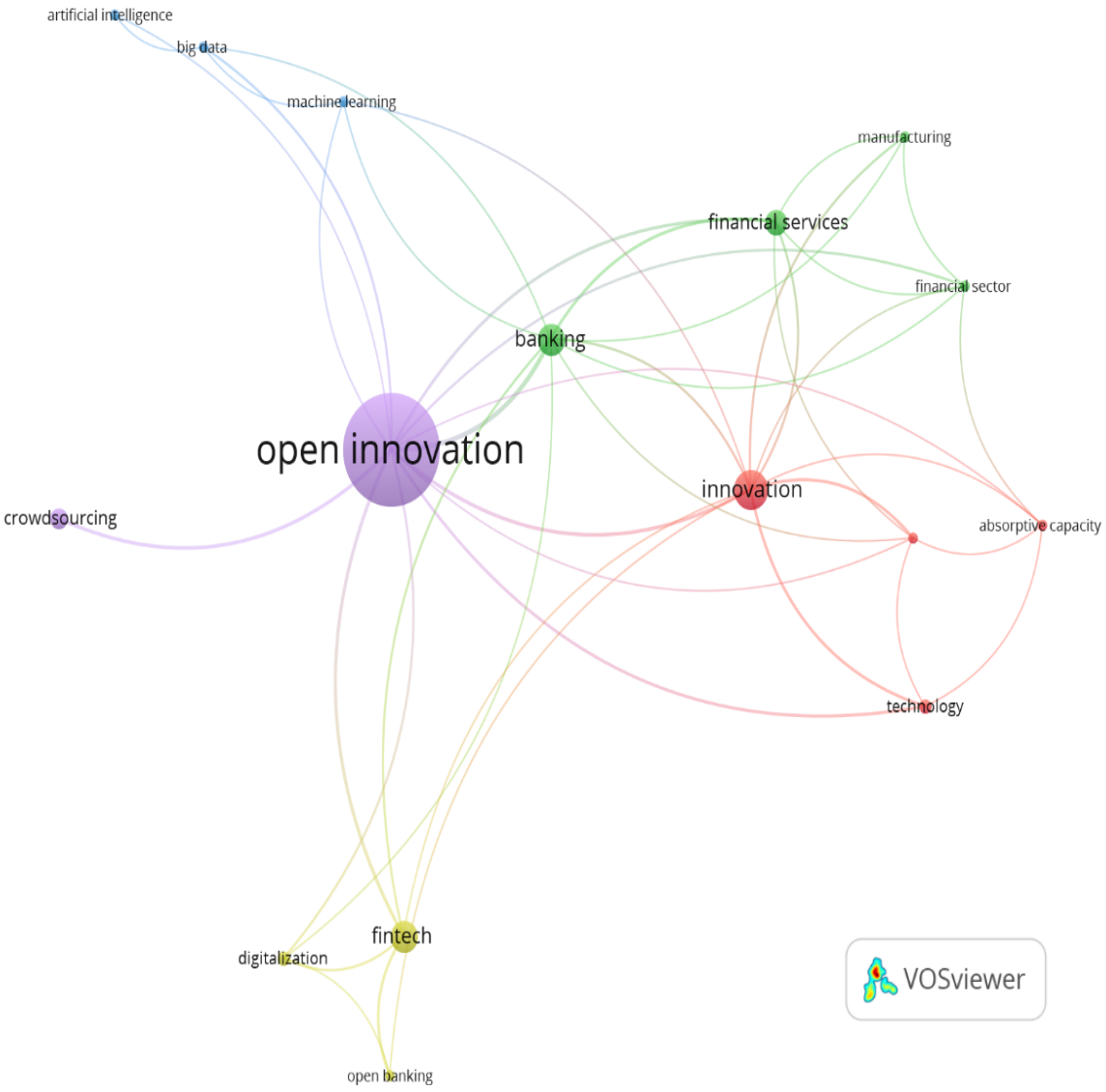

Fig. 7 – Keyword co-occurrences (min 3 occurrences) (*Source*: VOSviewer output)

4.2 – *Overview of the most cited papers and literature thematic mapping*

To gain a deeper understanding of the literature in this field of study, we perform two additional analyses. First, we provide an overview of the most influential studies in our sample. Second, we build and briefly discuss the thematic map of the papers in our sample.

To select the most cited papers, we rank the studies in our sample according to total citations and provide a short overview. Since older documents are more likely to be published, we also present the top 10 most-cited papers based on the average number of citations per year (De Giuli *et al*., 2024) to mitigate the potential effect of document age on the number of citations.

The selected documents are listed in Table 5. This analysis enables us to identify the studies that are considered most relevant by peer researchers. Moreover, these papers are frequently referenced by researchers investigating the subject, and they are likely to exert a significant influence on future literature. It is unsurprising that the most frequently cited papers have been published since 2009, given that the subject is a relatively recent one which is still evolving. The following three papers have been identified as those which have received the highest number of citations: Alzoubi and Aziz (2021), Rabbani *et al*. (2021) and Fasnacht (2009). Although all the papers included in the review, among the most cited, deal with open innovation and banking, they stress one or the other aspect and generally fail to address the two simultaneously with the same degree of depth. E

An exception is the seminal paper by Fasnacht that discusses the adoption of open innovation by the banking sectors and acknowledges a slow speed of adoption.

Table 5 – Top documents by total citations (*Source*: Authors elaboration on Bibliometrix output)

N	Paper	Total citations	Main research question	Sample and methodology	Key takeaways
1	**Alzoubi and Aziz (2021)**	83	– Investigates the correlation between the emotional intelligence (EI) of top managers and the quality of their strategic decisions – also examines the mediating role of open innovation, which is conceived as an essential tool for leadership	213 questionnaires collected from national banks in the United Arab Emirates	Significant positive correlation between managers' EI and the quality of their strategic decisions, and that intelligent information systems can enhance open innovation
2	**Rabbani *et al*. (2021)**	63	– Analyses how the Islamic financial system works in the post-COVID-19 recovery and how fintech can address the economic consequences of COVID-19	Review 125 studies	COVID-19 pandemic has encouraged the growth of social and open innovation, and the financial world has turned to open innovation to provide the world with a fast, timely, reliable and sustainable solution
3	**Fasnacht (2009)**	55	– Investigates the transformation of financial services and the new forms of innovation	Literature review and case studies on banks	The adoption of open innovation in financial services has been slow

4	**Muhdi and Boutellier (2011)**	52	– Explores crowdsourcing as one of the potential applications of open innovation	Case studies	Emphasise the emergence of virtual innovation communities, including both firm-hosted and internal company communities as well as third-party actors
5	**Altuna *et al.* (2015)**	49	– Explores the social innovations issue, conceived as innovative products or services aimed at meeting social needs and creating new relationships or collaborations under open innovation frameworks	Case study	Find three main managerial antecedents in the case study: integrating corporate social responsibility into business strategy with top management commitment, separating social innovation activities from traditional banking activities using a structural ambidexterity model, and applying open innovation principles by involving non-profit organisations for ideas and adoption
6	**Najib *et al.* (2021)**	46	– Explores the adoption of fintech in Indonesia.	Evaluates Indonesian small food businesses relying on P2P platforms	Open innovation in the paper is cited by the authors to argue that fintech is an open innovation product that can also be developed by fintech start-ups - and not only large banks - that can compete with them and that the increasing adoption of fintech solutions by food industry demonstrates its embrace of open innovation practices in its business model
7	**Náñez Alonso *et al.* (2021)**	44	– Analyse Central Bank Digital Currencies (CBDCs) – i.e. digital currencies backed by central banks.	Statistical correlation analysis to identify promising candidate countries/regions across different continents that exhibit high potential for successfully implementing a CBDC	Although the paper is not focused on open innovation, the latter is cited as one important tool to develop this type of innovative currencies
8	**Rossi (2015)**	42	– Discusses the role of open innovation and venture capital (VC) in financing and fostering innovation.	Focus on VC activity in Italy	The synergy between innovative firms with technical expertise and VCs with financial and managerial skills can lead to mutual success, but further empirical testing and comparative research across different industries is needed
9	**Carbone *et al.* (2012)**	42	– Understand the organisational changes required to adopt open innovation approach.	Case study examples from Bankinter, Telefonica I+D, and Repsol.	Adopting open innovation in an organisation requires both a change in the innovation process and a cultural shift supported by advanced technology
10	**Medase and Abdul-Basit (2020)**	39	– Examine the importance of external sources of knowledge as an influencing factor on innovation exploiting multiple external sourcing strategies, the	Data based on surveys by the World Bank on sub-Saharan Africa	Both internal and external sources of information are necessary to achieve the desired degree of innovativeness in open innovation domain

			internal competencies of firms, and industry characteristics into a singular conceptual model.		

Beside the top-cited paper by total citations, we also rank papers according to total citation per year (Table 6). Most of them are also present in Table 5. The objectives and key findings of these additional papers are briefly summarised below.

Table 6 – Top documents by total citations per year. Papers marked with an * are also reported in Table 5 (*Source*: Authors elaboration on Bibliometrix output)

N	Paper	Total citations	Total citations per Year
1*	**Alzoubi and Aziz (2021)**	83	20.75
2*	**RABBANI MR, 2021**	63	15.75
3*	**NAJIB M, 2021**	46	11.5
4	**MIKHAYLOV A, 2023**	23	11.5
5*	**NÁÑEZ ALONSO SLN, 2021**	44	11
6	**NASEER S, 2021**	32	8
7*	**MEDASE SK, 2020**	39	7.8
8	**JIAO H, 2022**	18	6
9*	**ALTUNA N, 2015**	49	4.9
10	**RASHID MHU, 2020**	24	4.8

Mikhaylov *et al*. (2023) argue that financial institutions face growing competition from fintech start-ups and bigtech companies like Facebook and Google, which leverage customer big data. To address this, banks must collaborate with fintechs and adopt technologies like cloud platforms, AI, and ML. As younger customers prefer digital banks, incumbents need to boost innovation and digitalisation. The study, focused on Russia's fintech sector (2002-2020), concludes that equal access to information via advanced infrastructure promotes financial development. AI, ML, cloud platforms, and improved technology are key drivers of open innovation in the banking sector.

Naseer et al. (2021) examine the impact of technological advancements in the field of Information and Communication Technology (ICT) on the transformation of the banking sector in Pakistan. Technology (ICT) on the transformation of the banking sector in Pakistan. The researchers explore the role of distinctive resources, such as Information Proactiveness Motivation (IPM), in influencing organisational performance. They find that creative cognitive style boosts individual and firm creativity, generating new ideas and innovations, especially for entrepreneurs. IPM, creative cognitive style, and open innovation enhance operational performance and innovation climate.

Jiao and Cui (2022) explore open innovation in emerging economies, emphasising the role of institutional pressures. They recommend policies supporting digital investment and regional clusters to promote open innovation.

Rashid *et al*. (2020) examine customer loyalty in Islamic banks, focusing on whether service quality influences loyalty. While the paper touches on open innovation briefly in the conclusion, it suggests that incorporating customer ideas and feedback can help develop products that meet market needs, potentially boosting customer loyalty and financial success. However, the study does not provide direct empirical evidence on this connection, leaving it as a suggestion for future research.

When looking at the overall picture of the most cited papers, the literature on open innovation in the financial sector draws upon a diverse array of theoretical foundations. Early works such as Fasnacht (2009) primarily utilised open innovation theory to examine the transformation of financial services.

Subsequent studies expanded the theoretical landscape, incorporating frameworks such as crowdsourcing theory (Muhdi and Boutellier, 2011) and social innovation theory (Altuna *et al*., 2015). More recent research has further broadened the theoretical base, with Alzoubi and Aziz (2021) integrating emotional intelligence and organisational intelligence theories, while Naseer *et al*. (2021) employed resource-based theory.

The latest studies, exemplified by Jiao and Cui (2022), have adopted more complex theoretical frameworks, combining institutional theory with knowledge management theory to explore open innovation in emerging economies. This evolution reflects a growing recognition of the multifaceted nature of open innovation in finance, necessitating interdisciplinary approaches to fully capture its complexities.

The methodological approaches employed have been as diverse as the theoretical frameworks. Early research relied heavily on qualitative methods, with Fasnacht (2009) utilising literature reviews and case studies.

This trend continued with Altuna *et al*. (2015) and Carbone *et al*. (2012) also adopting case study approaches. However, there has been a gradual shift towards more quantitative and mixed methods. Alzoubi and Aziz (2021) employed surveys and questionnaires, while Náñez Alonso *et al*. (2021) conducted statistical correlation analysis. More recent studies have leveraged large-scale datasets, such as Jiao and Cui's (2022) analysis of the World Bank Enterprise Survey. Mikhaylov *et al*. (2023) analysed macroeconomic indicators, while Rashid *et al*. (2020) combined primary and secondary data in a mixed-methods approach. This methodological diversity reflects the field's advancement and the increasing availability of relevant data.

The collective findings of these studies paint a nuanced picture of open innovation in banking. Fasnacht (2009) initially noted slow adoption of open innovation in financial services, but subsequent research has revealed its growing importance.

Alzoubi and Aziz (2021) found a positive correlation between managers' emotional intelligence and strategic decision quality, while Rabbani *et al*. (2021) highlighted how COVID-19 accelerated open innovation adoption in banking. Mikhaylov *et al*. (2023) identified AI and ML as significant factors for open innovation-based fintech potential, and Jiao and Cui (2022) demonstrated the positive influence of institutional pressures on open innovation in emerging economies.

Despite these insights, significant research gaps remain. There is a clear need for more empirical testing across geographical contexts, particularly in emerging economies. Furthermore, the relationship between open innovation, customer loyalty, and financial performance in banking requires empirical examination. Future research should also explore the long-term impact of AI and ML on open innovation in banking.

To understand the potential development of the field, we also build and analyse the thematic map through bibliometrix. The thematic map employs co-word network analysis and clustering (Cobo *et al*., 2011). Figure 8 shows the two largest bubbles are in the motor themes, necessary to have a basic understanding of the topics under analysis.

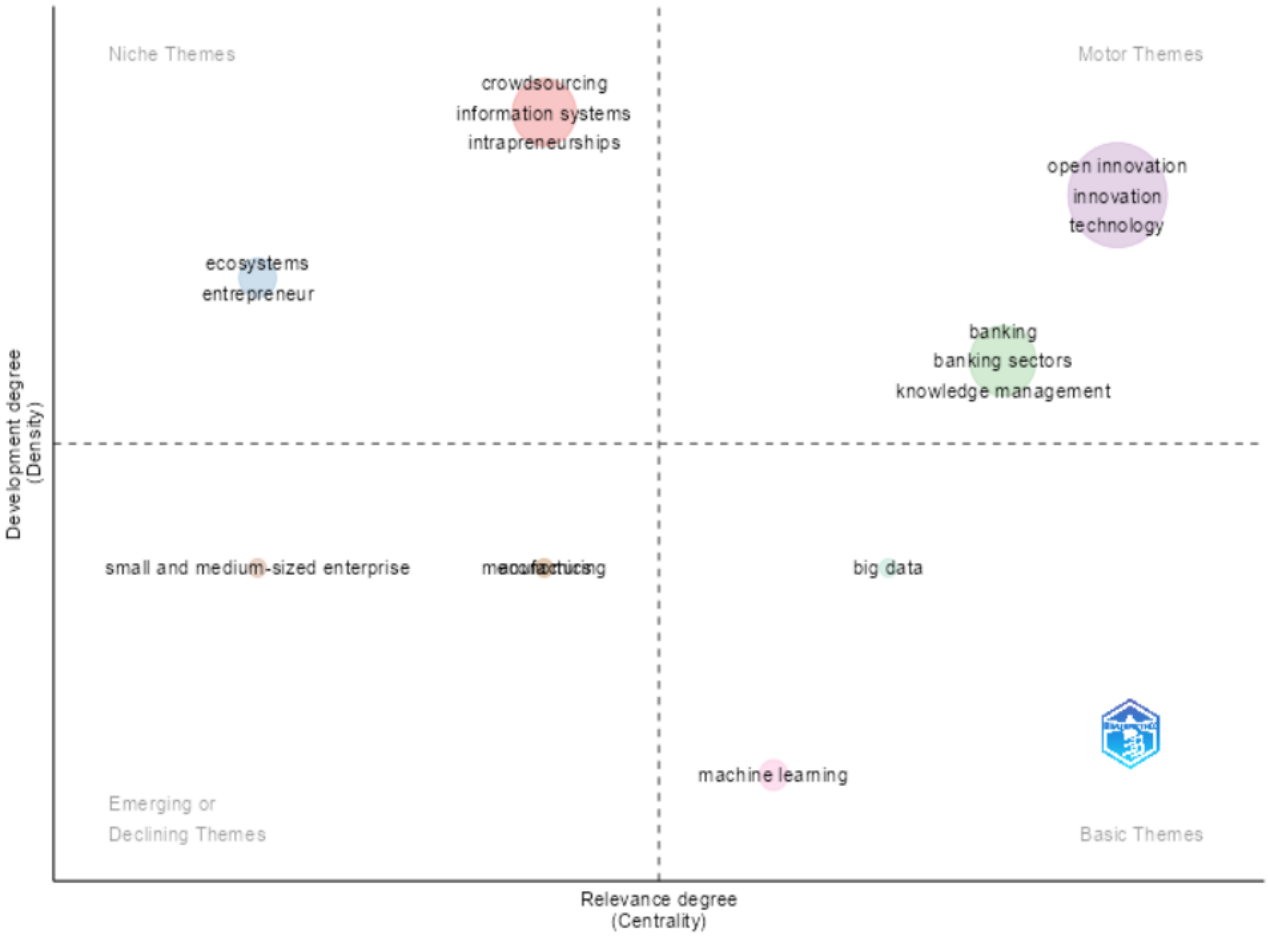

Fig. 8 – Thematic map (*Source*: Bibliometrix output)

The first contains papers dealing with "open innovation, innovation, technology" (e.g., Fan and Huo, 2009; Carbone *et al*., 2012); the second includes "banking, banking sectors; knowledge management" (e.g., Akhavan *et al*., 2017; Naseer *et al*., 2021). Basic themes relate to big data and ML, the technologies deemed essential to successfully develop open innovation and innovation in general in banking. The relevance of niche themes is limited, with this particular sample focusing on entrepreneurs and specific platforms or information systems, for example, crowdfunding. Additionally, the emerging/declining themes are underrepresented in the sample and are related to "manufacturing", "economics", or "SMEs."

5 – Discussion on future research directions and study limitations

This paper employs a bibliometric review and finds the number of papers on open innovation applications in banking is still limited but growing. Network of authors is not very developed and teams appear to work in silos. When looking at the content of the papers, we notice that most contributions present case studies and only few address the theoretical contribution to the literature on innovation in banking.

To improve knowledge on the topic, we suggest some research questions below. From the methodological point of view, more empirical testing and comparative research are needed, particularly across different countries, e.g. in emerging economies and different institutional contexts.

1. What are the specificities of open innovation in financial services compared to traditional product-based industries, and how do organisational resistance, strategic aspects, and institutional pressures influence open innovation in this sector?

2. What are the key strategic resources that banks need to develop effective open innovation strategies?

3. What is the significance of organisational platforms, business ecosystems and social issues in banking applying a systemic logic and how does this relate to open innovation?

4. How can the "banking-as-a-platform" concept be utilised to assess the efficiency and productivity of the fintech sector?

5. What are the mechanisms through which the "banking-as-a-platform" model can reduce information asymmetry, encourage the entry of neo-banks, and enhance competition in the market?

6. What policy-making activities are needed to regulate the fintech market and address regulatory gaps in open innovation approaches?

7. How can banks and fintech companies best integrate at the micro level to maximise the benefits of their collaboration through open innovation platforms?

8. How can incorporating customer ideas and feedback through open innovation help banks develop products and services that better meet market needs and technological advancements, and how can this contribute to increased customer loyalty and financial success (e.g., performing empirical studies on the relationship between open innovation, customer loyalty, and financial performance in banking)?

9. How do big data analytics, AI and ML have a systemic impact on the definition of new strategies, also based on the open innovation paradigm, for the banking system, especially in the long term?

We believe these questions can serve as a useful starting point for further research in the areas of open innovation, banking, fintech, and related topics.

Finally, we highlight our paper's limitations. We chose to employ Scopus due to its comprehensive coverage of academic literature. However, relying on a single database may have excluded important studies from other sources, potentially limiting the analysis. Future

work could overcome this limitation by incorporating additional databases such as Web of Science and Google Scholar to achieve more complete coverage across different academic sources. Additionally, most literature databases do not include industry reports and policymaker publications, which can provide valuable insights into this topic and the regulatory developments that will shape the market dynamics of open innovation. Bibliometric instruments provide an overview on the publishing trends, but fail to give insights into the content or quality of the studies. We reviewed the top-cited papers in this contribution, but we might have overlooked other relevant or recent papers, due to the tendency to cite highly cited papers and the natural delay in academic referencing. Future research could also tackle these issues.

6 – Conclusions

Our study shows that literature on open innovation in banking is steadily growing, reflecting the increasing attention and interest in collaborative innovation within the banking sector and financial markets. While existing studies provide valuable case-based insights, they tend to focus on narrow topics and generally lack integration with broader theories from management and organisational studies. This represents a notable gap, as a deeper, more systemic understanding of open innovation in banking could enhance both academic insight and practical application.

Compared to other industries, the banking sector appears less advanced in implementing open innovation practices. This nascent stage of research on the intersection of open innovation and banking presents a significant opportunity for further investigation. Overcoming thematic silos in the academic debate would enable a more holistic and systemic approach, generating richer insights with considerable benefits for banks, Fintech companies, policymakers, and regulators.

By advancing such research, open innovation can be leveraged not only to foster growth and innovation in financial services and products but also to better anticipate and navigate future developments in the sector.

7 – References

Akhavan, P., Batouei, M., Goudarzipour, H., & Rajabion, L. (2017). Open innovation and service management: Iranian Banks case study. *Proceedings of the European Conference on Knowledge Management*, 1, 8-14.

Ahmed, S., Alshater, M. M., El Ammari, A., & Hammami, H. (2022). Artificial intelligence and machine learning in finance: A bibliometric review. *Research in International Business and Finance*, 61, 101646. DOI:10.1016/j.ribaf.2022.101646

Al-Naimi, A. A., Al Abed, S., Farooq, U., Qasaimeh, G., & Alnaimat, M. A. (2023, March). *Impact of open banking strategy and fintech on digital transformation*. In 2023 International Conference on Business Analytics for Technology and Security (ICBATS) (pp. 1-5). IEEE.

Ale Ebrahim, N., & Bong, Y. (2017). Open innovation: A bibliometric study. *International Journal of Innovation*, *5*(3), 1-13. DOI:10.5585/iji.v5i3.184

Ali, Q., Yaacob, H., Parveen, S., Zaini, Z. (2021). Big data and predictive analytics to optimise social and environmental performance of Islamic banks. *Environment Systems and Decisions*, 41, 616-632. DOI:10.1007/s10669-021-09823-1

Ali, S., & Rangone, A. (2023). The Role of Decentralized Finance in Emerging Financial Services. *Economia Aziendale Online*, *14*(4), 863-885. DOI:10.13132/2038-5498/14.4.863-885

Altuna, N., Contri, AM, Dell'Era, C., Frattini, F., Maccarrone, P. (2015). Managing social innovation in for-profit organizations: the case of Intesa Sanpaolo. *European Journal of Innovation Management*, *18*(2), 258-280. DOI:10.1108/EJIM-06-2014-0058

Alzoubi, HM, Aziz, R. (2021). Does emotional intelligence contribute to quality of strategic decisions? The mediating role of open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(2), 130. DOI:10.3390/joitmc7020130

Bogers, M., Chesbrough, H., & Moedas, C. (2018). Open Innovation: Research, Practices, and Policies. *California Management Review*, *60*(2), 5-16. DOI:10.1177/0008125617745086

Bogers, M., Chesbrough, H., Heaton, S., & Teece, D. J. (2019). Strategic Management of Open Innovation: A Dynamic Capabilities Perspective. *California Management Review*, *62*(1), 77-94. DOI:10.1177/0008125619885150

Bouteraa, M., Chekima, B., Thurasamy, R., Bin-Nashwan, S. A., Al-Daihani, M., Baddou, A., Sadallah, M., & Ansar, R. (2024). Open innovation in the financial sector: a mixed-methods approach to assess bankers' willingness to embrace open-AI ChatGPT. *Journal of Open Innovation: Technology, Market, and Complexity*, *10*(1), 100216.

Cappa, F., Collevecchio, F., Oriani, R., & Peruffo, E. (2022). Banks responding to the digital surge through Open Innovation: Stock market performance effects of M&As with fintech firms. *Journal of Economics and Business*, 121, 106079. DOI: 10.1016/j.jeconbus.2022.106079

Carbone, F., Contreras, J., Hernández, J. Z., & Gomez-Perez, J. M. (2012). Open Innovation in an Enterprise 3.0 framework: Three case studies. *Expert Systems with Applications*, *39*(10), 8929-8939. DOI:10.1016/j.eswa.2012.02.015

Chen, T. H., & Peng, J. L. (2020). Statistical and bibliometric analyses of the effects of financial innovation. *Library Hi Tech*, *38*(2), 308-319. DOI:10.1108/LHT-09-2018-0140

Chesbrough, H., & Bogers, M. (2014). Explicating open innovation: Clarifying an emerging paradigm for understanding innovation. In Chesbrough, H., (ed.) et al. *New Frontiers in Open Innovation*. Oxford: Oxford University Press, 3-28. DOI: 10.1093/acprof:oso/9780199682461.003.0001

Chesbrough H., (2003). Open Innovation: *The New Imperative for Creating and Profiting from Technology*. Boston, MA: Harvard Business School Press.

Chesbrough, H. W. (2011). Bringing open innovation to services. *MIT Sloan management review*, *52*(2), 85.

Chesbrough, H. (2017). The future of open innovation. *Research-Technology Management*, *60*(6), 29–35. DOI:10.1080/08956308.2017.1373048.

Cobo, M. J., López-Herrera, A. G., Herrera-Viedma, E., & Herrera, F. (2011). 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. DOI:10.1002/asi.21525

Cohen, W., & Levinthal, D. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, *35*(1), 128–152. DOI:10.2307/2393553

Dahlander, L., & Gann, D. (2010). How open is innovation? *Research Policy*, 39, 699–709. DOI:10.1016/j.respol.2010.01.013.

De Brentani, U. (1993). The new product process in financial services: strategy for success. *International Journal of Bank Marketing*, *11*(3), 15-22. DOI:10.1108/02652329310027675

De Giuli, M. E., Grechi, D., & Tanda, A. (2024). What do we know about ESG and risk? A systematic and bibliometric review. *Corporate Social Responsibility and Environmental Management*, *31*(2), 1096-1108. DOI:10.1002/csr.2624

Enkel, E., Gassmann, O., & Chesbrough, H. (2009). Open R&D and open innovation: exploring the phenomenon. *R&D Management*, *39*(4), 311-316. DOI:10.1111/j.1467-9310.2009.00570.x

Fan, J. M., & Hou, G. M. (2009). Research on integration platform of dual-use core technologies based on open innovation. *2009 International Conference on Management Science and Engineering,* September, 1631-1637. DOI:10.1109/ICMSE.2009.5317809

Fasnacht, D. (2009). *Open innovation in the financial services*. *Growing Through Openness, Flexibility and Customer Integration.* Berlin Heidelberg: Springer International Publishing. DOI: 10.1007/978-3-540-88231-2

Fasnacht, D. (2018). *Open innovation in the financial services. Creating New Value Constellations in the Financial Services.* Cham: Springer International Publishing.

Francesconi, A., & Tanda, A. (2024). Towards Sustainable Practices: a literature review on SMEs in the Supply Chain*. Economia Aziendale Online*, *15*(4), 825-847. DOI: 10.13132/2038-5498/15.4.825-847

FSB (2021). *FinTech*. Available at https://www.fsb.org/work-of-the-fsb/financial-innovation-and-structural-change/fintech/.

Gianiodis, P. T., Ettlie, J. E., & Urbina, J. J. (2014). Open service innovation in the global banking industry: Inside-out versus outside-in strategies. *Academy of Management Perspectives*, *28*(1), 76-91. DOI:10.5465/amp.2012.0126

Ghisotti, E. (2023). Criptovalute e startup Fintech: la rivoluzione tecnologica e finanziaria. *Economia Aziendale Online*, *14*(3), 737-754. DOI:10.13132/2038-5498/14.3.737-754

Hallinger, P., & Kovačević, J. (2019). A bibliometric review of research on educational administration: Science mapping the literature, 1960 to 2018. *Review of Educational Research*, 89(3), 335-369. DOI:10.3102/0034654319830380

Jiao, H., Yang, J., & Cui, Y. (2022). Institutional pressure and open innovation: the moderating effect of digital knowledge and experience-based knowledge. *Journal of Knowledge Management*, *26*(10), 2499-2527. DOI:10.1108/JKM-01-2021-0046

Kovacs, A., Van Looy, B., & Cassiman, B. (2015). Exploring the scope of open innovation: a bibliometric review of a decade of research. *Scientometrics*, 104, 951-983. DOI:10.1007/s11192-015-1628-0Laursen, K., & Salter, A. (2006). Open for innovation: the role of openness in explaining innovation performance among UK manufacturing firms. *Strategic management journal*, *27*(2), 131-150. DOI:10.1002/smj.507

Lee I., & Shin Y. Sh. (2018). Fintech: Ecosystem, business models, investment decisions, and challenges. *Business Horizons*, 61, 35–46. DOI: 10.1016/j.bushor.2017.09.003

Locatelli, R., & Tanda, A. (2021). Financial education in times of digitalization and FinTech (r) evolution. In Viale et al. (ed.) *Financial Education and Risk Literacy,* 4, 60-74. Edward Elgar Publishing.

Medase, S. K., & Abdul-Basit, S. (2020). External knowledge modes and firm-level innovation performance: Empirical evidence from sub-Saharan Africa. *Journal of Innovation & Knowledge*, *5*(2), 81-95. DOI:10.1016/j.jik.2019.08.001

Mikhaylov, A., Dinçer, H., & Yüksel, S. (2023). Analysis of financial development and open innovation oriented fintech potential for emerging economies using an integrated decision-making approach of MF-X-DMA and golden cut bipolar q-ROFSs. *Financial Innovation*, *9*(1), 4. DOI: 10.1186/s40854-022-00399-6

Mongeon P., & Paul-Hus A. (2016). The journal coverage of Web of Science and Scopus: A comparative analysis. *Scientometrics*, 106, 213–228.

Muhdi, L., & Boutellier, R. (2011). Motivational factors affecting participation and contribution of members in two different Swiss innovation communities. *International Journal of Innovation Management*, *15*(03), 543-562. DOI: 10.1142/S1363919611003477

Najib, M., Ermawati, W. J., Fahma, F., Endri, E., & Suhartanto, D. (2021). Fintech in the small food business and its relation with open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(1), 88. DOI: 10.3390/joitmc7010088

Náñez Alonso, S. L., Jorge-Vazquez, J., & Reier Forradellas, R. F. (2021). Central banks digital currency: Detection of optimal countries for the implementation of a CBDC and the implication for payment industry open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(1), 72. DOI:10.3390/joitmc7010072

Naseer, S., Khawaja, K. F., Qazi, S., Syed, F., & Shamim, F. (2021). How and when information proactiveness leads to operational firm performance in the banking sector of Pakistan? The roles of open innovation, creative cognitive style, and climate for innovation. *International Journal of Information Management*, 56, 102260. DOI: 10.1016/j.ijinfomgt.2020.102260

Niankara, I., Hassan, H. I., Traoret, R. I., & Islam, A. R. M. (2025). Consumer Savings and Digital Remittance in Open Banking: Insights From Bibliometric and Geospatial Econometric Analysis. *Human Behavior and Emerging Technologies*, *2025*(1), 9352257.

OECD (2023). *Shifting from open banking to open finance. Results from the 2022 OECD survey on data sharing frameworks*. January 27, 2023. https://www.oecd.org/publications/shifting-from-open-banking-to-open-finance-9f881c0c-en.htm

Polasik, M., Huterska, A., Iftikhar, R., & Mikula, Š. (2020). The impact of Payment Services Directive 2 on the PayTech sector development in Europe. *Journal of Economic Behavior & Organization*, 178(October), 385-401. DOI:10.1016/j.jebo.2020.07.010

Rabbani, M. R., Bashar, A., Nawaz, N., Karim, S., Ali, M. A. M., Rahiman, H. U., & Alam, M. S. (2021). Exploring the role of islamic fintech in combating the aftershocks of covid-19: The open social innovation of the islamic financial system. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(2), 136. DOI:10.3390/joitmc7020136

Randhawa, K., Wilden, R., & Hohberger, J. (2016). A bibliometric review of open innovation: Setting a research agenda. *Journal of product innovation management*, *33*(6), 750-772. DOI:10.1111/jpim.12312

Rashid, M. H. U., Nurunnabi, M., Rahman, M., & Masud, M. A. K. (2020). Exploring the relationship between customer loyalty and financial performance of banks: Customer open innovation perspective. *Journal of Open Innovation: Technology, Market, and Complexity*, *6*(4), 108. DOI:10.3390/joitmc6040108

Rossi, M. (2015). The role of venture capital funds in financing innovation in Italy. Constraints and challenges for innovative small firms. *International Journal of Globalisation and Small Business*, *7*(2), 162-180.

Schueffel, P., & Vadana, I. (2016). *Financial services and open innovation: what do we know after a decade of research?*. In Mention A-L., Torkkeli, M., (eds) Open Innovation: A Multifaceted Perspective: Part II, 315-346.

Secinaro, S., Brescia, V., Calandra, D., & Biancone, P. (2021). Data quality for health sector innovation and accounting management: a twenty-year bibliometric analysis. *Economia Aziendale Online*, *12*(4), 407-431. DOI:10.13132/2038-5498/12.4.407-431

Stefanelli, V., & Manta, F. (2023). Digital Financial Services and Open Banking Innovation: Are Banks Becoming 'invisible'? *Global Business Review*, *0*(0). DOI:10.1177/09721509231151491

Tanda A., & Schena C-M. (2019). *FinTech, BigTech and Banks. Digitalisation and its impact on Banking Business Models*. Palgrave. ISBN: 978-3-030-22426-4

Teece, D. (1986). Profiting from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research Policy*, 15, 258–305.

Utterback, J. M. (1971). The process of technological innovation within the firm. *Academy of management Journal*, *14(*1), 75-88. DOI:10.2307/254712

von Hippel, E. (1976). The Dominant Role of Users in the Scientific Instrument Innovation Process. *Research Policy*, 5, 212–239. DOI:10.1016/0048-7333(76)90028-7

von Hippel, E. (1986). Lead users: A source of novel product concepts. *Management Science*, *32*(7), 791–805.

von Hippel, E. (1988). *The sources of innovation.* Oxford: Oxford University Press.

West, J., & Bogers, M. (2017). Open innovation: current status and research opportunities. *Innovation: Organisation & Management*, *19*(1), 43–50. DOI:10.1080/14479338.2016.1258995

Zillner, S., Becker T., Munné R., Hussain, K., Rusitschka, S., Lippell, H., Curry E., & Ojo, A. (2016). *Big data-driven innovation in industrial sectors*. In Cavanillas, J.M., Curry, E., Wahlster, W., (2016) New Horizons for a Data-Driven Economy: A Roadmap for Usage and Exploitation of Big Data in Europe, 169-178, Cham: Springer Nature.