Journal of MultiDisciplinary Evaluation
Volume 21, Issue 50, 2025

JMDE
Journal of MultiDisciplinary Evaluation

ISSN 1556-8180
http://www.jmde.com

Typology of Carrots, Sticks, and Sermons: Tracing Its Influence on the Discipline of Public Policy

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Background: The 1998 book *Carrots, Sticks & Sermons: Policy Instruments and Their Evaluation* introduced a seminal typology, categorizing policy tools by their mechanisms of influence. Despite its potential to shape policy theory and practice, its broader disciplinary impact and citation patterns remain underexplored. This article evaluates the book's legacy in public policy literature while testing bibliometric methods, including emerging generative artificial intelligence (GAI) tools for research synthesis. `

Purpose: The study aims to (1) assess the influence of the book on the discourse in the public policy literature and (2) explore the utility and limits of AI-driven tools for tracing scholarly impact. It addresses four areas: the book's citation trends, its presence in major disciplinary texts, citation intent, and GAI's ability to reference the work accurately.

Setting: Not applicable.

Intervention: Not applicable.

Research Design: A mixed-methods approach consisted of: (1) quantitative bibliometrics (citation counts, trends, and keyword analysis); (2) qualitative content analysis by human researchers (major disciplinary handbooks/textbooks and articles); and (3) generative AI semantic search and analysis.

Data Collection and Analysis: The quantitative analysis covered a corpus of interdisciplinary public policy literature from 1998 to 2024, extracted from citation databases (Scopus, Web of Science, Google Scholar). Qualitative analysis focused on 20 major handbooks and textbooks from public policy discipline (occurrence of references to book and policy instruments typology) and coding of 20 highly cited articles (classification of citation types in terms of intent). Work with GAI focused on semantic search and analysis with various AI platforms.

Findings: The findings underscore the typology's enduring relevance while advocating for methodological rigor in impact assessments and GAI-aided research. The book has achieved "classic" status in public policy, evidenced by 1,369 citations on Google Scholar, 924 citations on Scopus, and 627 citations on Web of Science, as well as presence in 15 out of 20 major disciplinary handbooks/textbooks. Its typology is foundational but often superficially referenced; only 7 of 20 top articles applied it directly. GAI tools also referred to the book, although they frequently misattributed or diluted the source, highlighting risks in automated literature reviews. We propose updating the typology of policy instruments to include behavioral tools (e.g., nudges) and stress the need for human verification of GAI outputs.

Keywords: *policy tools, policy instruments, generative AI, bibliometric analysis, policy instruments typology*

Our paper focuses on the book *Carrots, Sticks & Sermons: Policy Instruments & Their Evaluation*, edited by Marie-Louise Bemelmans-Videc, Ray C. Rist, and Evert Vedung (1998). Our main goal is to assess the book's influence on the discourse in the public policy literature. We focus on the overall impact of the whole book and its central concept—the typology of instruments—without exploring the contributions of individual authors and their chapters. Readers interested in how the book was developed and the intellectual origins of the typology of instruments can refer to the article by Evert Vedung in this section.

Our Rationale for Studying the Book *Carrots, Sticks & Sermons*

We have focused on this book because it addresses the issue central to policy theory and practice—the spectrum of policy instruments available in the government's toolbox (see Box 1). On the one hand, the proposed typology was straightforward and easy to remember. On the other hand, in the era before behavioral science, it was an unorthodox approach to organize typology according to the underlying mechanisms for inducing change among policy addressees (the only other contemporary example being Schneider & Ingram, 1990). This combination of common sense and out-of-the-box thinking makes the book potentially highly relevant to the audience beyond program evaluation. Thus, we want to trace its impact 26 years after its publication.

Our additional purpose for this paper is to explore basic bibliometric methods in literature search. We are especially interested in the utility and limits of emerging generative artificial intelligence (GAI) tools (Matthews, 2021; Glickman & Zhang, 2024). This can be valuable inspiration for evaluators interested in tracing how knowledge flows.

Box 1. *Carrots, Sticks and Sermons* Typology in a Nutshell

The book offers a tripartite classification of policy instruments based on the degree of constraint or authoritative force involved in the governance efforts to control the behavior of citizens, corporations, or subgovernments.

Regulation (the stick) uses authoritative rules and directives to control behavior and limit choices, with varying degrees of constraint and obligation imposed on the target population. It can be classified into unconditional and conditional regulations, with conditional regulations further divided into regulations with exemptions, permissions, and obligations to notify.

Economic means (the carrot) use economic incentives or rewards (e.g., subsidies, grants, in-kind services) to encourage specific behaviors or activities. The government conditionally transfers funds to, or for the benefit of, another party to achieve some level of activity or provision. Recipients of these incentives are not obligated to take the measures involved, which distinguishes the carrot from the stick.

Information (the sermon) involves attempts at influencing policy addressees through the transfer of knowledge, communication of reasoned argument, and moral (per)suasion. It represents voluntary appeals to the general population or specific target groups. It can emphasize the prevention of wrong or stimulation of right conduct by offering insights into the consequences of behavior.

The book also notes that these policy instruments may come in packages and be employed sequentially, suggesting increasing degrees of complexity in policy design.

Note. Adapted from *Carrots, Sticks & Sermons: Policy Instruments and Their Evaluation* (Chapters 1 and 11), by M.-L. Bemelmans-Videc, R. Rist, & E. Vedung (Eds.), 1998, Transaction Publishers.

Approach to Assessing the Book's Influence

The volume *Sticks, Carrots and Sermons* poses challenges for bibliometric analysis. There have been reprints over the years, along with a change of publishing house. Referring authors have often cited different chapters without referencing the main book. That led to citation proliferation and various versions, which hinder automated bibliographic searches. Therefore, we had to develop a more nuanced and combinatory approach.

We have operationalized the "influence" of the book through four questions, each addressed by specific data sources and methods. The table below provides the overview, while the following sections

discuss the details of the process and findings for each question.

Table 1. Approach for Assessing the Influence of the Book

Research question	Focus	Data source and type of analysis
Q1: What is the quantity and trend and what are the patterns of the book's citations in academic literature?	Occurrence	Academic databases Expert quantitative analysis
Q2: What is the book's occurrence in major disciplinary handbooks and textbooks?	Occurrence	Selected literature Expert analysis
Q3: What are the intents of the citations?	Use by humans	Academic databases GAI semantic analysis Expert qualitative analysis
Q4: Do generative artificial intelligence (GAI) agents use the book to answer queries on policy instrument typology?	Use by AI	GAI analysis and synthesis

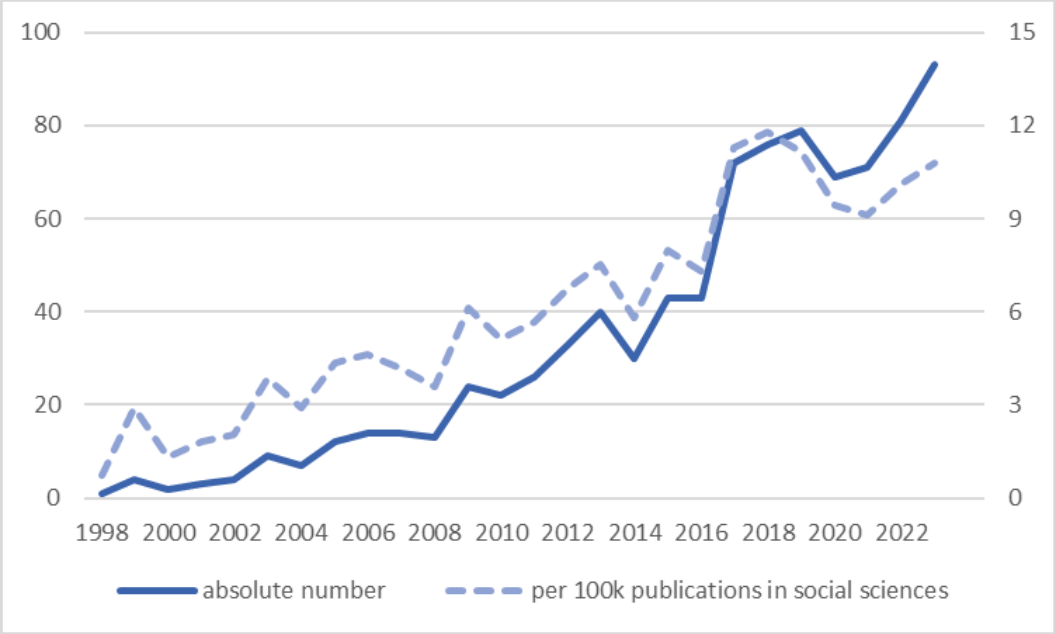
It is also worth summarizing the emerging options for information search in the era of AI. Traditional search engines and databases are accompanied now by large language models (LLMs) and an adaptation of LLMs that combines traditional information retrieval systems (databases) with GAI (so-called retrieval-augmented generation [RAG]). Thus, we can (1) search directly in databases, (2) ask GAI for answers (LLM searching internet), or (3) use various GAI to search specific pools of data (RAGs).

Q1: What Is the Quantity and Trend and What Are the Patterns of the Book's Citations in Academic Literature?

Data and Method Used. We have established the number of citations for Google Scholar, Scopus, and Web of Science databases. The search was performed on July 10, 2024. Google Scholar is the only one of these three sources where a simple title search was possible. The book is multiple-indexed in Scopus and Web of Science, with differing authors, publication dates, and publishers. Therefore, we used the cited references option to get the best proxy of the actual citation number. Of the three sources, Scopus was chosen as a base to analyze trends and thematic patterns, as this database provides the best balance between quality and coverage.

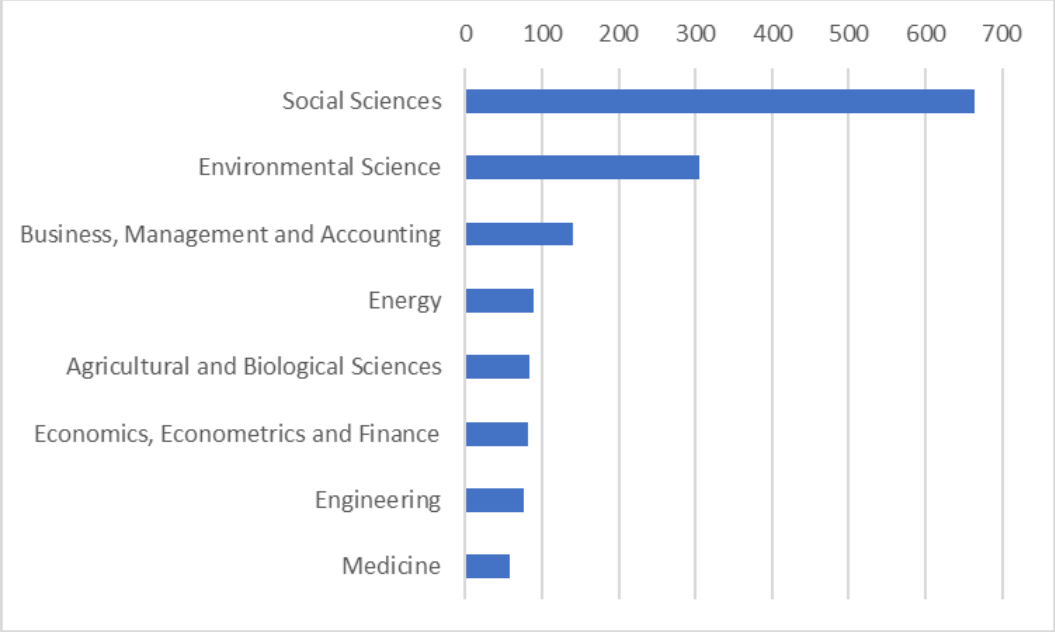
Our Findings. The book of our interest has garnered significant recognition, evidenced by 1,369 citations on Google Scholar, 924 citations on Scopus, and 627 citations on Web of Science. Interest in the book and its impact has been steadily growing over time, with the number of citations indexed in Scopus exceeding 90 in the past year. Most references are found in articles (603), followed by book chapters (161) and books (75).

Figure 1. Number of Citations per Year, Based on Scopus Data



References to the book can be found in over 20 subject areas, demonstrating its interdisciplinary impact. Not surprisingly, the highest of references is related to the social sciences (39%). Environment, energy, and agriculture combined represent another 28%, followed by management and economics with 13%. Single-source titles with the highest citation number include: *Policy Sciences* (18), *Sustainability* (18), *Energy Policy* (15), *Forest Policy and Economics* (12), and *Journal of Cleaner Production* (12). The book has been cited by authors from 75 countries writing in 23 languages (details on languages come from Google Scholar).

Figure 2. Number of Citations per Subject Area, Based on Scopus Data



By far, the most popular keyword used in the publications citing our book of interest is "policy instrument(s)" (131). "Policy tool(s)," "policy design," and "policy mix" are also relatively common, along with other keywords with the word "policy." "Governance" (including multilevel, network, collaborative, and adaptive) is the second prevailing topic (66).

Figure 3. Most Frequent Keywords in Citing Publications, Based on Scopus Data

Q2: What Is the Book's Occurrence in Major Disciplinary Handbooks and Textbooks?

Data and Method Used. Utilizing our expertise, we selected ten major handbooks and ten textbooks on public policy from renowned international publishers such as Oxford University Press, Edward Elgar, Sage, Springer, and Routledge. For each of these, we conducted a comprehensive verification process to determine whether the book or any of its chapters had been cited.

Our Findings. Nine out of ten handbooks and six out of ten textbooks cited the book. The majority of those citations were brief mentions of the typology, along with other attempts in the literature to categorize policy tools.

However, more specialized handbooks (on policy design and policy tools) went into explaining the details of the typology, comparing it with other taxonomies and even using it for further modifications and applications.

Table 2. Ten Major Handbooks on Public Policy

Handbook	Does it cite the book?	Comments
(Araral et al., 2013)	YES	The source is cited in one chapter (on the policy-making process), along with other sources on various tools relying on different types of governing resources for their effectiveness.
(Colebatch & Hoppe, 2018)	YES	Typology is extensively discussed and compared with other approaches in chapter on research on policy instruments.
(Farazmand, 2023)	NO	—
(Fischer et al., 2007)	YES	Typology is mentioned in the chapter on theories of policy cycle—merged with other typologies into one paragraph on regulatory, financial, informational, and organizational policy tools.
(Howlett & Mukherjee, 2020)	YES	Five chapters refer to the source. Some use it as a base for further developing discussions and categorizations.
(Howlett, 2023)	YES	The source was discussed extensively and cited in several chapters (13 out of 44) of the handbook devoted to an overview of policy tools, their specific applications, and past and future trends of policy tools. The source is used as a background reference and as the basis for further modifications and applications.
(Moran et al., 2006)	YES	The book is cited in the chapter on policy tools as one of the three conventional strains of government tools. It is noted that the typology was developed based on a trichotomy of types of organizational control (Etzioni, 1961).
(Peters & Pierre, 2006)	YES	Book is cited in chapter on implementation. Authors briefly mention that policy design literature suggests that any policy can be broken down into one or a combination of a finite set of generic policy instruments (although there is no agreement on the unified typology of instruments).
(Peters & Fontaine, 2022)	YES	The typology is cited in two chapters: "Instrumentation in Policy Design" (discussed briefly with other typologies of policy tools) and "Designing for Coordination: The Case of Regulatory Management Policy" (in a footnote explaining regulation types).
(van Gerven et al., 2023)	YES	Typology is discussed in the entry on policy instruments.

Table 3. Ten Major Textbooks on Public Policy

Textbook	Does it cite the book?	Comments
(Birkland, 2020)	YES	The source is recommended as additional reading in the "Policy Design and Policy Tools" chapter.
(Cairney, 2019)	NO	—
(Capano & Howlett, 2020)	YES	The source is mentioned twice when authors discuss useful taxonomies of policy tools and policy mixes and packaging.
(Dunn, 2017)	NO	—
(Dye, 2017)	NO	—
(Gerston, 2010)	NO	—
(Hill & Varone, 2021)	YES	The typology is mentioned as one of the sources of three ways of securing compliance among policy targets. However, the terms "sticks," "carrots," and "sermons" are misassigned primarily to Hood 2007 (who quoted the original book).
(Howlett et al., 2020)	YES	The book is cited twice: first as a general source of typology (one of the attempts to identify instruments and classify them into meaningful categories) and second as a source of examples of applications of specific tools type – "the sermons".
(Knill & Tosun, 2012)	YES	The source is mentioned in the section on typologies of public policies, together with other classification attempts by governance principles and instruments.
(Peters, 2021)	YES	In the chapter on policy instruments, there is a brief mention of classification that describes instruments as carrots, sticks, and sermons.

Q3: What Are the Intents of the Citations?

Data and Method Used. We employed two ways to explore how authors in recent years have used the book in their work. The first way was fully automated. We used Semantic Scholar.[1] For the full-text papers, it analyzed the so-called citation intent, distinguishing among the following types of citations (Semantic Scholar, 2024):

- *Background citations* provide historical context, justification of importance, and/or additional information directly related to that which exists in a cited source.
- *Method citations* use the previously established procedures to determine whether the results are consistent with findings in related studies.
- *Result citations* extend on findings from research that was previously conducted.

The second way was more labor intensive. Based on data from Question 1 (list of articles that cite the book), we identified the top 20 most-cited articles in SCOPUS that have used the book as a source. Then we performed an in-depth analysis on how the book was actually used in these individual articles. Following Stremersch et al. (2015), we distinguished five types of citations:

1. *Application citations* occur when the citing article directly uses a concept or typology from the cited book.
2. *Affirmation citations* provide support for the cited book.
3. *Negation citations* reject or criticize concepts or conclusions of the cited book.
4. *Review citations* show that prior literature was studied.
5. *Perfunctory mentions* occur when authors cite the book only indirectly without really using it.

Findings from AI - Semantic Scholar. Semantic Scholar identified 164 and 442 citations for two different versions of the book and 620 citations for Chapter 1 (search performed March 7, 2024). We

[1] Semantic Scholar is an AI-powered research platform developed by the nonprofit Allen Institute for Artificial Intelligence for navigating and accelerating literature search in all scientific domains (https://www.semanticscholar.org/).

conducted citation intent analysis on references to Chapter 1. Due to limits in full-text access, citation intent analysis was possible for 295 citations. Of these, *246 were background citations, 47 were methods citations, and 2 were results citations.*

Additionally, Semantic Scholar identified 45 highly influential citations, a designation that means the book has a significant impact on the shape and content of the citing publications.

Findings from Human Coding. Our analysis of the 20 most-cited articles in SCOPUS revealed that the most common type of citation of the book (nine out of twenty) is *review citations*; authors reference the work to show that prior literature has been studied and acknowledged. The review citations are prevalent in discussions about policy instruments, providing a theoretical foundation or background without directly applying the specific concepts in the core analysis of the articles. For example, articles such as those by Davies and Mazumder (2003), Howlett (2009), Huang & Chen (2015), and Morseletto (2020) use the typology as part of a broader literature review to support their discussions on various policy tools.

Seven articles in the sample include *application citations*, directly utilizing the concepts and typologies proposed in the book by Bemelmans-Videc, Rist, and Vedung. Authors such as Borrás and Edquist (2013); Dubois and colleagues (2019); and Hildebrandt and colleagues (2017) employ the "carrots, sticks, and sermons" framework to analyze policy instruments in their studies. This usage illustrates a thorough engagement with the cited work, applying it as an analytical tool to support research. Some texts use the book's main concept as a foundation to propose new frameworks. For instance, Steurer (2010) adds partnering instruments ("ties") and hybrid instruments ("adhesives") to the typology for analyzing Corporate Social Responsibility (CSR)-oriented policies, while Krott et al. (2014) extend the concept to develop an actor-centered power approach.

Perfunctory mentions, where the authors cite the book indirectly without deeply engaging with its content, occur in a few articles. In these cases, the authors use the citation more as a formal acknowledgment of existing literature than as an integrated and substantial part of their primary arguments or analysis.

Affirmation citations were observed only in the article by Jordan, Wurzel, and Zito (2003). The citation provides foundational support for categorizing policy instruments, affirming the "carrots, sticks, and sermons" concept as a valid framework in environmental policy discussions.

Interestingly, there are no instances of *negation citations* in the analyzed texts. This absence may suggest that Bemelmans-Videc, Rist, and Vedung's work is widely accepted and uncontroversial within the academic community, with no authors in the selected sample directly rejecting or criticizing their concepts. The lack of negation citations is a testament to the broad acceptance of their typologies in the field of policy studies, reassuring readers of the concepts' validity as they are utilized and built upon rather than challenged or dismissed.

Table 4. Types of Bemelmans-Videc, Rist, & Vedung (1998) Citation in 20 Leading Articles

Type of citation	Number of articles where cited	Articles
Application citations	7	(Borrás & Edquist, 2013; Dubois et al., 2019; Givoni et al., 2013; Hildebrandt et al., 2017; Krott et al., 2014; Rodić & Wilson, 2017; Steurer, 2010)
Affirmation citations	1	(Jordan et al., 2003)
Negation citations	0	
Review citations	9	(Capano & Howlett, 2020b; Chen et al., 2012; Cubbage et al., 2007; Davies & Mazumder, 2003; Hezri & Dovers, 2006; Howlett, 2009; Huang & Chen, 2015; Morseletto, 2020; Runhaar et al., 2014)
Perfunctory mentions	3	(Ek & Söderholm, 2010; Ellegård & Palm, 2011; Wallner, 2008)

Q4: Do GAI Agents Use the Book to Answer Queries on Policy Instrument Typology?

Data and Method Used. Our final test involved the emerging phenomenon of generative AI—a game changer of modern research. In principle, AI agents can find and synthesize information from general web sources (LLMs) or specific pools of data (RAGs).

We asked the following simple questions/prompts to various AI tools (performed March 7, 2024):[2]

Prompt for universal GAI (ChatGPT 4.0, Claude 3.5 Sonnet, Meta AI): Act as a researcher. What are the typologies of policy instruments? Provide literature sources for your answer.

Prompt for research-specific GAI (Elicit, Perplexity Pro, Scite, SciSpace): What are the typologies of policy instruments?

We speculated that if the book is visible to AI agents, they would refer to the typology of carrots, sticks, and sermons in their answers to our questions, just like knowledgeable human experts would.

Our Findings. Although all AI agent responses included the typology of carrots, sticks, and sermons, they displayed three limitations. First, some AI agents mistakenly multiplied the typology by reading different chapters in the same book as separate sources and then discussing them as distinctive typologies (ChatGPT, Claude). Second, certain AI agents used secondary sources as bases for describing the original typology (thus not citing the book directly; Scite, SciSpace). Third, specific agents hallucinated and misrepresented citations by merging different sources (Meta AI). To sum up, only two AI agents correctly referenced the source and correctly summarized descriptions of the types (Perplexity, Elicit).

Conclusions on Book Influence

We have verified that the book is influential well beyond the field of evaluation. The presented typology of policy instruments can be called a "classic" of the public policy discipline. The framework of "carrots, sticks, and sermons" has significantly shaped academic discourse and research within public policy, providing a foundational structure widely adopted and cited across various sectoral applications. Its impact is evidenced by the diverse fields in which it has been referenced, demonstrating its importance in the ongoing conversation about policy tools and their effectiveness. Extensive citations in academic literature, handbooks, and textbooks underscore its role in advancing research and theory in public policy, continually informing scholarly work.

We are convinced that the typology has the potential for further impact, although it needs an update. The evolving landscape of public policy requires an adaptation of the original typology to include new approaches to policy tools, such as nudges, sludges, and boosts (Olejniczak et al., 2020; Thaler & Sunstein, 2021; OECD, 2024). The updated typology would be especially useful in two applications. First, its straightforward terms can suit the needs of policy designers who run deliberative approaches to co-creating policy tools. Second, it can help researchers conduct comparative public policy studies, particularly mechanism-focused comparisons of interventions' architecture.

In our study we used academic sources and did not explore how the book influenced applied practice. Future research could investigate how the book's concepts are utilized by policy makers and practitioners (including evaluators), providing a more comprehensive understanding of its influence and effectiveness in practical settings. This could offer valuable insights into the adaptation and implementation of policy instruments in diverse contexts, verifying the typology's continued relevance and utility.

Reflections on Impact Tracing Method

Looking beyond that publication and reflecting on the lessons for evaluators on publication tracing, we conclude that this investigative work based on bibliometrics analysis is a promising way to assess the impact of the publications. The analysis of actual citation use, whether unstructured in handbooks and textbooks or structured in articles, was particularly insightful.

Reflecting on the application of GAI, we conclude that well-prompted GAI can provide an initial, quick overview of the topic and help mapping the literature. However, GAI outputs should always be critically verified by humans (human-in-the-loop rule). GAI summaries can assist but not replace thorough literature reviews.

[2] Prompts slightly differ because nonspecific AI agents have to be put in a specific role to perform expert tasks, and a need for sources should be indicated to limit the risk of the model's hallucination. AI agents calibrated on research have these settings as default.

This caution arises from our case, where GAI frequently misattributed original references.

The use of GAI for literature reviews is an accelerating trend. Authors should therefore ensure their texts are accessible and visible to GAI on online platforms. This involves two measures: providing accurate digital descriptions of their works for proper automated system recognition, and making their sources open access to enhance knowledge availability for policy practitioners and AI machines.

Funding Information

This article is a part of research funded by the National Science Centre, Poland (grant number 2021/43/B/HS5/01935).

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