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Social Learning for Policy Design: A Bibliometric Analysis

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Abstract: Social learning is the main policy-design mechanism that involves interactions between agents. This study provides an overview of the research on policy design using social learning. Descriptive and co-citation analyses were used to identify emerging research lines and thematic similarities between scientific publications. The database used for the bibliometric analysis contained 271 articles published between 1979 and 2022 in 152 journals indexed by the SSCI. We propose a study based on the origins and the future research agenda of social learning for policy design. The results reveal that "environment", "governance", and "social" represent the knowledge base. These topics have evolved over time and have become established as a consolidated intellectual structure. In addition, a new topic called "media and news" has emerged, focusing on the challenges of spreading fake news and learning manipulation in a post-truth world. The cluster "Media and news" is gaining significance due to its impact on the dissemination of information and the shaping of opinions in contemporary society.

Keywords: policy design; social learning; bibliometric analysis; WoS; co-citation analysis

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1. Introduction

Over the past decade, policymakers have implemented various strategies to achieve their objectives and advance their primary goals within political frameworks (Sorz et al. 2020). With this purpose in mind, the role of social interaction in political contexts as a support measure in this challenging task cannot be overstated, as it yields several benefits in the realms of learning and problem-solving. Social interaction enhances our understanding of social dynamics by identifying best practices, avoiding past mistakes, and adopting successful approaches in similar situations (Tump et al. 2022). Additionally, it fosters adaptability and flexibility by allowing one to recognize that what works in one context may not necessarily work in another. Finally, it promotes efficiency in resource utilization, because learning from the experiences of others can optimize the use of limited resources (Tikhonova et al. 2022). However, despite these positive aspects, government entities do not consider it a convenient political tool, as it can affect the stability of governments and their ability to maintain control over development policies (Lull 1992; Madoery 2001).

Being aware of this reality, researchers have also devoted efforts to providing theoretical frameworks and empirical evidence on how these strategies operate. Moreover, to stay within the changes in society, these mechanisms should have the ability to be readapted. In this regard, the main mechanisms for analyzing interactions between governments concerning policy design are yardstick competition, tax competition, and spillover effects (Ferraresi 2020). In a yardstick competition setting, policies are designed while keeping in mind that voters are aware of neighboring policies. In the tax competition framework, the primary objective is to attract firms and voters by reducing tax base rates. Finally, in the spillover effect model, policy programs are created considering that citizens can benefit from investments made in territories of geographical proximity (e.g., infrastructures).

In addition to these mechanisms, the literature highlights others such as benchmarking, policy experimentation, and intergovernmental coordination. Benchmarking involves the systematic comparison of policies or outcomes across different jurisdictions to establish standards and improve the performance of public policies (Tarabini-Castellani and Bonal-Sarró 2011). Policy experimentation refers to the implementation of public policies on a small scale or in a controlled environment before being adopted on a broader level (Heilmann 2008). Intergovernmental coordination involves the cooperation and collaboration between different levels of government (national, regional, and local) in the implementation and management of public policies (Abrucio and Grin 2015).

A common issue in these models is that there is no interaction between different agents. Moreover, two points remain unclear: (i) the evolution between suggestions and policy or how these ideas become policy, and (ii) the conditions for a successful exchange of ideas and policies. Therefore, it is necessary to identify effective policy-design mechanisms. Social learning theory states that learning occurs through interactions among different actors (Boyle et al. 2021).

The term social learning (SL) emerged in the 1970s and highlighted the value of learning by modeling the behavior of peers rather than individual cognitive learning or learning by doing (Bandura 1997). Although we did not find a single definition of the concept of social learning in policy design (PD), different authors have referred to the application of this mechanism. Sol et al. (2013) defined social learning as an interactive and dynamic process in a multi-actor setting, where knowledge is exchanged, and actors learn through interaction and co-create new knowledge during ongoing interactions.

The real effects of social learning benefits span diverse fields, yielding tangible outcomes and enhancing decision-making processes (Albert et al. 2012; Boyd et al. 2011; Garcia-Retamero et al. 2009). Currently, there is a growing trend towards the incorporation of social welfare, considering all stakeholders involved in formulating policy guidelines, despite persistent doubts about the robustness of the scientific foundation behind such research (Diener et al. 2009). This type of research has been proposed for use in specific policy domains such as health, labor markets, and agriculture.

For instance, Nykvist (2014) demonstrated that learning among farmers is inherently social, but without policies, individual leadership, or facilitation, it does not become a significant factor. However, policymakers remain uncertain, with few exceptions in their utilization (Noll 2013). Social learning helps to amend ineffective public policy and practice but can also support social change in a broader sense (Hall 1993). Policy advice and dialogue, the dissemination of regulations, and international forums provide new perspectives for solving problems (Chelminski 2022).

Owing to this generic definition of social learning, applications can be found in different fields. For instance, some authors highlighted the potential role of social learning as a governance mechanism for natural resource management (Lebel et al. 2010; Van der Wal et al. 2014; Ison et al. 2011). Social learning is essential for fostering behavioral change and questioning established norms, both of which are critical for promoting sustainability in complex environmental systems (Silva-Jean and Kneippb 2024). Social learning not only facilitates knowledge sharing but also creates opportunities for innovation by motivating shifts in attitudes and approaches toward ecological challenges. This process is particularly relevant in environmental contexts, where collective action and adaptive learning are necessary for addressing multifaceted issues such as climate change, resource depletion, and biodiversity loss (Koskinen and Paloniemi 2009). Similarly, in psychology, the dimension of social learning provides a helpful analytical tool for co-creative planning (Von Schönfeld et al. 2019; Heyes 2016; Kalkstein et al. 2016). Finally, regarding technology, the recognition of interconnections provides an empirical basis for political planning and the development of social learning (Matschoss and Repo 2020; Raven et al. 2008; Verbong et al. 2008).

Some authors believe that policymakers call only social learning when faced with unknown economic environments (Baskaran 2021; Glick 2014). From that point forward, we follow a successful social learning process that underscores the need for social learning

theory. This process can facilitate understanding social learning not only in terms of the interactions taking place between stakeholders but also in terms of the dynamics, knowledge, and social relations produced by this interaction (Beers et al. 2010).

This article provides an overview of what has been researched to date in policy design using the social learning methodology. This topic has been developed by a wide range of authors in different areas of applied policy. The current researchers believe that a longitudinal approach that incorporates these different theoretical perspectives and their interactions over time will provide a useful analytical framework for understanding the benefits of applying social learning to policy design. Different research objectives, methodologies, and units of analysis were detected that provided an extensive framework. An overall review of these different approaches was undertaken, and new directions for further research were subsequently identified. A quantitative review of the existing literature was conducted to achieve that purpose. Additionally, because of scientific advancements in recent decades, the measurement of quantitative data has led to the use of bibliometric analysis as a useful tool (Sancho 1990). Conducting a bibliometric analysis allows one to understand the current development of research, establish solid lines of knowledge, and identify studies related to the objective under study. Two bibliometric techniques were employed during the current research—descriptive analysis and co-citation analysis—to assess thematic similarities between scientific publications. We focused on two research questions (RQs).

RQ1. What are the origins and the knowledge base of social learning for policy design?

RQ2. What is the evolution of the concept of social learning for policy design?

The remainder of this paper is organized as follows. Section 2 describes the research design, data collection method, and tools used to visualize the dataset. Section 3 presents the major results, which are divided into three subsections. Finally, Section 4 presents the conclusions and research answers.

2. Data and Methods

This study used a bibliometric analytical approach. Bibliometric analysis is used to estimate, analyze, and visualize the construction of scientific fields (Koskinen et al. 2008). It is used to describe the expansion of a desired field within a particular area of knowledge (Liu et al. 2019). Unstinting attempts were made to accurately select the literature that constitutes the study set. First, the digital bibliographic database from which the study set would be extracted was selected. There are several databases for carrying out bibliometric analysis, such as Web of Science (WoS), Scopus, and Google Scholar. WoS was selected (Singh et al. 2021) because it is the most selective, and the database has adopted the best quality standards. As Liu (2019) suggested, the Thomson Reuters Social Science Citation Index (SSCI) was also selected because it is a good data source that is widely used in bibliometric studies (Diez-Vial and Montoro-Sanchez 2017; Galvagno and Pisano 2021; Hernández-Linares et al. 2018) and practically all studies of interest in this topic appear in this database.

It can be assumed that social learning has a multidisciplinary application, given that the SSCI database features numerous articles that apply social learning theory to different disciplines, such as education (e.g., Bolmsten and Kitada 2020; Jonsson and Lillvist 2019), medicine (e.g., Bieniek and Bąbel 2022), criminology (e.g., Dearden and Parti 2021), and religion (e.g., Łowicki and Zajenkowski 2020). Therefore, to refine the research, we filtered by categories that are more closely related to policy design to avoid articles outside the area of concern. For this reason, the selected categories are regional and urban planning, economics, political science, management, urban studies, and business and public administration.

Once the database and categories were selected, the keyword search strategy was set to identify the use of social learning methodology in policy design. We selected "policy" and "social learning" as search terms. To not rule out any articles related to the topic, we added the "polit*" and "polic*" variations. Thus, WoS suggested the following keyword

strategy: ("polit*" OR "polic*") AND ("social learning"). Finally, the language criterion of English was added because it is the major language in science, and the document type was filtered by article. WoS subsequently returned 301 articles on 12 July 2022.

Although the journals were filtered by category, some were multidisciplinary journals, which explains why it was necessary to narrow down the set of articles to guarantee the quality of the database. A detailed analysis of all papers was conducted in two rounds of peer review, discarding papers that were not related to policy design. After the two rounds of review, the two lists were compared, and papers marked as "not related" in both lists were eliminated. In this phase, 22 articles (7.3% of the total dataset) were excluded. The articles marked as "related" in both lists were then accepted; that is, 253 articles. Finally, the co-authors of this study consulted the remaining 26 articles (301 − 22 − 253 = 26). After a detailed reading of each paper, eight articles (2.7% of the dataset) were removed.

In this context, the final database used for bibliometric analysis contained 271 articles. The next step consisted of the standardization of capital letters, verification of the initials of the authors, elimination of duplicates in the cited references, and completion of the data. This usually involves an iterative process until the researcher obtains the correct information records.

Table 1 summarizes the final databases. Papers published between 1979 and July 2022 in 152 journals, indexed by the SSCI, were noted. There were 871 different keywords; therefore, on average, an article presented 3.2 keywords. We identified 588 authors and 88 single-author articles.

Table 1. Database information.

Articles	271	Average
Temporal space	1979–2022	6.16 articles per year
Journals	152	1.78 articles per journal
Keywords	871	3.21 keywords per article
Authors	588	2.17 authors per article
Single-authored documents	88	32.5% of the total database

Source: Authors' elaboration based on WoS database.

For the final database, both descriptive and co-citation analyses were applied. Hence, it was possible to identify and develop social learning methods to design and implement policies. Being cognizant of the information from the countries and institutions where they had been published provided a certain degree of explanation of their sociodemographic contexts (Danvila-del-Valle et al. 2019). Analyzing citations enabled the present researchers to determine which articles were the greatest disseminators of knowledge.

Finally, a co-citation analysis was conducted to examine the articles and authors supporting this study. Co-citation is defined as the time that two documents in the references are cited together (Egghe and Rousseau 2002). In addition, cluster analysis was used to group the authors and provide information on the intellectual organization of a given field (McCain 1990). Data analysis and visualization were performed using Biblioshiny (RStudio) (Aria and Cuccurullo 2017) to identify the data and ascertain co-occurrence and collaboration networks (Ho et al. 2021).

3. Results

A comprehensive exploration through bibliometric analysis to unravel the essence of the literature's contributions is presented in this section. The goal of this section is to provide an understanding of the key outcomes derived from the analytical processes and to submit a description of the research landscape. This part is divided into three subsections.

The first subsection presents a descriptive analysis and temporal division. Information on the most important articles, journals, and countries is presented. The second subsection analyzes the most influential articles in the database by conducting a co-citation analysis (Moya-Anegón et al. 2004). This analysis is dealt with in two parts: first, we present the

descriptive analysis of article citations, divided into two time periods, and then we evaluate the direct citation network using RStudio's Biblioshiny package. The third subsection provides a historical view of the founders' documents that appear in references to our database articles. It is also analyzed in two parts: first, we present the descriptive analysis of the documents, and then we conduct the co-citation analysis. This analysis can be used to generate new knowledge on the application of social learning in policy design.

3.1. Publications, Journals, and Countries in Social Learning (SL) for Policy Design (PD)

Figure 1 shows the increase in the number of articles over the years, reaching 26 and 25 in 2020 and 2021, respectively. In addition, as of 2016, more than 50% of the literature has been published in recent years. This result indicates how popular this topic is among the scientific community. It is important to clarify that articles published in 2022 have not been considered to make the time series because for the rest of the years, all the articles are available, and therefore the graph would have a temporal bias. However, to make the analysis as current as possible, articles from 2022 are featured in the rest of the descriptive analyses.

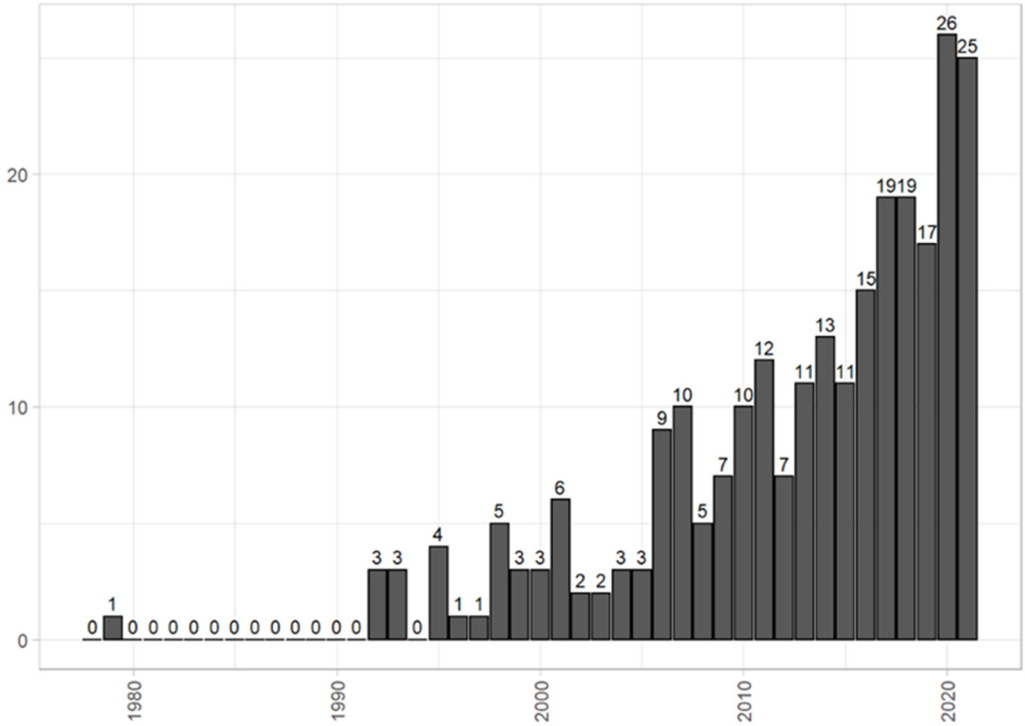

Figure 1. Number of relevant publications.

Figure 2 shows the number of different journals by year that published articles related to this topic. Comparing Figure 2 with Figure 1, it can be observed that the ratio between the number of articles and the number of journals per year is close to 1. This fair dispersion implies that the topic has been published in several journals, and different communities of scientists have worked on it. The multidisciplinary nature of these journals is discussed in the following subsection.

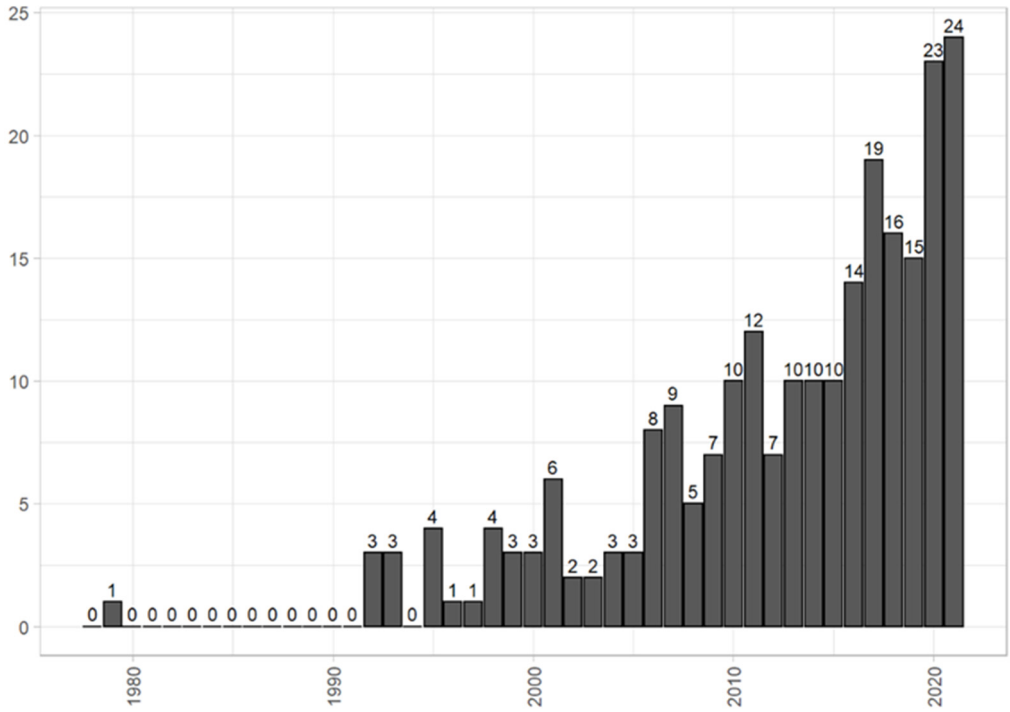

Figure 2. Number of journals per year.

Previous studies have supported dividing the sample into periods, because citation habits change over time (e.g., Ramos-Rodríguez and Ruíz-Navarro 2004; Ronda-Pupo and Guerras-Martín 2010). To investigate this issue in greater depth over time, the journals that published the most articles in two timeframes, 1979–2015 and 2016–2022, were listed. This temporal division was made according to Lazzeretti et al. (2014), since the same number of articles could then be obtained. If we were to consider the same time frame (Heo et al. 2017), the database would become very unbalanced, and there would not be a clear view of the concept's evolution. A total of 135 and 136 articles were published in the first and second periods, respectively. Table 2 illustrates that the same number of papers has been published in the last seven years as in the previous 37 years.

Table 2. Two time frames.

	Period 1	Period 2
Articles	135	136
Starting year	1979	2016
Ending year	2015	2022

Source: Authors' elaboration based on WoS database.

The objective of this temporal division is, on the one hand, to understand the temporal evolution of the concept, and on the other hand, to see what types of journals are interested in publishing on the topic. One would expect only generic policy journals, such as Public Administration or Policy and Politics, because the database was created on the application of social learning in policy design. Nevertheless, journals on ecological and environmental issues, natural resources, and world development dominated both periods. The results are presented in Tables 3 and 4.

Table 3. Ranking of the 10 most productive journals in Period 1.

Journal	Freq	Citation Count	Mean
Ecological Economics	9	787	87.44
Society & Natural Resources	7	592	84.57
Public Administration	6	708	118
Journal of Rural Studies	5	534	106.8
Journal of Environmental Planning and Management	5	166	33.2
Political Research Quarterly	4	445	111.25
Governance—An International Journal of Policy Administration and Institutions	4	370	92.5
Policy and Politics	3	163	54.33
Energy Policy	3	137	45.67
Journal of Politics	2	437	218.5

Source: Authors' elaboration based on WoS database.

Table 4. Ranking of the 10 most productive journals in Period 2.

Journal	Freq	Citation Count	Mean
Society & Natural Resources	6	97	16.17
Management Science	4	86	21.5
Journal of Environmental Policy & Planning	4	67	16.75
Journal of Rural Studies	4	42	10.5
Journal of Environmental Planning and Management	4	27	6.75
World Development	3	37	12.33
Forest Policy and Economics	3	21	7
Futures	3	17	5.67
Local Environment	3	16	5.33
Energy Policy	2	83	41.5

Source: Authors' elaboration based on WoS database.

For the first period, the highlighted journals are Ecological Economics, with 787 citations in 9 articles, and Society & Natural Resources, with 592 citations in 7 articles. The first 10 journals accumulated 48 out of 135 articles. This represents 35.5%, indicating a significant dispersion among the journals that published the articles. In the second period, Society & Natural Resources had the most citations (97 citations), followed by 6 articles. As expected, this period presents lower values for the number of citations because they appear in the database for a shorter time than those in the first period. In that case, the first 10 journals accumulated 36 out of 136 articles. This represents 26.5%, indicating an even greater dispersion of journals. Additionally, the evolution of journals in terms of the environment can be observed. There were four journals at the top of the first period, whereas in the second period, the number increased to seven. This growing interest in climate change may be owing to the adoption of the Paris Agreement on Climate Change in 2015.

Following this, the research team explored where the research topic has been mainly investigated; that is, where the authors who researched social learning in policy design originated from. The economics and sociology literature have identified the importance of social learning from peers in overcoming such "information failures" in developed countries (Griliches 1957).

The results show that there are authors from 41 countries. Figure 3 shows the countries with more than two articles and differentiates between articles of single-country publications (SCPs) and multiple-country publications (MCPs). The large number of different countries involved demonstrates the global relevance of using social learning in policy design. Moreover, this diversity of countries, including the United States, the United Kingdom, Australia, Netherlands, and China, among others, provides a wide range of

perspectives on the subject and reflects both international collaboration and broad dissemination (Andersson 2009; Brans and Coenen 2016). In addition, it clearly demonstrates that the main contributors to the rapid progress of this issue were developed countries.

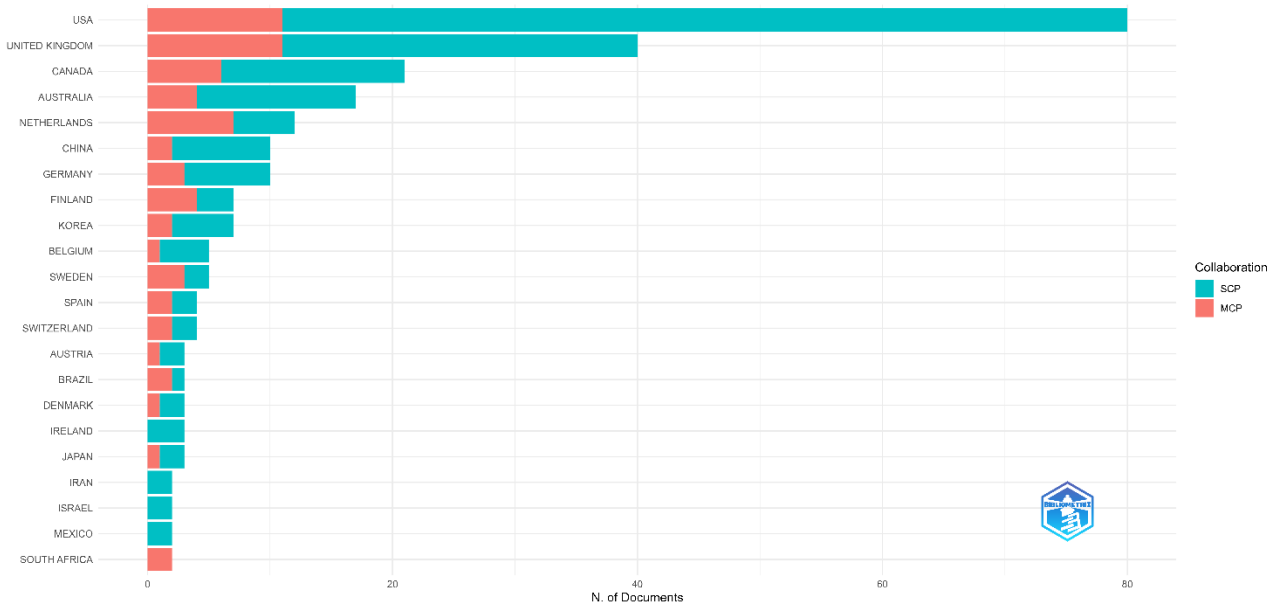

Figure 3. Corresponding author's country.

The increase in the number of articles published over the years highlights the importance of social learning. Several journals and countries exploring social learning in policy design were identified, reflecting broad diversity in this field. Topics in three areas were identified: environmental policy, economic policy, and social sciences. This underscores the need for a deeper analysis to understand their origins and new research challenges.

3.2. Historical View of the Origins of SL for PD

This section presents an analysis of the cited documents in the database articles. The 271 articles in the database encompass 16,240 references. Table 5 lists the most relevant references. The research team identified 26 documents cited by 10 or more articles in our database. The most-cited document was Hall (1993), cited in 33 articles in the database; this article was also included in the database. This study examines the social learning model, compares it to cases of policy change, and analyzes ideas in policymaking. The second-most referenced document, with 24 citations, was written by Bandura (1997). In this book, the author offers a proposal on social learning theory in which he distinguishes between two processes in the social diffusion of innovation: the acquisition of innovative behaviors and their adoption in practice. Furthermore, he recognizes the role of social learning theory in the dissemination of new ideas, such as innovation and dissemination of public policies.

An overview of what the remaining works in Table 5 are about reveals the following. Some documents explore policy paradigms, social learning, and governments in economic policymaking, addressing the fundamentals of social learning theory. They provide theories on policy learning, advocate for an adaptive governance framework, and analyze collaborative resource management (Bennett and Howlett 1992; May 1992; Rittel and Webber 1973). These works cover policy learning, governance, planning theory, and innovation diffusion, focusing on the relationship between policy paradigms and the state in economic policymaking (Banerjee 1992; Sabatier 1988).

Table 5. Referenced documents of our database with at least 10 cites.

Title	Authors and Year	Citation Count
Policy paradigms, social learning, and the state: the case of economic policymaking in Britain	(Hall 1993)	33
Social learning theory (Vol. 1)	(Bandura 1997)	24
The lessons of learning: Reconciling theories of policy learning and policy change	(Bennett and Howlett 1992)	20
An advocacy coalition framework of policy change and the role of policy-oriented learning therein	(Sabatier 1988)	17
Social learning for collaborative natural resource management	(Schusler et al. 2003)	17
Adaptive governance of social-ecological systems	(Folke et al. 2005)	16
Modern Social Politics in Britain and Sweden	(Heclo 1974)	15
A critical review of the theory and application of social learning in participatory natural resource management processes	(Muro and Jeffrey 2008)	15
Organizational Learning: A Theory of Action Perspective	(Argyris and Schön 1978)	14
Social Learning in Environmental Management: Towards a Sustainable Future	(Keen et al. 2005)	14
Competing structure, competing views: the role of formal and informal social structures in shaping stakeholder perceptions	(Prell et al. 2010)	14
Policy learning and failure	(May 1992)	13
Dilemmas in a general theory of planning	(Rittel and Webber 1973)	13
A simple model of herd behavior	(Banerjee 1992)	12
Challenges to science and society in the sustainable management and use of water: investigating the role of social learning	(Ison et al. 2007)	12
A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes	(Pahl-Wostl 2009)	12
Lesson-drawing in public policy: A guide to learning across time and space (Vol. 91)	(Rose 1993)	12
Collaborative governance in theory and practice	(Ansell and Gash 2008)	11
Social Learning in European River-Basin Management: Barriers and Fostering Mechanisms from 10 River Basins	(Mostert et al. 2007)	11
Communities of practice: Learning, meaning, and identity	(Wenger 1998)	11
Evolution of co-management: Role of knowledge generation, bridging organizations and social learning	(Berkes 2009)	10
A theory of fads, fashion, custom, and cultural change as informational cascades	(Bikhchandani et al. 1992)	10
What kinds of knowledge, knowing and learning are required for adressing resource dilemmas? A theoretical overview	(Blackmore 2007)	10
Who learns what from whom: a review of the policy transfer literature	(Dolowitz and Marsh 1996)	10
Governing the commons: the evolution of institutions for collective action	(Ostrom 1990)	10
The diffusion of innovations among the American states	(Walker 1969)	10

Source: Authors' elaboration based on WoS database.

Other works focus on sustainable water management challenges and emphasize the impact of social learning, exploring how formal and informal social structures influence perceptions in environmental management (Folke et al. 2005; Ison et al. 2007; Mostert et al. 2007). Some works underscore the role of social learning in collaborative natural resource management and identify its barriers (Keen et al. 2005; Muro and Jeffrey 2008; Schusler et al. 2003).

Finally, the documents also discuss the evolution of co-management, highlighting knowledge generation and cultural change theories, while tracing the roles of bridging organizations and social learning (Prell et al. 2010; Wenger 1998). Organizational learning is examined from a theory of action perspective, along with theories about fads, fashion, customs, and cultural changes (Argyris and Schön 1978; Heclo 1974).

Co-Citation Analysis

The objective of this analysis was to identify which authors were the main founders of social learning in policy design. Co-citation analysis uses references as a measure of proximity for mapping (Tang et al. 2022). References that appeared together were deemed to be more related or similar. This technique was used to conceptualize the structure of this study. All the references of each article in this study's database were considered for the co-citation analysis. It provided 16,240 references for the 271 articles in the database, and their co-citations were analyzed to group them into different clusters. It was noted that 16,240 references was an impractical number that would produce indefinite results. In addition, some of the articles' references had been lost. For example, WoS does not save references, and incorrect information about the title, author, or year may appear. Therefore, the database was simplified to include only 10,975 references. This process allowed the research team to explore the documents that needed to be cited; that is, to analyze the theoretical framework.

The co-citation analysis that we conducted was an exploratory factor analysis with principal component analysis as the extraction method, which is the most used technique for finding subfields in bibliometric studies (Diez-Vial and Montoro-Sanchez 2017). The correlation matrix obtained using the SPSS software allowed for a significant reduction of the total number of references to 114. Next, the variance explained by each factor and the elbow graph were analyzed to select the components for the factor analysis. It was resolved to incorporate only the first four factors, as they explained approximately 80% of the total variance. In addition, the significant influence on the creation of the factor exerted by documents with a loading of at least 0.7, rounded to one digit, was considered (Vogel and Güttel 2012). The final version of the database had 77 documents with loadings of at least 0.7 in any of the factors.

The results (see Figure 4 and Table 6) show that the first component (white-colored component) was set by 51 documents; thus, more than 66.2% of the documents support the creation of the factor. Documents related to environmental management (Keen et al. 2005) viewed the subject from a social learning perspective. Text on climate change (e.g., Collins and Ison 2009) and the implications of adapting to political paradigms were also found. The factor also deals with the management of natural resources (e.g., Rist et al. 2007). Adaptive and integrated water management was prominent among these sources (e.g., Pahl-Wostl 2008). The aforementioned reasons explain why this factor was labeled "Environmental and natural resources".

In the blue-colored component, called "public policy", 16 documents appear as core contributions. In this component, 87.5% of respondents dealt with the design and implementation of policies. This study highlighted documents that examined, on the one hand, distinct types of policy learning, and on the other, the difficulties of any attempt to attribute policy change to policy learning (Bennett and Howlett 1992). Papers on economics, specifically on the power of applying economic ideas to politics (Hall 1989), were also found. Other documents were also considered in this factor; Haas (1992) introduced the coordination of groups that meet periodically to generate agreements, as well as the relationships with international policies.

Two components had lower impacts than the other components. These components represent only 16% of the total number of documents. Only 13% of the documents had a loading of at least 0.7. The green-colored component was called "Governance", and documents were found among these that focused on participatory management; for instance, Muro and Jeffrey (2012) dealt with the structure of dialogue processes. Ansell and Gash (2008) authored the most transversal study of this variable, because it presents collaborative governance at a theoretical level. They also presented several cases (137) of practical applications. Finally, Newig et al. (2010) provided support for this factor by defining network governance as a governance process that relies on networks as a relatively stable form of coordination.

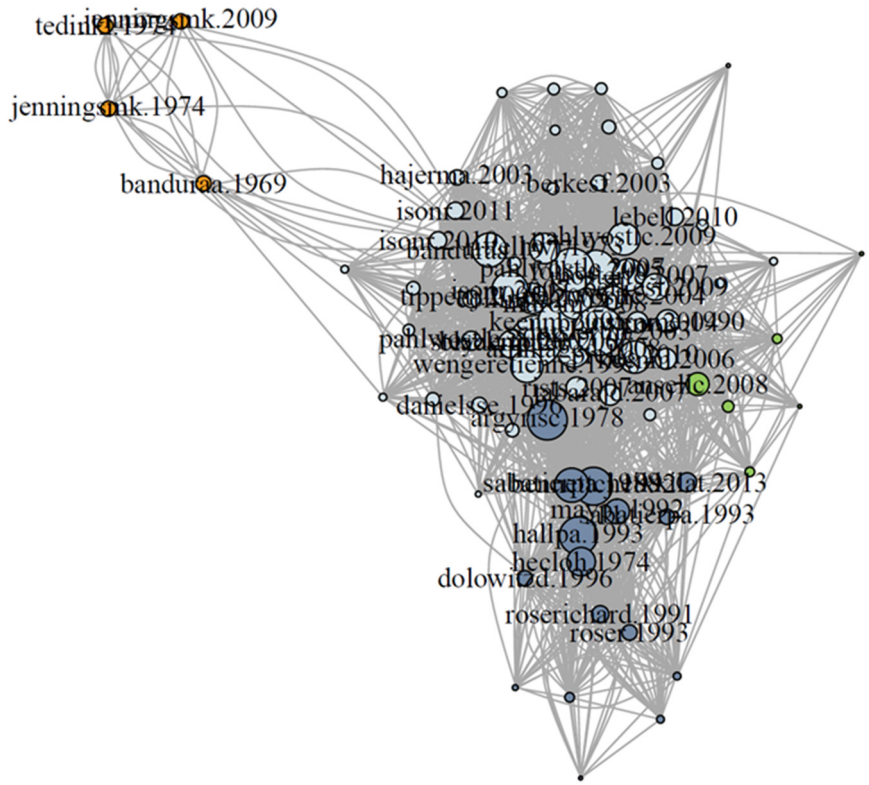

Figure 4. Components of the factor analysis.

Table 6. Description of the components of factor analysis by the founders.

Component	Labels [1]	Most Relevant Documents [2]	Loadings [3]
1 (white) "Environmental and natural resources"	Sustainability, water, management, adaptive, governance, natural resources	(Keen et al. 2005) (Pahl-Wostl 2007) (Armitage et al. 2008) (Folke et al. 2005) (Rist et al. 2007)	0.974 0.971 0.97 0.954 0.947
2 (blue) "Public policy"	Knowledge, politics, states, collaboration, organization, society	(Heclo 1974) (Hall 1993) (Dolowitz and Marsh 1996) (Hall 1989) (Rose 1991)	0.845 0.838 0.763 0.751 0.79
3 (green) "Governance"	Network, governance, participation, policy, lessons, adaptive	(Cash et al. 2003) (Gerlak and Heikkila 2011) (Hu and Bentler 1999) (Muro and Jeffrey 2012) (Newig et al. 2010)	0.639 0.783 0.685 0.655 0.659
4 (orange) "Social"	Socialization, communication, similarity, parents	(Bandura 2019) (Jennings et al. 2009) (Jennings and Niemi 1974) (Tedin 1974)	0.792 0.682 0.669 0.662

Source: Authors' elaboration based on co-citation analysis. [1] This column shows the most frequent keywords of the top 5 articles from the documents of each component. [2] In the column, "Most relevant documents" only the first author of the study is shown. [3] The loading value determines the influence of the document on the creation of the factor.

The last component (orange-colored component), called "Social", helped to identify documents analyzing the behavior acquired by individuals in political issues. Jennings et al. (2009) explained the transmission of political questions through the interactions

between different groups. Documents addressing the construction of political ideas among adolescents were also found (Tedin 1974).

3.3. The Most Influential Articles in SL for PD

To identify the leading articles, the number of citations received was compared. The temporal division presented above was used because an article's year of publication is directly related to the total number of citations. As per López-Rubio et al. (2022), the citations per year were indicated (yearly citations column) to ascertain the average annual impact of each article. Tables 7 and 8 show the 10 articles with the most citations per year in each period.

Table 7. Period 1 top 10 articles based on yearly citations.

Title	Authors and Year	Yearly [1] Citations	Citation Count
Policy Paradigms, Social Learning, and the State: The Case of Economic Policymaking in Britain	(Hall 1993)	103.73	3112
An Integrative Framework for Collaborative Governance	(Emerson et al. 2012)	100.91	1110
Why comply? Social learning and European identity change	(Checkel 2001)	31.45	692
Politics across Generations: Family Transmission Reexamined	(Jennings et al. 2009)	29.93	419
Transfer agents and global networks in the 'transnationalization' of policy	(Stone 2004)	25.68	488
Evaluation, policy learning and evidence-based policy making	(Sanderson 2002)	24.33	511
Social learning for collaborative natural resource management	(Schusler et al. 2003)	21.05	421
The lessons of learning-reconciling theories of policy learning and policy change	(Bennett and Howlett 1992)	19.1	592
Developing and applying a framework to evaluate participatory research for sustainability	(Blackstock et al. 2007)	15.88	254
Paradigms and Paradox: The Politics of Economic Ideas in Two Moments of Crisis	(Blyth 2013)	13.6	136

Source: Authors' elaboration based on WoS database. [1] Yearly citations are the average citations per year since the publication of the article.

Table 8. Period 2 top 10 articles based on yearly citations.

Title	Authors and Year	Yearly [1] Citations	Citation Count
Social Learning and Incentives for Experimentation and Communication	(Benyishay and Mobarak 2019)	16.75	67
Does ethical leadership enhance group learning behavior? Examining the mediating influence of group ethical conduct, justice climate, and peer justice	(Walumbwa et al. 2017)	13.67	82
Pathways to Implementation: Evidence on How Participation in Environmental Governance Impacts on Environmental Outcomes	(Jager et al. 2020)	10.67	32
When Extremists Become Violent: Examining the Association Between Social Control, Social Learning, and Engagement in Violent Extremism	(Becker 2021)	9.5	19
Social Learning and the Design of New Experience Goods	(Feldman et al. 2019)	8.75	35
Transition to low-carbon economy: Assessing cumulative impacts of individual behavioral changes	(Niamir et al. 2018)	8.4	42
Predicting intention to adopt solar technology in Canada: The role of knowledge, public engagement, and visibility	(Parkins et al. 2018)	8.2	41
Differential Online Exposure to Extremist Content and Political Violence: Testing the Relative Strength of Social Learning and Competing Perspectives	(Pauwels and Schils 2016)	8	56
Learning urban energy governance for system innovation: an assessment of transformative capacity development in three South Korean cities	(Wolfram 2019)	8	32
Why people enter and stay in public service careers: the role of parental socialization and an interest in politics	(Fischer and Schott 2022)	8	8

Source: Authors' elaboration based on WoS database. [1] Yearly citations are the average citations per year since the publication of the article.

In both periods, the top 10 most-cited articles highlighted the relevance of social learning, adaptability, and collaboration in policy development (Checkel 2001; Feldman et al. 2019; Sanderson 2002). They also emphasize the importance of evaluating and learning from previous policies (Bennett and Howlett 1992; Jager et al. 2020), along with public participation and ethics in governance (Emerson et al. 2012; Hall 1993). In the first period, although they also addressed natural resources and sustainability (Blackstock et al. 2007; Schusler et al. 2003), they focused more on the evolution of politics through social learning, emphasizing collaborative management (Blyth 2013). The transmission of policies across generations (Jennings et al. 2009) and borders as a necessity for integrated governance (Stone 2004) were also addressed.

The second period encompasses topics such as innovation in energy governance, ethics in leadership (Walumbwa et al. 2017), and participation in public service (Fischer and Schott 2022). Additionally, these articles focused on the interconnection between individual behavior and collective outcomes, power structures, and how politics can influence these actions (Benyishay and Mobarak 2019). They also addressed violence in political contexts, (Becker 2021; Pauwels and Schils 2016) and dealt to a greater extent with the environment, natural resources, and sustainability (Niamir et al. 2018; Parkins et al. 2018; Wolfram 2019). In addition, as the articles of the second period inherited the work of the previous period, it is easier to understand the methodological techniques and tools that are at the forefront of social learning and their political implications.

Direct Citation Network

The direct citation network shows articles from a database that cite another article from the same database, allowing the current researchers to ascertain the structure of research in the field, and as a consequence, to identify both established and emerging areas. A direct network was specifically created for the current study using RStudio's Biblioshiny package, and nine different clusters were established (see Figure 5 and Table 9). The blue cluster, called "Policy-making", contains 48 articles related to change and social learning within the framework of economic decision-making and policy formulation. A wide temporal dispersion was observed, ranging from older articles such as Bennett and Howlett (1992) and Hall (1993) to recent ones such as Mcmillan et al. (2022), indicating that this is an established line of research. The red cluster, called "Morality and Policy Diffusion", contains six articles and suggests a reformulation of legislation and reinvention of models, with an emphasis on issues such as abortion regulation, the death penalty, and political corruption (Boehmke and Witmer 2004; Mooney 2001). "Morality and Policy Diffusion" is a closed line of research, as there have been no citations from our database to any article within the cluster since 2004. The green cluster, called "Good Praxis in Sustainability", contains 11 articles and gathers studies that demonstrate concepts, lessons, and proposals for innovation in the field of sustainable development (Feliciano et al. 2019; Ison et al. 2021).

The yellow cluster, called "Socio-ecological Governance", contains six articles and highlights the role of social learning and public participation in transforming forest governance, sustainable natural resource management, and overcoming socio-ecological vulnerability (Nenko et al. 2019; Schultz et al. 2018). The pink cluster, named "Generational-Political Change", contains six articles that studied the intergenerational transmission of political inclinations. This demonstrates the role of parents and their influence on electoral participation and the formation of political identifications (Jennings et al. 2009; Kudrnáč and Lyons 2017). The turquoise cluster, named "Media and News", contains five articles that address the challenges of spreading fake news and learning manipulation in a post-truth word, where the terms disinformation and misinformation have gained prominence[1]. On the one hand, disinformation is defined as the deliberate dissemination of false information for the purpose of deception and manipulation (Mostagir and Siderius 2022), often employed as a political tool to influence elections and undermine trust in institution. On the other hand, misinformation is defined as the unintentional dissemination of false information that,

despite not being intended to mislead, can have significant consequences (Papanastasiou 2020). Finally, it is worth mentioning that the sizes of the purple, cyan, and khaki clusters are too small to consider them as true emerging trends. As a result, "Socio-ecological Governance", "Generational-Political Change", and "Media and News" are emerging clusters since they have few articles, but there are recent ones (Keppo et al. 2022; Meeusen and Boonen 2022; Souza et al. 2020). According to previous studies, the "Media and News" cluster plays a crucial role, as the effects of fake news are more pronounced in politics than in other topics such as terrorism, natural disasters, or financial reporting (Aïmeur et al. 2023; Vosoughi et al. 2018), posing major challenges. It is essential to implement strategies such as integrating media literacy programs (Boyle et al. 2021), fostering collaboration between governments, media, and fact-checkers (Pauwels and Schils 2016), and improving transparency and promoting the responsible use of algorithms that prioritize truthful information (Keppo et al. 2022).

Table 9. Description of the components of factor analysis by the disseminators.

Component	Labels [1]	Most Relevant Documents [2]	LCS [3]	GCS [4]
1 (blue) "Policy-making"	State, governance, change, framework, transfer	(Hall 1993)	33	3037
		(Checkel 2001)	7	692
		(Bennett and Howlett 1992)	20	573
		(Stone 2004)	1	475
		(Blackstock et al. 2007)	1	247
2 (red) "Morality and Policy Diffusion"	Diffusion, system, American, innovation, reforms, federal, states	(Mooney and Lee 1995)	5	282
		(Mooney 2001)	0	201
		(Boehmke and Witmer 2004)	0	167
		(Hays 1996)	0	51
		(Mooney and Lee 1999)	0	45
3 (yellow) "Socio-ecological Governance"	Governance, management, water, transformative, participation, knowledge, community	(Rist et al. 2007)	5	192
		(Cheng et al. 2011)	1	35
		(Suškevičs et al. 2019)	0	17
		(Souza et al. 2020)	0	6
		(Nenko et al. 2019)	0	4
4 (green) "Good praxis in Sustainability"	Governance, management, water, sustainability, science	(Garmendia and Stagl 2010)	3	155
		(Ison et al. 2013)	4	76
		(Luks and Siebenhüner 2007)	2	59
		(Colvin et al. 2014)	3	51
		(Einsiedel et al. 2013)	0	37
5 (pink) "Generational-Political Change"	Socialization, transmission, turnout, parents, similarity	(Jennings et al. 2009)	5	419
		(Gidengil et al. 2016)	0	40
		(Rico and Jennings 2016)	1	31
		(Kudrnáč and Lyons 2017)	0	6
		(Nolan-García and Inclán 2017)	0	3
6 (turquoise) "Media and News"	Information, Bayesian, design, product, quality	(Feldman et al. 2019)	1	31
		(Papanastasiou et al. 2018)	2	30
		(Papanastasiou 2020)	2	19
		(Mostagir and Siderius 2022)	0	0
		(Keppo et al. 2022)	0	0
7, 8, 9 (purple, cyan, khaki)		*Not enough articles*		

Source: Authors' elaboration using Biblioshiny. [1] In the column "Labels", the 5 most frequent "'keywords" for each cluster appear, but without considering "Policy" and "Social Learning", since they appear in all clusters due to the database we are working with. [2] In the column "Most relevant documents", only the first author of the study is shown. [3] The local citation score (LCS) determines the citations received inside the database. [4] The global citation score (GCS) shows the total number of citations to a paper in the WoS database.

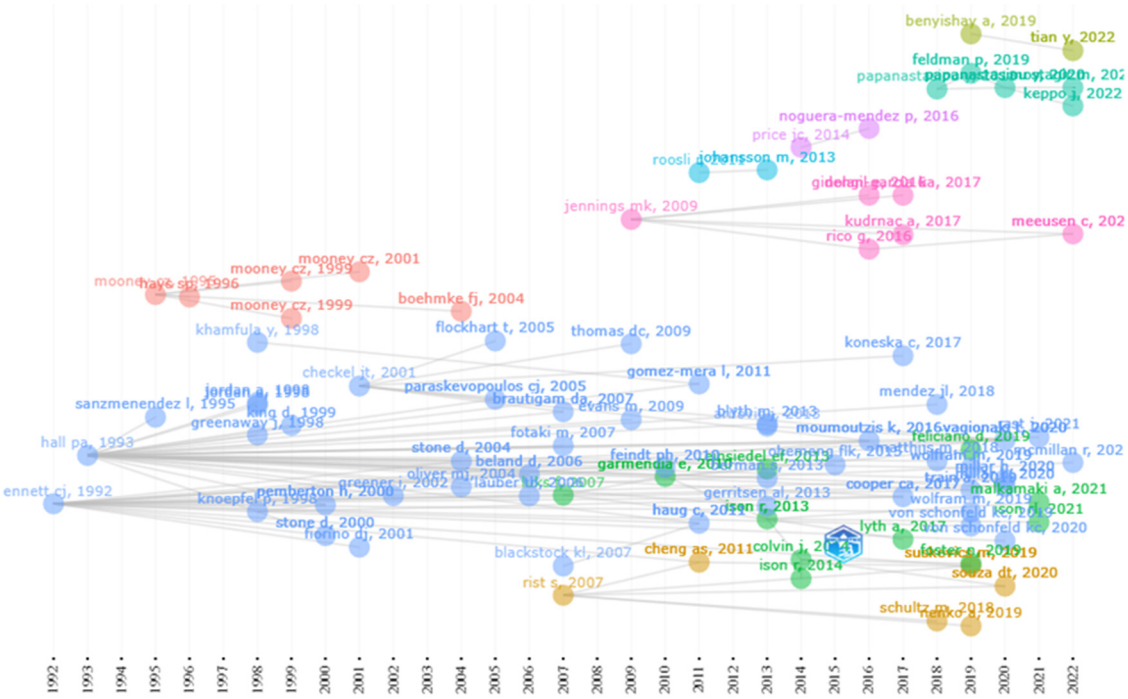

Figure 5. Direct citation network.

4. Conclusions

This study examined the crucial role of social learning for policy design. To this end, the scientific literature was analyzed by extracting papers from a database from WoS. A bibliometric analysis was then conducted to evaluate the current state of the literature in both database articles and references.

First, a descriptive and visual analysis of the information contained in the articles was presented. The increasing trend of publications over the years, along with the fact that in just 7 years (period 2, 2016–2022), the same number of articles have been published as in the previous 37 years (period 1, 1979–2015), highlights the importance of social learning for policy design. The analysis revealed that social learning for policy design encompasses several areas of knowledge, with publications in various journal categories and as a subject of study in countries worldwide. Additionally, there was a notable increase in the presence of journals focused on the environment during period 2. These initial results demonstrate an interest in achieving a thorough understanding of the origins and current state of the topic, as well as its evolution.

Second, using the references from the database, the foundational structure was identified, and a historical perspective on the origins of social learning for policy design was presented. With this study, the first research question, RQ1, was answered. The historical origins of the application of social learning for policy design over time can be grouped into four main categories: environmental and natural resources, public policy, governance, and social aspects.

Third, a direct citation network was created to identify both established and emerging areas, providing insights into the development and interconnections between various research topics. The second question, RQ2, was answered by identifying the consolidated topics in this field: sustainable management of natural resources, public policy and governance, and intergenerational transmission of political behavior. Moreover, a cluster labeled "morality and policy diffusion" emerged but showed limited progression. In addition, emerging strands include the "Media and News" cluster, which focuses on the challenges associated with the dissemination of fake news and the understanding of manipulation in a post-truth era. This cluster emerged in 2019, driven by rapid technological evolution and globalization, which have intensified the spread of unverifiable information, establishing

new challenges and paradigms. The analysis of the impact and consequences of misinformation in politics, as well as the examination of financial support for the development of algorithms to detect and mitigate the spread of false information, are key areas of focus. It is also essential to foster cross-border international collaboration to address the global nature of fake news.

By conducting an in-depth analysis of the development of consolidated research, an intriguing shift in the main areas of this research topic was found. Comparing the founders' studies with those included in our database reveals substantial changes in research priorities.

The issues of climate change and resource management are not new; however, the strong involvement of governments in climate change adaptation has stimulated research growth, marked by two significant events: the adoption of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and the adoption of the Paris Agreement on Climate Change in 2015. The latter emphasized the importance of collaboration among different actors and countries in seeking solutions, underscoring the relevance of applying social learning in environmental policies.

Governance and public policies are dynamic and constantly evolving. For this reason, concepts traditionally recognized by the founders such as "networks", "participation", and "collaboration" are now central elements of social learning. Initially viewed in theoretical terms by the founders, these concepts now constitute the cornerstone of social learning applied to policy design and implementation.

The impetus to explore public policies through the framework of social learning began to emerge from 2009 onward, driven by shifts in electoral participation patterns. These changes, coupled with developments in socialization methods, highlighted that the automatic assumption of voting similarity between parents and children could no longer be made.

Our study has some limitations. The main drawback relates to the initial search. The results of a bibliometric analysis are undoubtedly influenced by the choice of the database, keywords, sources, and categories. Expanding the search to other important databases such as Scopus or Google Scholar could provide a broader perspective. Additionally, it would be beneficial to include additional categories that might reveal diverse uses of social learning, even if they are not explicitly oriented towards policy design. Furthermore, different keywords could be used in the search to either broaden the base or narrow it down with more specific articles. Nevertheless, the authors believe that this research is robust, provides a complete picture of the concept of social learning, and presents opportunities for new research. Several assumptions underlie these approaches for developing new research. This study aims to make a significant contribution to future research in this field. With this in mind, it can pave the way for exploring future directions of the concept, such as developing new policies informed by social learning or assessing its potential for broader global application.

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