

The Application of Co-Design in Service Design: A Bibliometric Analysis of 2018-2022

Yue Cao

Nanjing Normal University, Nanjing, 210019, China

ABSTRACT

The objective of this study is to comprehensively analyse the current status and global characteristics of the application of co-design in the literature of service design. **Methods:** The data source for this study is the literature related to the application of co-design in service design, included in Web of Science. The scientific knowledge map was mapped using VOSviewer with the method of scientific bibliometric visualization, in terms of year output distribution, country, research institution, author, keyword clustering, and reference co-citation. The results were visualized to sort out the research pulse. **Results:** The results of the study indicate that the number of documents in the search area is on the rise, with countries such as Australia and the UK leading the way in terms of research. The main research hotspots are healthcare design, research methodology, participatory design of public services, and design assessment. The references cited together form the main knowledge base for the application of co-design in service design and link most of the research. Improved participatory approaches to service design, including co-creation, co-design, and co-innovation, are emerging trends for future development. **Conclusion:** The study shows that collaborative design is a widely applied approach in service design, with increasing research interest globally. The identified research hotspots and emerging trends provide guidance for future research in the field of collaborative design and service design. The use of scientific bibliometric methods is a valuable tool to comprehensively analyse and understand the current status and global characteristics of research in this field.

Keywords: Service design, Co-design, Bibliometrics, VOSviewer

INTRODUCTION

The term Service Design (SD) first appeared in 1991 in the book “Total Design” by Bill and Mrs Hollins on design management (Xin and Cao, 2014). Service design is an activity that aims to enhance user experience and service quality by strategically planning and coordinating the various components involved in a service, including people, facilities, communication, materials, and processes (Wang et al., 2021). In the field of design, various concepts such as Collaborative Design, Co-design, and Participatory Design are commonly employed and can be collectively referred to as ‘co-design’ for the purposes of this discussion. Co-design places emphasis on a novel interpretation of the concept of ‘human-centred’ design, wherein the focus shifts from ‘designing for the user’ to ‘designing with the user’. The user is no longer considered

solely as an object to be studied but instead becomes actively involved in the decision-making process of a product or service, in a role similar to that of a designer (Xin and Wang, 2018).

In the design process of service design, designers often encounter numerous challenges that cannot be resolved by the design profession alone and may need to involve researchers from diverse disciplines in co-design workshops to collaboratively address issues arising from service innovation. Co-design can therefore be utilized as a design methodology to enhance the feasibility and effectiveness of service design.

In recent years, a substantial body of literature has emerged due to the widespread application of Co-design in Service Design Research (hereafter referred to as Co-SDR). However, there is currently no comprehensive literature review on Co-SDR. To further promote the development of service design and Co-design as a tool for innovation, it is crucial to comprehensively summarize and analyse the relevant research, particularly its current state over the past five years. Furthermore, the existing research literature in the field of Co-SDR is extensive, spanning across diverse disciplines and fields of knowledge, and the research content and perspectives are complex. As such, traditional methods of literature review may not be adequate in capturing the current research hotspots and development dynamics. To address this, quantitative analysis of the existing literature through scientific bibliometric methods can provide a more accurate understanding of the current state of research in Co-SDR, objectively analyse the patterns and connections underlying the literature data in this field and provide a comprehensive reference for scholars researching in this field.

STUDY DESIGN

DATA SOURCES

As high-quality scientific literature is subject to rigorous peer review and scrutiny by published journals, its findings are more representative of the discipline. Therefore, the search strategy of using TS = ((co-design OR collaborative design) AND (service design)) in the Web of Science (WOS) core database was adopted in this study. The three major citation indexes commonly used in the WOS database, namely the Social Sciences Citation Index (SSCI), the Science Citation Index (SCI), and the Arts and Humanities Citation Index (A&HCI), were chosen as the search sources. The search spanned from 2018 to 2022 to examine the development dynamics and current status of research in the last five years. To avoid the loss of interdisciplinary literature, the sources were not streamlined. The search results were exported as txt files in the format of “full records with cited references.” Subsequently, articles that did not pertain to the research topic, lacked crucial field information such as time, keywords, authors, and other key information, or contained duplicate data were excluded. A total of 880 articles were selected and used for further quantitative analysis.

RESEARCH METHODOLOGY

To obtain more rigorous and comprehensive data indicators, the study employed VOSviewer, a bibliometric visualization software that uses a scientific

bibliometric approach to empirically analyse the retrieved data. Bibliometrics refers to the quantitative analysis of various types of bibliographic data to identify potential patterns and information in the vast amount of bibliographic data available. This approach was first proposed by Pritchard in 1969 (Chen et al., 2022). VOSviewer is a citation analysis JAVA program that combines database and analysis software to derive key points, establish relationships between units of knowledge in the literature and illustrate areas of scientifically mapped knowledge (Tan et al., 2021). VOSviewer has advanced graphical representation capabilities and is well-suited for locating the focus and hotspots of research topics in large-scale data (Van Eck and Waltman, 2010).

LITERATURE MEASUREMENT RESULTS AND ANALYSIS

ANALYSIS OF THE VOLUME OF ARTICLES PUBLISHED

The pattern of change in statistical academic literature output over time is a crucial method for measuring trends in research topics and can effectively assess the research dynamics of the discipline (Li et al., 2019). The retrieved data were cleaned and de-duplicated, and the fields were extracted to obtain Figure 1. As seen from the volume curve and trends in Figure 1, global research on Co-SDR decreased in 2018–2019 but showed a steady upward trend from 2019–2022, with the peak yet to appear. This indicates that the research field has not yet reached maturity. From 2018–2022, the average annual output of literature on Co-SDR in the research field was 176 articles/year, with

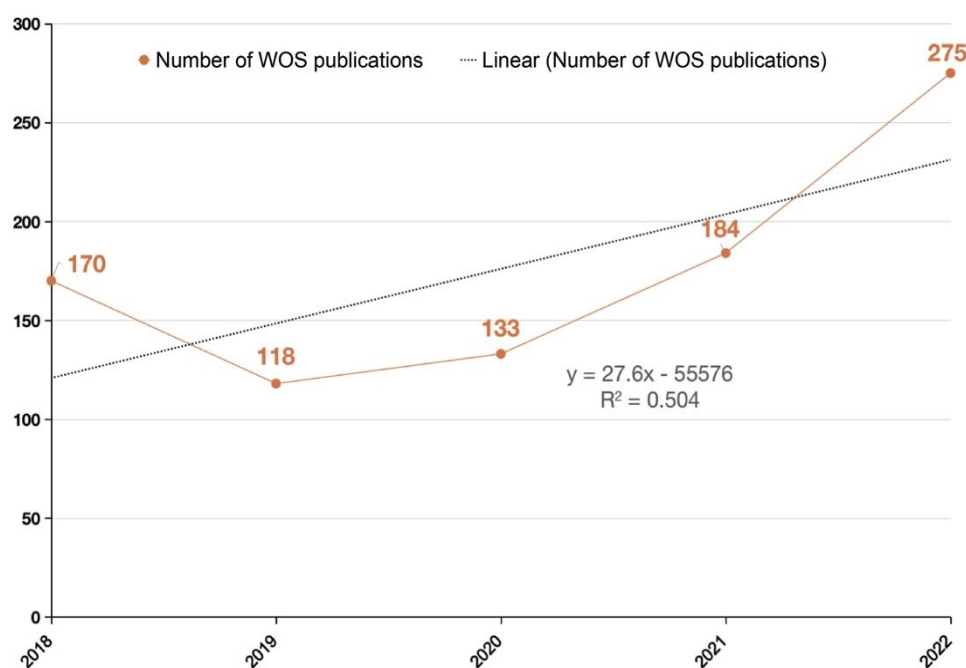


Figure 1: A distribution map of the annual publication volume of Co-SDR literature. (Self-illustrated by author).

DISTRIBUTION OF LITERATURE BY COUNTRY AND RESEARCH INSTITUTION

Australia has emerged as the leading country in Co-SDR research, contributing 284 publications, which represents 20.6% of the total publications in this field. Australia and the UK stand out among the top 10 countries in terms of volume, with both exceeding 200 articles. The research collaboration network highlights Australia and the UK as the leading countries in terms of both publications and citations, and thus, they can be regarded as the primary contributors in this research area.

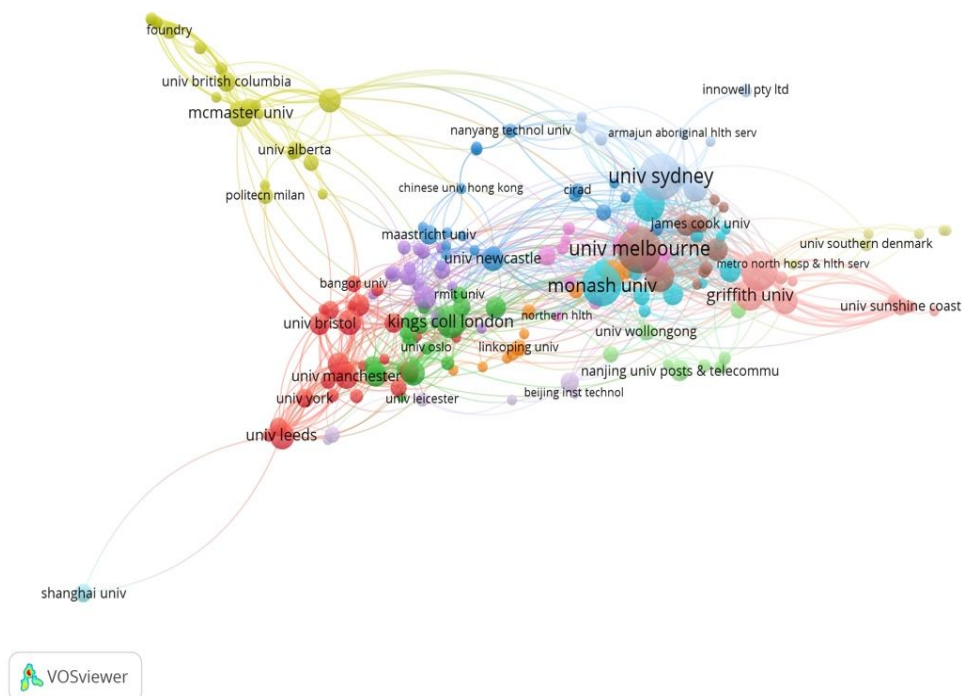


Figure 2: Cooperative institutions co-occurrence network. (Self-illustrated by author).

The dataset also highlights that 1,716 research institutions worldwide are actively engaged in the application of co-design in service design from 2018-2022. In order to obtain a collaborative network of organizations, the VOSviewer software was employed. Specifically, the “Organizations” option was selected, and the node threshold was set to 3. As a result, the generated network consisted of 197 nodes, which represent distinct organizations, and 1432 partnerships, reflecting the collaborative relationships between them. These findings are illustrated in Figure 2. Notably, the international collaboration on the application of co-design in service design is relatively close, with the University of Melbourne, King’s College London, and McMaster University being the primary institutions. These high-impact research institutions form three large collaborative subgroups within the search, with the University of Melbourne leading the ranking with 49 articles, followed by the University of Sydney with 48 articles, Monash University with 41 articles, the University of Queensland with 34 articles, and the University of New South Wales with 25 articles.

ANALYSIS OF RESEARCH HOTSPOTS AND FRONTIER TRENDS

Within the designated search area, a total of 880 documents were analysed, yielding 4839 distinct keywords. In order to identify clusters of related keywords, a frequency threshold of 5 was applied to the dataset using Vosviewer software. Following the filtering and merging of synonymous keywords, a total of 245 distinct keyword clusters were identified and visualized in Figure 3. Notably, keywords sharing the same colour denote membership within the same cluster, with four overarching clusters being discernible. These clusters include: #1 Healthcare Design, #2 Research Methodology, #3 Participatory Design of Public Services, and #4 Design Assessment.

Cluster #1 - Healthcare Design comprises a total of 78 members, predominantly in the areas of digital health, ehealth, mhealth, mental health services, care, youth, women, child, aboriginal, and gamification. By combining the high-frequency keywords, the research hotspot of Cluster 1 is centred on the application of co-design in healthcare service design. The pluralistic design objects of women, adolescents, children, and aboriginal groups present a strong inclusive perspective. To implement person-centred care in health and social care services, stakeholders must be involved in jointly designing a robust, secure, and scalable digital solution that can provide more efficient and integrated care solutions for older people (Sanz et al., 2021). Co-design is a crucial step in improving user-centred interventions, and e-health interventions co-designed by children and young people, such as computer games for children’s anxiety and self-monitoring apps for young people’s stress, can make interventions more engaging, satisfying, and useful (Thabrew et al., 2018). Experience-based co-design puts the voice of the service user at the heart of improving healthcare and can be effective in improving mental health services through collaborative redesign between service users and staff (Cooper et al., 2016). The COVID-19 pandemic has severely impacted traditional face-to-face co-design activities, and in this context, gamification has been proposed as a promising approach to facilitate online

Scandina-style approach to systems design and is often categorised as ‘collaborative design’, emphasising the role of designers and users in improving the quality of life at work (Halskov and Hansen, 2015). The value of involving users and different stakeholders in the design process is further understood and valued as collaborative design and participatory design processes are increasingly being used with success in different fields (Kerr et al., 2022). Design thinking, one of the high-frequency words in this cluster, is recognised as a way of thinking and a process for design, business innovation, and various complex problem-solving tasks (Kim and Park, 2021). Co-production is understood as the process by which “citizens can play an active role in producing public goods and services that affect them” (Ostrom, 1996). Co-production and co-design practices are increasingly being promoted for the development of user-centred public services (Farr, 2018).

Cluster #4 - Design assessment contains a total of 41 cluster members, mainly containing access, equity, human-centred design, needs, quality-of-life, scoping review, service delivery, usability, etc. Most of the high-frequency words in this cluster belong to design evaluation criteria in the service design research system, such as needs, service delivery, quality-of-life, usability, etc. Therefore, this cluster can be characterized as design assessment in service design. In design research, human-centered approaches have been linked to participatory co-design, which supports and enhances human skills while focusing on human values in iterative design and implementation (Holeman and Kane, 2020). To reflect human-centered, experience-based design solutions, specific quantitative assessment metrics are used to co-design with users, based on statistical analysis of their experiences and needs for services.

THEORETICAL FOUNDATIONS OF THE CO-SDR STUDY

In terms of theoretical foundations, the Co-SDR study identified 38,103 valid references from 28,520 scholars among the 880 documents searched. These references were used to construct a co-citation network, which demonstrates the evolution of Co-SDR research at the basic knowledge level. VOSviewer was used to generate a co-citation network of 240 references and 4,968 co-citation relationships, which were extracted from references with a citation frequency of no less than 5 in 2018-2022. The top 10 co-cited classics, as shown in Table 1, form the most significant knowledge base for the Co-SDR study.

The most frequently cited article in the literature is the 2006 work by Paul Bate and Glenn Robert. This article focuses on the emerging discipline of design sciences and experience-based design, proposing that the integration of users into the design process and attention to their movement through and interaction with the various parts of a service can achieve the common goal of making services ‘more comfortable’ for users (Bate and Robert, 2006). The paper argues that users should move from being passive recipients to active participants in the improvement and innovation process. This article has had a significant impact on subsequent research into user participatory design.

Table 1. A total of the top 10 classical literature cited (Note: TIs = Total link strength; TC = Total Citations.).

No.	Title	Sources	Time	TIs	TC
1	Experience-based design: from redesigning the system around the patient to co-designing services with the patient	Qual Saf Health Care	2006	335	46
2	Experience-based Co-design and Healthcare Improvement: Realizing Participatory Design in the Public Sector	The Design Journal	2015	389	44
3	Co-creation and the new landscapes of design	CoDesign: International Journal of CoCreation in Design and the Arts	2008	246	37
4	Using Experience-based Co-design (EBCD) to improve the quality of healthcare: mapping where we are now and establishing future directions	King's College London	2014	315	35
5	Achieving Research Impact Through Co-creation in Community-Based Health Services: Literature Review and Case Study	The Milbank Quarterly	2016	212	31
6	Benefits of Co-design in Service Design Projects	International Journal of Design	2011	229	28
7	Improving healthcare through the use of co-design	THE NEW ZEALAND MEDICAL JOURNAL	2012	211	26
8	Organizing for Quality: The Improvement Journeys of Leading Hospitals in Europe and the United States	CRC Press	2007	173	24
9	The Participatory Zeitgeist: an explanatory theoretical model of change in an era of coproduction and codesign in healthcare improvement	MEDICAL HUMANITIES	2018	238	24
10	Patients and staff as codesigners of healthcare services	BMJ-BRITISH MEDICAL JOURNAL	2015	224	24

The second most cited article is by Sara Donetto et al. published in The Design Journal in 2015. This article discusses the strengths and challenges of experience-based co-design (EBCD) as a participatory research method applied to healthcare delivery. The co-design process becomes part of a reconfiguration of power relations between citizens and public services, allowing healthcare professionals and patients to renegotiate their roles and expectations in the co-design process (Donetto et al., 2015).

The third most cited is Elizabeth et al's 2008 publication 'Co-creation and the new landscapes of design', which refers to the scale or complexity of the human-centred design approach that began in the 1970s as a failure to address the challenges faced today. Design research has evolved from a user-centred approach to co-design. The evolution of design research has created a new field of co-creation, where 'users' can be co-designers throughout the design process. The level of expertise, enthusiasm, and creativity of the 'user' determines whether or not everyone can be a designer. This evolution has changed the face of design practice, and new landscapes of design and research are constantly changing in space and time (Sanders and Stappers, 2008).

The bulk of the remaining top ten highly cited works expound about co-design within the domain of healthcare delivery systems, including but not

limited to experience-based co-design (EBCD) and mental health co-design (MH ECO). A meticulous examination of these concepts and relevant case studies indicates that, in healthcare settings, co-design connotes the collaborative efforts of patients and caregivers with healthcare professionals to enhance services. It is incumbent upon patients to engage in more protracted and direct involvement in identifying, executing, and assessing improvements in healthcare services (Robert et al., 2015).

CONCLUSION AND DISCUSSION

The analysis reveals that Co-SDR research output has increased significantly in the past two years. Few countries/regions, institutions, and scholars demonstrate high productivity, and research collaborations tend to be institutionally dominated and fragmented.

The keyword clustering analysis shows that Co-SDR research is comprehensive and multidisciplinary, with four primary categories: #1 Healthcare Design, #2 Research Methodology, #3 Participatory Design of Public Services, and #4 Design Assessment. Together, these clusters form the hotspots of Co-SDR research, including service design methods and evaluation, user interaction, experience and co-design processes, reflecting a strong inclusive character and emphasising “user-centredness.”

The reference co-citation network analysis reveals that Co-SDR research is relatively mature, and the field has produced a body of classic literature. The research methodology is primarily a user-centred participatory approach, using specific quantitative evaluation metrics for service design, with the aim of improving services through co-design. Research theories include value co-creation, experience-based co-design, technical co-design, and planning studies, which have played an essential role in driving the development of subsequent research on Co-SDR.

ACKNOWLEDGMENT

The author sends thanks to the guest editors and all anonymous reviewers for valuable comments and suggestions.

REFERENCES

- Bate, P. & Robert, G. 2006. Experience-based design: from redesigning the system around the patient to co-designing services with the patient. *BMJ quality & safety*, 15, 307–310.
- Bell, S., Benatti, F., Edwards, N. R., Laney, R., Morse, D. R., Piccolo, L. & Zanetti, O. 2018. Smart cities and M 3: Rapid research, meaningful metrics and co-design. *Systemic Practice and Action Research*, 31, 27–53.
- Chen, Y., Jiang, Y., He, R. & Wu, X. 2022. Emotional Design Trends and Research Progress: A Scientometric Analysis-Based Study. *PACKAGING ENGINEERING*, 43, 32–40.
- Cooper, K., Gillmore, C. & Hogg, L. 2016. Experience-based co-design in an adult psychological therapies service. *Journal of Mental Health*, 25, 36–40.

- Donetto, S., Pierri, P., Tsianakas, V. & Robert, G. 2015. Experience-based co-design and healthcare improvement: realizing participatory design in the public sector. *The Design Journal*, 18, 227–248.
- Farr, M. 2018. Power dynamics and collaborative mechanisms in co-production and co-design processes. *Critical Social Policy*, 38, 623–644.
- Halskov, K. & HANSEN, N. B. 2015. The diversity of participatory design research practice at PDC 2002–2012. *International Journal of Human-Computer Studies*, 74, 81–92.
- Holeman, I. & Kane, D. 2020. Human-centered design for global health equity. *Information technology for development*, 26, 477–505.
- Kerr, J., Whelan, M., Zelenko, O., Harper-Hill, K. & Villalba, C. 2022. Integrated co-design: A model for co-designing with multiple stakeholder groups from the ‘fuzzy’ front-end to beyond project delivery. *International Journal of Design*, 16, 75–90.
- Kim, Y. S. & Park, J. A. 2021. Design thinking in the framework of visual thinking and characterization of service design ideation methods using visual reasoning model. *The Design Journal*, 24, 931–953.
- Li, J., Liu, J., Wang, J. & Feng, C. 2019. Academic map of fire safety science based on the Fire Safety Journal. *Fire Science and Technology*, 38, 1760–1765.
- Ostrom, E. 1996. Crossing the great divide: coproduction, synergy, and development. *World development*, 24, 1073–1087.
- Robert, G., Cornwell, J., Locock, L., Purushotham, A., Sturmey, G. & Gager, M. 2015. Patients and staff as codesigners of healthcare services. *Bmj*, 350.
- Sanders, E. B.-N. & Stappers, P. J. 2008. Co-creation and the new landscapes of design. *Co-design*, 4, 5–18.
- Sanz, M. F., Acha, B. V. & García, M. F. 2021. Co-design for people-centred care digital solutions: a literature review. *International Journal of Integrated Care*, 21.
- Seidelin, C., Dittrich, Y. & Grönvall, E. 2020. Foregrounding data in co-design—An exploration of how data may become an object of design. *International Journal of Human-Computer Studies*, 143, 102505.
- Tan, H., Sun, J., Wenjia, W. & Zhu, C. 2021. User experience & usability of driving: A bibliometric analysis of 2000–2019. *International Journal of Human-Computer Interaction*, 37, 297–307.
- Thabrew, H., Fleming, T., Hetrick, S. & Merry, S. 2018. Co-design of eHealth interventions with children and young people. *Frontiers in psychiatry*, 9, 481.
- Van Eck, N. & Waltman, L. 2010. Software survey: VOSviewer, a computer program for bibliometric mapping. *scientometrics*, 84, 523–538.
- Wang, Y., Xin, X., Yu, H. & Luo, J. 2021. Visualization analysis of service design literature metrology. *Journal of Nanjing Arts Institute (Fine Arts & Design)*, 99–105.
- Wetter-Edman, K., Sangiorgi, D., Edvardsson, B., Holmlid, S., Grönroos, C. & Mattelmäki, T. 2014. Design for value co-creation: Exploring synergies between design for service and service logic. *Service Science*, 6, 106–121.
- Xin, X. & Cao, J. 2014. Service design drives public affairs management and organizational innovation. *DESIGN*, 124–128.
- Xin, X. & Wang, X. 2018. Co-Creation and Uncertainties of Experiences in Service Design. *ZHUANGSHI*, 74–76.
- Zhang, Z., Patricio, R., Carella, G. & Zurlo, F. 2022. Supporting a sustainable and engaging online transition for Co-design through gamification. *Sustainability*, 14, 6716.