

How 6G Technology Contributes to Business Development: Bibliometric Analysis

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Abstract. *With the rapid development of wireless communications, 6G technology is becoming a major force behind innovation in a number of industries. The integration of 6G networks offers new perspectives for efficiency, automation and digital transformation as sectors increasingly rely on cloud computing, blockchain, artificial intelligence and the Internet of Things. However, there is still fragmentation in the academic ecosystem around 6G business applications, requiring a methodical approach to examine important contributions and new research trends. To map the current state of research on 6G and business applications, this study uses bibliometric analysis to identify significant themes, collaboration patterns and influential authors. Concurrent, co-author, citation and overlap visualization maps were created by analyzing data from the Web of Science database, which included papers from 2014 to 2025. VOSviewer was used for this analysis. The main themes, influential figures and future directions of 6G business research are examined in this paper. According to the findings, the US, China, Finland and Germany are the main participants, and the interest in AI-based automation, cybersecurity, IoT and metaverse applications is expanding. The overlap analysis shows that the focus of research has shifted from technical infrastructure to business strategies, legislation and sustainability. This paper contributes to our understanding of the business implications of 6G by mapping industry and academic collaborations. Future research on the effects of 6G on business innovation and digital ecosystems will be guided by the findings, which highlight the need for interdisciplinary research, regulatory frameworks, and commercialization approaches.*

Keywords: 6G technology, business applications, bibliometric analysis, digital transformation, innovation.

Introduction

Wireless communication technology has advanced significantly in recent decades, from 1G to 5G, each bringing innovations that have a profound impact on both daily life and the business world (Letaief, et al., 2019). With its promise of previously unseen data transmission speeds, incredibly low latency, and sophisticated integration with technologies such as Artificial Intelligence (AI), Internet of Things (IoT), and cloud computing, 6G is currently being touted as the next revolutionary step (Zong, et al., 2019). In addition to supporting sophisticated and new applications, these qualities will revolutionize corporate operations and present exceptional opportunities for economic expansion and creativity (Saad, et al., 2019). Because the communications industry is growing so rapidly, the BSS (Business Support Systems) of operators continuously integrates the technical standards of the IT industry, creates its own ecological

organization, and improves the relevant technical standards at all stages of business development (Ouyang, et al., 2023).

There is no denying the significance of 6G in commercial technology. By increasing operational efficiency, developing new business models, and improving customer experience, industries such as manufacturing, transportation, healthcare, and telecommunications anticipate substantial benefits from implementing this technology (Dang, et al., 2020).

However, there are a number of substantial obstacles to 6G adoption, such as the requirement for large infrastructure investments, cybersecurity concerns, and regulatory issues (Tariq, et al., 2020). To determine the opportunities, challenges, and future research directions, it is imperative to examine the development potential of 6G technology in the business context.

The purpose of this article is to use bibliometric analysis to investigate the future research prospects of 6G technology. Bibliometric study provides a thorough view of the state of knowledge in a given topic and is a reliable technique for identifying trends, significant themes and research collaborations (Zupic & Čater, 2015).

Even though 6G technology is still in its infancy, its effects on business and society are already profound, making this study essential. There is a lack of literature analyzing the adoption patterns of this technology and its future prospects. While there are studies that discuss the technical elements of 6G, there is a lack of research that analyzes the corporate, strategic, and economic ramifications of the technology. Thus, the purpose of this study is to examine the existing body of literature and provide a thorough bibliometric analysis, highlighting important themes, significant writers, and new developments in the subject.

The fundamental ideas and theoretical foundations of 6G technology are covered in the following section, along with its application in business. An overview of the current literature is provided in this section, with a focus on research opportunities and gaps.

Theoretical background

Academic and scientific institutions around the world have started to look at 6G, which are expected to be implemented around 2030, as 5G networks go to the commercial implementation stage. It is anticipated that the 6G network will provide a worldwide wireless connection, while obtaining energy efficiency. However, future applications that require extremely high flow, extremely low latency and extremely high reliability cannot be served by the current network design (Quy, et al., 2023).

Business operations, collaboration, and innovation are about to undergo a radical change due to the emergence of 5G and the exciting potential of 6G communication technology. The revolutionary potential of 5G and 6G technologies in promoting efficiency, innovation, and competitiveness, as well as enabling agile management methods, must be investigated. To fully understand the revolutionary potential of these next-generation communication technologies and their significant implications for agile management practices, all parties involved in the communication technology ecosystem must embark on a journey (Aluvala & Suryanarayana, 2024).

One way to think of the 6G system model is as a highly sophisticated wireless communications ecosystem that combines multiple parts and technologies to deliver fast, reliable, and immersive connectivity. While a particular system model may change depending on the network architecture and implementation, the following figure outlines the essential parts of the 6G system model (Singh, et al., 2024).

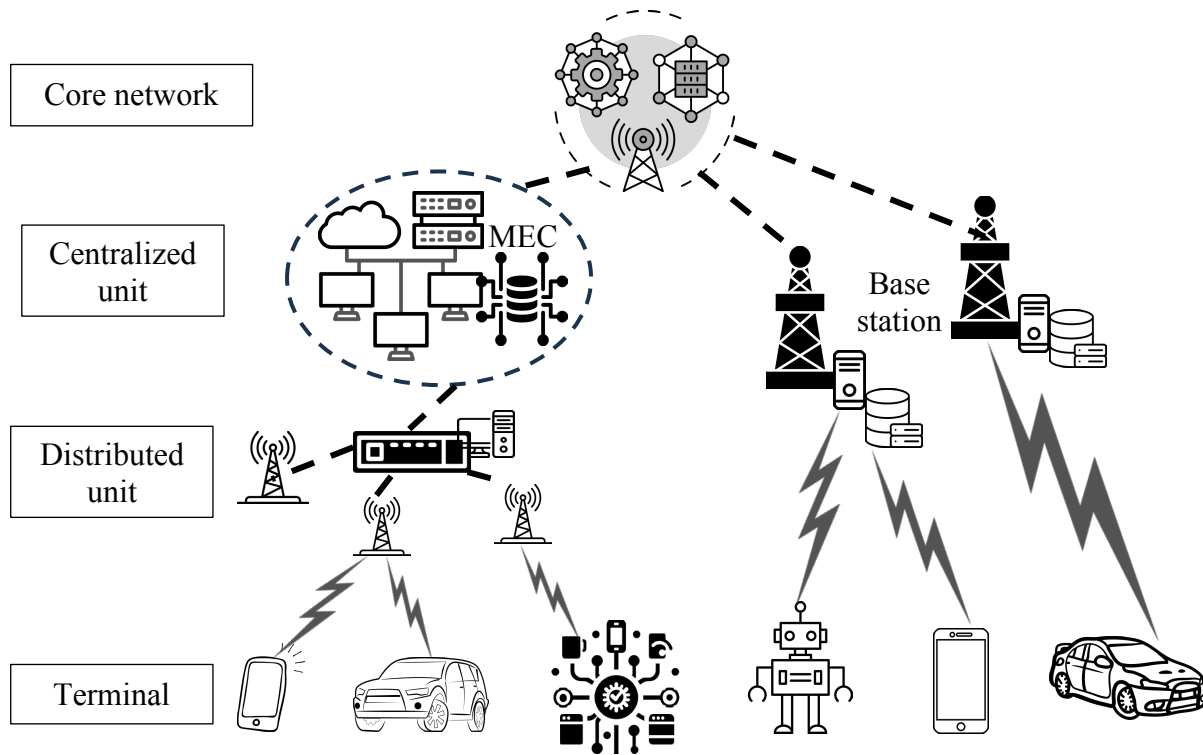


Figure 1. General structure of a 6G network architecture

Source: Adapted from (Singh, et al., 2024).

The 6G network design, which distributes intelligence at the centralized, local, and terminal levels for low-latency, AI-powered communications, is seen in the diagram. While base stations and multi-access edge computing (MEC) process data closer to users, reducing latency, the core network handles large-scale processing. To improve efficiency, security, and power consumption, user terminals such as smartphones, driverless cars, and Internet of Things devices use local intelligence for computing and caching. Real-time AI applications, industrial automation, and smart cities are all supported by this framework.

IoT gadgets and smartphones have changed the way people communicate with each other. 5G and 6G networks make it possible to connect many devices simultaneously and use incredibly large volumes of data. New commercial and economic norms will result from the implementation of 5G and 6G networks for applications such as social networks, online gaming, and high-definition (HD) movies. Cloud services will facilitate industry collaboration and information exchange (Gkagkas, et al., 2024).

6G has enormous business potential and will impact many different industries. For example, 6G could greatly improve patient outcomes in the healthcare industry by enabling robotic surgery and real-time remote diagnostics (Wu, et al., 2021). Complete automation in the industrial sector could be achieved through 6G smart factories, which would optimize production procedures and reduce costs (Zhang, et al., 2019). But 6G deployment also comes with a number of challenges, such as the need for large infrastructure expenditures, concerns about energy use, and the creation of strong cybersecurity defenses (Chen, et al., 2020).

The technological components of 6G, including network architecture, spectrum usage, and energy efficiency, have been the main focus of previous research (Viswanathan & Mogensen,

2020; Basar, et al., 2019). The business potential of 6G, especially its effects on the economy and industrial applications, is attracting increasing attention. However, there are still important gaps, including a lack of attention to commercial use, inadequate bibliometric research, and unresolved issues such as energy consumption and cybersecurity risks in commercial contexts (Wu, et al., 2021; Zhang, et al., 2019).

Industry 5.0 will be driven by innovation due to 6G's ability to deliver real-time cyber-physical communication with critical performance metrics, unlike 5G. Applications for control, storage and communication will change as a result, changing business models and attracting new investors (Yrjölä, et al., 2020). By 2030, 6G networks will incorporate edge operations, virtualization, spectrum sharing, and artificial intelligence, transforming society and everyday life. This will result in new revenue opportunities and company strategies (Bhat & Alqahtani, 2021).

Methodology

Research design

The development potential of 6G technology in business is examined in this study using bibliometric analysis. A quantitative technique for mapping the research environment, identifying important trends, and examining collaborative networks in a given topic is bibliometric analysis (Donthu, et al., 2021). This method helps identify thematic clusters and research gaps, while providing an organized summary of the existing body of literature. Three main steps are followed in the research process for this study.

Initially, information was retrieved from the Web of Science (WoS) database, a well-known source of peer-reviewed scientific publications. Keywords including “6G”, “business”, “6G business”, “sixth generation 6g”, “innovation”, “applications” and “digital transformation” were included in the search query. To further narrow down the results, boolean operators (AND, OR) were used.

Second, only peer-reviewed journal papers published in English between 2014 and 2025 were included in the dataset. To ensure the quality and relevance of the dataset, studies that did not specifically address 6G applications in business were removed.

Third, VOSviewer, a program specifically designed for bibliometric visualization, was used to import the cleaned dataset. To find significant authors, organizations, and thematic groups, the study conducted studies on keyword co-occurrence, co-author networks, and citation networks.

After being downloaded from the Web of Science, the dataset was saved in a .txt file and put into VOSviewer for processing. Several mapping methods based on bibliographic information were chosen for the investigation (the selections can be seen in Figure 2):

- Initially, the “Create a map based on text data” option was selected for keyword co-occurrence analysis, which allows mapping keyword associations and frequency to identify important study themes.
- Secondly, to display collaboration networks, the “Create a map based on bibliographic data” tool was used for co-authorship analysis. Authors and countries were chosen as the unit of analysis.
- Third, to highlight the most important articles and their links, citation analysis was performed using the citation reference mapping tool. To investigate the temporal evolution of research trends and show how topics have changed over time, an overlay visualization was also created.

By ensuring that research patterns in 6G commercial applications were represented in an organized manner, these processes made it possible to identify prominent areas of study, key contributors, and emerging trends.

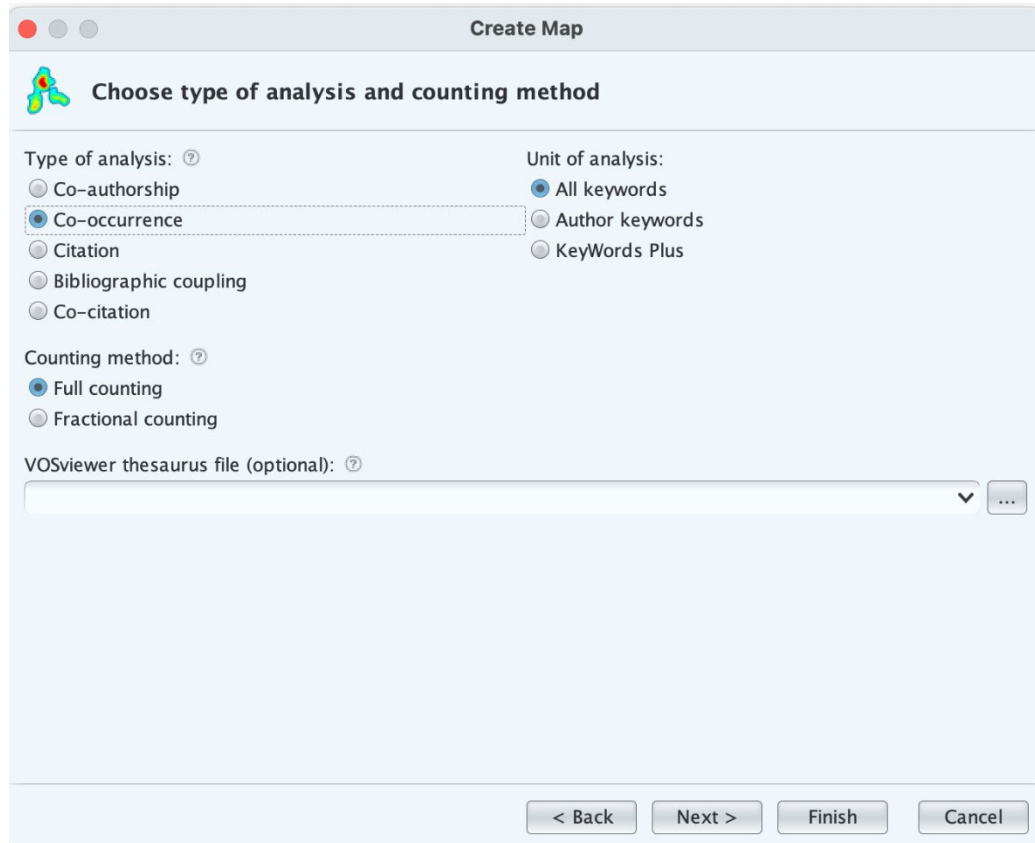


Figure 2. Selection in VOSviewer

Source: Authors' processing in VOSviewer, using WoS indexed articles.

Research hypotheses

The following research hypotheses serve as the compass of the study:

1. As a result of the growing interest of researchers in this topic, research on 6G and corporate applications has expanded significantly.
2. Different topic clusters, including AI integration, IoT applications, cybersecurity issues, and digital transformation, are used to organize the literature on 6G and business.
3. Cooperation between scholars, organizations, and nations is essential to expand our understanding of 6G technology in the commercial sector.

Bibliometric mapping in VOSviewer

The research landscape was examined using bibliometric techniques, with particular attention paid to keyword co-occurrence analysis, which identifies commonly used terms and major research themes; co-authorship network analysis, which analyzes collaboration patterns between researchers and institutions; and citation analysis, which identifies the most important studies and sources in the field. These bibliometric analyses were created using VOSviewer to provide important insight into the research field.

Emerging topics such as edge intelligence, blockchain, and metaverse are also mentioned, suggesting a move towards increasingly sophisticated and interconnected technologies.

The strong connections between these terms suggest a multidisciplinary approach to 6G, in which artificial intelligence, the Internet of Things, and cybersecurity play critical roles in business applications. These findings validate the second hypothesis, confirming the existence of a distinct research group.

Each of the clusters formed by these terms represents a different research topic:

- Cluster 1 (red) highlights the technical challenges of 6G implementation focusing on network architecture and resource allocation.
- Cluster 2 (green) focuses on stakeholder engagement and business models, with an emphasis on strategic and financial aspects of 6G.
- In line with the increased concern about cybersecurity in 6G applications, Cluster 3 (blue) investigates privacy and data security.
- Cluster 4 (yellow) focuses on innovation and new technologies within 6G.
- Cluster 5 (purple) investigates the multidisciplinary uses and effects of 6G technology on society.

The most active writers and research institutions in 6G related business studies are highlighted by the co-authorship network map, which examines collaboration patterns between authors and institutions. The collaboration models of the most active researchers in 6G business research are depicted in the image below, which displays clear clusters of research relationships.

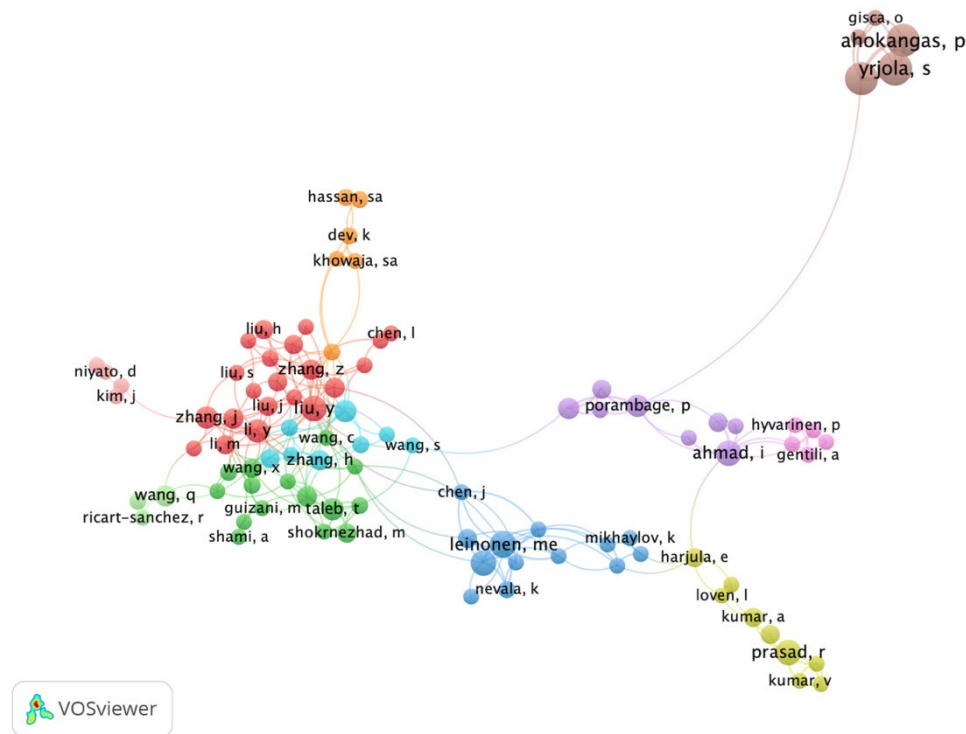


Figure 4. A map of author collaborations in 6G and business applications

Source: Authors' processing in VOSviewer, using WoS indexed articles.

The collaboration patterns of the countries are depicted in the co-authorship network map (Figure 4 and Figure 5), where the most active research centers are the USA, China and Europe. The graph supports hypothesis number 3 by confirming that international cooperation is essential

for the progress of 6G research. However, certain geographical areas continue to be underrepresented, suggesting possible shortcomings of international research initiatives. These findings are consistent with previous bibliometric research of emerging technology (Salih, et al., 2024).

The most active writers and organizations in 6G business research are identified by the co-author network map (Figure 4). Key contributors include:

- Dey, K., Hassan, S.A., and Khowaja, S.A., who have written extensively on 6G network architectures.
- IoT and edge computing applications are the focus of Liu, H., Chen, L., and Zhang, Z.
- Wang, Q., Guizani, M., and Taleb, R., who have significant impact on business models and the cutting-edge network.

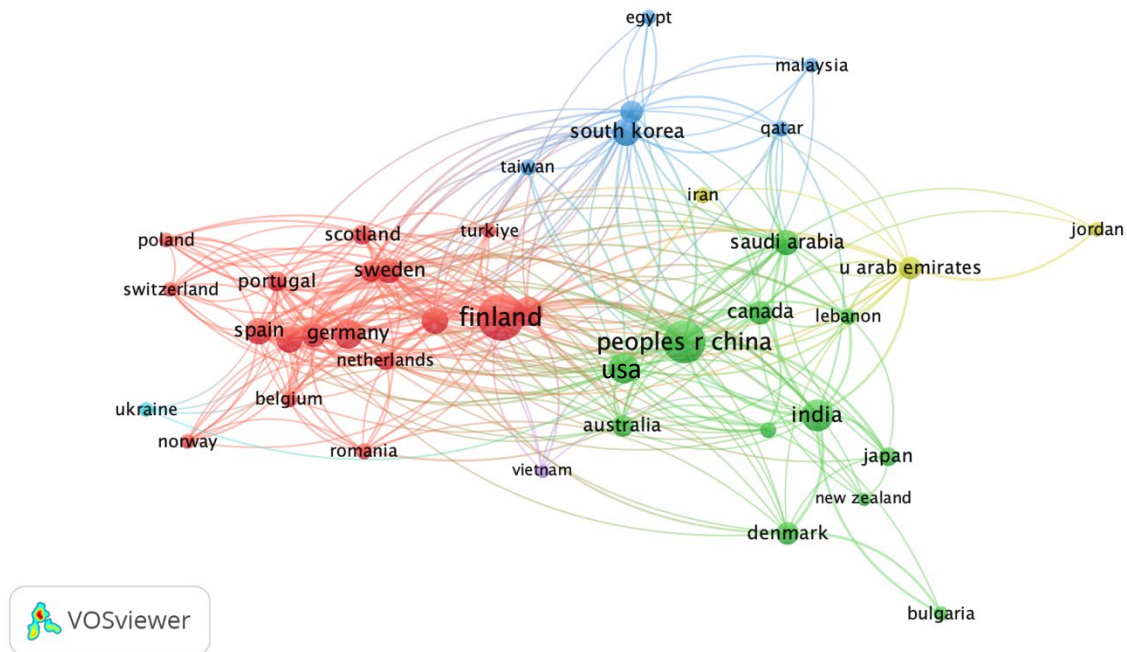
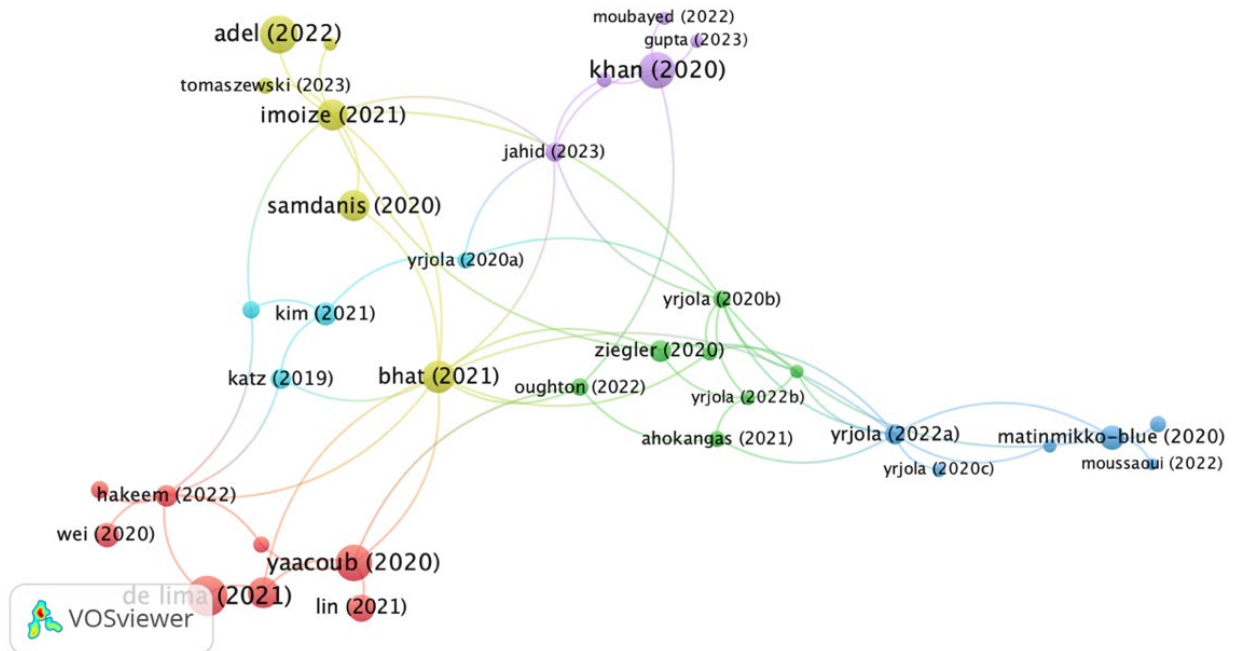


Figure 5. A map of the international collaboration network in 6G business research

Source: Authors' processing in VOSviewer, using WoS indexed articles.

Figure 5 shows that China, Finland, Germany, India and the United States are the most prominent nations in 6G business research, according to the co-authorship network map, which highlights important international partnerships in this area. While China and India dominate relations in Asia, Finland is a key player in European research, working closely with Germany, Sweden and Spain. There are clear regional clusters, with interconnected research networks growing in Europe, Asia and the Middle East.

While countries such as Romania, Ukraine and Vietnam continue to be less interconnected, highly connected nations such as China, Germany and the United States serve as global research hubs. The results show that 6G innovation is led by Finland, China and Germany, while Saudi Arabia and India are increasing their research presence. Global 6G research and innovation could be further improved by strengthening partnerships with underrepresented regions.



Based on citation relationships, the citation network map (Figure 6) shows the most important articles in 6G business research and their connections. More prominent papers that are foundational research in this topic are indicated by larger nodes, including Khan (2020), Bhat (2021), and Samdanis (2020). Strong citation links to more recent studies such as Imoize (2021) and Adel (2022) demonstrate how these foundational papers impact subsequent studies.

The different clusters imply that the literature is thematically divided. While the red cluster, which is based around Yaacoub (2020) and Lin (2021), is likely focused on security and network efficiency in 6G applications, the yellow cluster, which is led by Adel (2022) and Imoize (2021), could represent current developments in 6G technological frameworks. The green and blue clusters, which include Ziegler (2020) and Yrjola (2020a, 2022a), appear to investigate the financial and legal aspects of 6G adoption.

All things considered, this network demonstrates that a small number of foundational articles act as knowledge hubs, influencing the course of 6G business research. This supports hypothesis 1, as the number of citations and links is increasing, and academic interest is growing rapidly. The strong connectivity of the clusters supports the interdisciplinary aspect of 6G development, demonstrating how research on business applications, technological developments, and policy considerations are developing in an integrated manner.

Displaying keyword patterns from 2014 to 2025, overlay visualization (temporal analysis) analyzes how research topics have changed over time, providing insights into new research areas

and shifts in academic focus. With older topics in blue and newer topics in yellow, the image below illustrates how research topics in 6G commercial applications have changed over time.

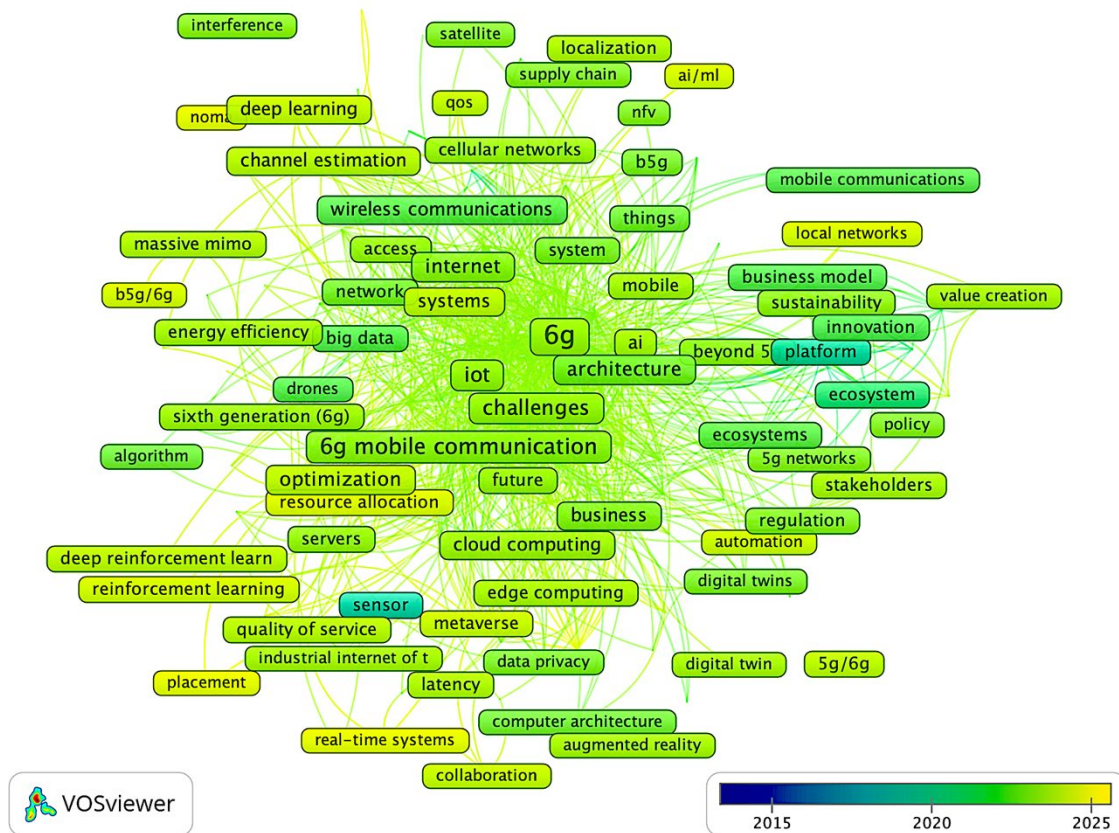


Figure 7. A map of the temporal evolution of 6G business research

Source: Authors' processing in VOSviewer, using WoS indexed articles.

Research topics in 6G commercial applications are shown in the overlay view map (Figure 7) as they have changed over time. Older topics (those toward the blue, 2015-2018) give way to more recent trends (yellow, 2022-2025). Key themes that have remained important areas of study over time include “6G mobile communications,” “IoT,” “AI,” and “architecture,” suggesting that they have played a crucial role in influencing 6G-related advancements.

Previous studies, which are represented by darker shades, focused on “wireless communications,” “network systems,” and “energy efficiency,” indicating an early focus on the technical framework of 6G. As research has continued, new areas have emerged, including “AI/ML,” “deep learning,” and “edge computing,” indicating a move toward data-driven optimization and intelligent automation. The terms “business model,” “innovation,” “value creation,” and “policy,” which are highlighted in yellow, are the most recent developments. These indicate growing interest in the financial and legal ramifications of 6G adoption. The focus of 6G research is shifting from technological advances to societal and economic applications. Future research will likely focus on legislation, digital twins, sustainability, and metaverse integration.

Based on the bibliometric analysis, the table below provides a summary of the top ten research articles on 6G business applications. It provides essential information about authors, research methodologies, impact factors, publication sources, and key findings. The results of these

researches support the patterns presented in the bibliometric maps and provide pertinent information on new 6G business models, technological drivers, and economic ramifications.

Table 1. Top 10 most influential research articles on 6G business applications

	Authors	Title	Journal/ Conference	Impact factor	Main findings	Research method
1	Yrjölä S., Matinmikko-Blue M., Ahokangas P.	How could 6G Transform Engineering Platforms Towards Ecosystemic Business Models?	6G Wireless Summit 2020	Q1	6G will drive modular ecosystemic business models, enabling new players in the industry	Conceptual Framework and Case study
2	Yang N., Siemon D., Hyrynsalmi S.	Modeling 6G Software Business Ecosystem: A Look Ahead	IEEE/ACM International Workshop on Software- Intensive Business	Q2	6G business models will shift from linear value chains to complex networked ecosystems	Morphological analysis
3	Ahokangas P., Yrjölä S., Matinmikko-Blue M., Seppänen V., Koivumäki T.	Antecedents of Future 6G Mobile Ecosystems	6G Wireless Summit 2020	Q1	6G mobile ecosystems will experience major structural changes with new governance models	Futures- oriented action research
4	Yrjölä S.	How could Blockchain transform 6G towards open ecosystemic business models?	IEEE International Conference on Communications Workshops	Q2	Blockchain will decentralize 6G business ecosystems, enabling secure transactions	Blockchain ecosystem modeling
5	Nidhi, Mihovska A., Kumar A., Prasad R.	Business Opportunities for Beyond 5G and 6G Networks	25th International Symposium on Wireless Personal Multimedia Communications	Q3	Network slicing will drive business opportunities in 6G with flexible monetization models	Technology business mapping
6	Yrjölä S., Ahokangas P., Matinmikko-Blue M.	Sustainability as a Challenge and Driver for Novel Ecosystemic 6G Business Scenarios	Sustainability Journal	Q1	Sustainability considerations are key to future 6G business scenarios	Scenario planning
7	Ahokangas P., Matinmikko-Blue M., Basaure A., Yrjölä S.	Use Cases for Local 6G Networks	Joint European Conference on Networks and Communications & 6G Summit	Q2	Local 6G networks will define region-specific use cases for optimized connectivity	Use case analysis
8	Ziegler V., Yijola S.	6G Indicators of Value and Performance	6G Wireless Summit 2020	Q2	New indicators for 6G business models will redefine market valuation and performance metrics	Quantitative performance analysis
9	Matinmikko-Blue M., Latva-aho M., Ahokangas P., Yrjölä S.	6G Business Models and Economic Considerations	IEEE Communications Magazine	Q1	Economic models for 6G emphasize platform- based business strategies	Economic model evaluation
10	Tanenbaum A., Bellman R.	AI and 6G: Future Challenges in the Digital Economy	Future Technologies Conference	Q2	AI and automation will play a crucial role in shaping 6G-driven digital economies	AI integration and market trends analysis

Source: Authors' own research.

Key trends in 6G business research are highlighted in the reviewed papers. Studies have indicated a trend towards decentralized, AI-powered platforms, with modular and ecosystem-based business models emerging as prominent themes (Yrjölä, et al., 2020; Ahokangas, et al., 2020).

For 6G applications to be secure and scalable, technological enablers such as blockchain, AI, and network segmentation are essential. In line with the findings of the overlay view on business models and policy frameworks, the research of Nidhi et al. (2022) and Matinmikko-Blue et al. (2021) places a strong emphasis on automation, sustainability, and governance models.

The study's findings support the research hypotheses and provide pertinent insights into the current state of 6G research. The results are consistent with previous research, including (Imoize, et al., 2021), who also mentioned network segmentation and edge computing as important areas of focus. This analysis goes a step further, however, by drawing attention to emerging topics, such as blockchain and the metaverse, that have not been fully discussed in previous works.

Examination of the co-author network highlights how crucial international cooperation is for the advancement of 6G research. The results of Katz, et al. (2018), who emphasized the need for international collaboration to address the technical and financial challenges of 6G deployment, are consistent with this.

The most influential papers are those that provide in-depth assessments or suggest new frameworks, according to citation analysis. As an illustration, (Ismail & Buyya, 2022) presented an innovative strategy for combining AI and IoT in 6G networks, which has been widely cited and used in subsequent research.

Important questions still remain, despite the progress of 6G research. To maintain compliance and trust, further research on ethical and legal issues, especially data security and privacy, is needed. The potential of 6G in sectors such as manufacturing and agriculture, as well as its compatibility with international sustainability goals such as energy efficiency, are still poorly understood. Multidisciplinary research and innovative approaches, such as case studies and longitudinal analyses, are needed to address these gaps.

Conclusion

The bibliometric analysis of 6G commercial applications presented in this study highlights key authors, international partnerships and research trends. The results demonstrate a shift away from technology and towards business models, cybersecurity, AI and the Internet of Things. In addition to highlighting the need for multidisciplinary approaches to address the socioeconomic, legal and environmental issues in 6G deployment, it provides an organized summary of 6G research and identifies important topic clusters.

Key themes influencing the direction of 6G technology and its economic impact are highlighted in the top ten most influential research publications on 6G commercial applications. As seen in the works of Yrjölä, Ahokangas and Matinmikko-Blue, a recurring element in these studies is the shift from conventional telecommunications models to modular, AI-powered business ecosystems. These articles highlight blockchain, network segmentation and sustainability as key factors in making 6G deployment secure and scalable.

All things considered, the results show that 6G is not just a scientific breakthrough, but also an economic revolution, and that to achieve its full potential, researchers, policymakers, and business executives must work together. In conclusion, this study lays the foundation for further investigation into 6G technology and its implications for business. Innovation, business models, and sustainability can all be improved by building on these findings. The findings provide a roadmap for scientists, business leaders, and policymakers to optimize the potential of 6G.

References

- Ahokangas, P., Yrjölä, S., Matinmikko-Blue, M., Seppänen, V., & Koivumäki, T. (2020). Antecedents of Future 6G Mobile Ecosystems. *6G Wireless Summit (6G SUMMIT)*.
- Aluvala, P. R., & Suryanarayana, P. A. (2024). Monumental Transition From 5G To 6G: Skill Development Needs And Workforce Evolution Imperative. *Educational Administration: Theory and Practice*, 30(5), 13699-13706.
- Basar, E., Renzo, M. D., Rosny, J. D., Debbah, M., Alouini, M.-S., & Zhang, R. (2019). Wireless Communications Through Reconfigurable Intelligent Surfaces. *IEEE Access*, 7, 116753 - 116773.
- Bhat, J. R., & Alqahtani, S. A. (2021). 6G Ecosystem: Current Status and Future Perspective. *IEEE Access*, 9, 43134 - 43167.
- Chen, S., Liang, Y.-C., Sun, S., Kang, S., Cheng, W., & Peng, M. (2020). Vision, Requirements, and Technology Trend of 6G: How to Tackle the Challenges of System Coverage, Capacity, User Data-Rate and Movement Speed. *IEEE Wireless Communications*, 27(2), 218 - 228.
- Dang, S., Amin, O., Shihada, B., & Alouini, M.-S. (2020). What should 6G be? *Nature Electronics*, 3, 20-29.
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N., & Lim, W. M. (2021). How to conduct a bibliometric analysis: An overview and guidelines. *Journal of Business Research*, 133(5), 285-296.
- Gkagkas, G., Vergados, D. J., Michalas, A., & Dossis, M. (2024). The Advantage of the 5G Network for Enhancing the Internet of Things and the Evolution of the 6G Network. *Sensors*, 24(8), 2455.
- Imoize, A. L., Adedeji, O., Tandiya, N., & Shetty, S. (2021). 6G Enabled Smart Infrastructure for Sustainable Society: Opportunities, Challenges, and Research Roadmap. *Sensors*, 21(5).
- Ismail, L., & Buyya, R. (2022). Artificial Intelligence Applications and Self-Learning 6G Networks for Smart Cities Digital Ecosystems: Taxonomy, Challenges, and Future Directions. *Sensors*, 22(15).
- Katz, M., Matinmikko-Blue, M., & Latva-aho, M. (2018). 6Genesis Flagship Program: Building the Bridges Towards 6G-Enabled Wireless Smart Society and Ecosystem. *IEEE 10th Latin-American Conference on Communications*.
- Letaief, K. B., Chen, W., Shi, Y., Zhang, J., & Zhang, Y.-J. A. (2019). The Roadmap to 6G: AI Empowered Wireless Networks. *IEEE Communications Magazine*, 57(8), 84 - 90.
- Nidhi, Mihovska, A., Kumar, A., & Prasad, R. (2022). Business Opportunities for Beyond 5G and 6G Networks. *25th International Symposium on Wireless Personal Multimedia Communications (WPMC)*.
- Ouyang, Y., Zhang, Y., Wang, P., Liu, Y., Qiao, W., Zhu, J., . . . al., e. (2023). *White Paper on 6G BSS Technologies*. China.
- Quy, V. K., Chehri, A., Quy, N. M., Han, N. D., & Ban, N. T. (2023). Innovative Trends in the 6G Era: A Comprehensive Survey of Architecture, Applications, Technologies, and Challenges. *IEEE Access*, 11, 39824 - 39844.
- Saad, W., Bennis, M., & Chen, M. (2019). A Vision of 6G Wireless Systems: Applications, Trends, Technologies, and Open Research Problems. *IEEE Network*, 34(3), 134 - 142.
- Salih, Q. M., Rahman, M. A., Firdaus, A., Jassim, M. R., Kahtan, H., Zain, J. M., & Ali, A. H. (2024). A Review and Bibliometric Analysis of the Current Studies for the 6G Networks. *Computer Modeling in Engineering & Sciences*, 140(3), 1-10.

- Singh, S., Singh, D. P., Chandra, K., & Gupta, R. (2024). Unlocking the Potential of 6G Technology: A Comprehensive Study on Advancements, Challenges, and Applications. *KEPES Journal*, 21(4), 118-123.
- Tariq, F., Khandaker, M. R., Wong, K.-K., Imran, M. A., Bennis, M., & Debbah, M. (2020). A Speculative Study on 6G. *IEEE Wireless Communications*, 27(4), 118 - 125.
- Viswanathan, H., & Mogensen, P. E. (2020). Communications in the 6G Era. *IEEE Access*, 8, 57063 - 57074.
- Wu, Q., Zhang, S., Zheng, B., You, C., & Zhang, R. (2021). Intelligent Reflecting Surface-Aided Wireless Communications: A Tutorial. *IEEE Transactions on Communications*, 69(5), 3313 - 3351.
- Yrjölä, S., Ahokangas, P., & Matinmikko-Blue, M. (2020). *White Paper on Business of 6G* (Vol. 3). University of Oulu: 6G Research Visions.
- Yrjölä, S., Matinmikko-Blue, M., & Ahokangas, P. (2020). How could 6G Transform Engineering Platforms Towards Ecosystemic Business Models? *6G Wireless Summit (6G SUMMIT)*.
- Zhang, Z., Xiao, Y., Ma, Z., Xiao, M., Ding, Z., & Lei, X. (2019). 6G Wireless Networks: Vision, Requirements, Architecture, and Key Technologies. *IEEE Vehicular Technology Magazine*, 14(3), 28 - 41.
- Zong, B., Fan, C., Wang, X., Duan, X., Wang, B., & Wang, J. (2019). 6G Technologies: Key Drivers, Core Requirements, System Architectures, and Enabling Technologies. *IEEE Vehicular Technology Magazine*, 14(3), 18-27.
- Zupic, I., & Čater, T. (2015). Bibliometric Methods in Management and Organization. *Organizational Research Methods*, 18(3), 429-472.