

Accelerating research processes with Scopus AI: A place branding case study

Aceleración de los procesos de investigación con Scopus AI: un estudio de caso sobre place branding

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Abstract

Academic databases play a crucial role in advancing science by hosting a vast array of peer-reviewed literature. However, academic database search tools involve a relatively slow and rather unintuitive process of searching and evaluating content. To address these challenges, in January 2024, Elsevier introduced Scopus AI, a generative artificial intelligence that synthesises evidence indexed in Scopus based on prompts. This study assesses the utility of Scopus AI (in its beta version at the time of the research), within the context of a doctoral thesis through a specific case study. By employing a relational prompt and three follow-up questions, the study aims to pinpoint intersections between different topics within the realm of Social Sciences and, more specifically, Communication, with a case on place branding. The consolidated result provides an initial list of references, offers a comprehensive overview, and allows to generate a meta-synthesis based on the summaries provided by each prompt. Scopus AI (beta) presents features that enable researchers to identify influential authors and works, explore relevant keywords, review recent literature, and identify potential research gaps. Although Scopus AI has some limitations, such as the dependence on the abstracts of documents indexed in Scopus, the simplification of concepts, or the relative disconnection between arguments, the results demonstrate the value of this tool in accelerating research processes, as it synthesises research in a given area, maps its main characteristics and allows for information discovery.

Keywords: Scopus AI beta; Artificial intelligence; Academic databases; Academic research; Doctoral theses.



Resumen

Las bases de datos académicas son fundamentales para el avance científico, ya que albergan una gran cantidad de literatura evaluada por pares. Sin embargo, las herramientas de búsqueda en estos entornos implican un proceso relativamente lento y poco intuitivo de búsqueda y evaluación. En respuesta a estos retos, en enero de 2024 Elsevier comercializó Scopus AI, una herramienta que utiliza inteligencia artificial generativa que sintetiza la evidencia indexada en Scopus a partir de prompts. Este estudio evalúa la utilidad de Scopus AI (en su versión beta en el momento de la investigación) en el contexto de una tesis doctoral a través de un caso de estudio concreto. Para ello se emplea un prompt relacional y tres preguntas de continuidad con la finalidad de conocer las coordenadas de la intersección entre distintos temas dentro de la rama de las Ciencias Sociales, y más específicamente de la Comunicación, a partir de un caso de estudio sobre *place branding*. El resultado consolidado permite obtener un primer listado de referencias, así como una visión panorámica útil, y elaborar una meta-síntesis a partir de los resúmenes generados por los distintos *prompts*. Las funcionalidades de la herramienta permiten conocer autores y trabajos influyentes, familiarizarse con palabras clave, revisar la literatura más reciente y descubrir aproximaciones y posibles huecos de investigación. Aunque Scopus AI (beta) presenta limitaciones como la dependencia de los resúmenes de los documentos indexados en Scopus, la simplificación de conceptos o la desconexión entre argumentos, los resultados demuestran el valor de esta herramienta para resumir la investigación reciente de un área determinada, mapear sus principales características y permitir el descubrimiento de información relevante.

Palabras clave: Scopus AI beta; Inteligencia artificial; Bases de datos académicas, Investigaciones académicas; Tesis doctorales.



1. Introduction

In recent years, the expansion of artificial intelligence (AI) technologies has been exponential, reaching many sectors of society. This surge in both scale and scope of AI development and implementation is unprecedented (Hajkowicz et al., 2023). Alongside other innovative technologies, AI serves as a catalyst for what has been coined the fourth revolution (Ivaldi et al., 2021) and the fourth wave of mediatisation, rooted in big data (Couldry & Hepp, 2017).

The scientific and research sector is one of the early adopters of artificial intelligence and has grown in virtually all disciplines (Hajkowicz et al., 2023). Although some AI tools have emerged in the last few years, they embody significant disruptive potential within academia and scholarly publishing (Kaebnick et al., 2023; Lopezosa & Codina, 2023; Lund et al., 2023), by reconfiguring the dynamics of scientific discovery and influencing the organisation of science (Bianchini et al., 2022). However, the implementation of AI technologies also poses several challenges, including ethical, political, legal and policy concerns, organisational, managerial and technological obstacles, data-related issues and social implications and economic impacts (Dwivedi et al., 2021).

1.1. Searching and navigating scholarly literature

The basis of scientific advancement is to make an original contribution to a field of research (Baptista et al., 2015). Yet, the research environment can be daunting, since it contains a vast amount of published research in many academic outlets indexed in several databases. This context can be particularly challenging for early-career researchers, given that scientific advancement is a cumulative process (Bird, 2007; Codina, 2020). In addition, any new research project should include a review of previous literature, as such reviews are integral components of all research efforts.

Literature reviews synthesise previous research. Their evidence-based approach is crucial for understanding research fronts, advancing theory development, and identifying interdisciplinary areas and research gaps, or areas that require further research (Snyder, 2019). What is more, literature reviews are part of the ethical requirements of research, as outlined by the European Code of Conduct for Research Integrity (ALLEA, 2023, p. 7). However, one of the main challenges when conducting research remains navigating a sheer quantity of literature, as well as searching, screening and extracting data manually (De la Torre-López et al., 2023).

AI tools are starting to transform conventional research practices. In this context, literature reviews are of particular interest, since they handle vast amounts of partially organised information, and are an integral part of research across all disciplines (Wagner et al., 2022). Furthermore, manual methods when approaching systematic reviews can prove time-consuming, expensive and impractical. As a result, researchers use machine learning to streamline the process of conducting evidence syntheses (Marshall & Wallace, 2019). This constitutes an avenue for further research, as AI tools can assist in the process and hold the potential to transform the way research is conducted (Burger et al., 2023).

1.2. The role of AI in research processes

In recent years, academic search tools incorporating AI technology have proliferated. This is the case of the Dimensions database or the Semantic Scholar search engine, as well as tools such as Elicit and Scite. These platforms provide a wide range of academic literature and contribute to accelerating search and discovery of academic information by facilitating the



understanding of scientific texts and the extraction of relevant data, as well as the evaluation of citations.

The abundance of information and the rise of AI that characterise the 21st century, require students and researchers to be both data and AI literate: to search, interpret and manage data effectively, as well as understand how AI tools can streamline their work (UNESCO, 2019). Yet, while automated approaches offer the advantage of accelerating research processes, few schools and universities “have developed institutional policies and/or formal guidelines on the use of generative AI applications” (UNESCO, 2023). There is a misalignment between skills adopted in the academic setting, and those required to thrive in the evolving world of AI technologies (Dwivedi et al., 2021). Besides, the adoption of AI technologies is also limited by the learning curve involved and the lack of studies evaluating their benefits (De La Torre-López et al., 2023).

Previous studies at the intersection between AI and academia include reviews looking into the conceptualisation of AI literacy (Ng et al., 2021) and the automation of literature reviews (Tsafnat et al., 2014; Van-Dinter et al., 2021; De La Torre-López et al., 2023). Additionally, the hype surrounding ChatGPT has transcended into scientific studies, with research papers offering a comprehensive review of this revolutionary tool (Ray, 2023), studying its impact on academia and libraries (Lund & Wang, 2023), its use in journal reviews (Biswas et al., 2023) and academic writing (Bhatia, 2023), or incorporating it in systematic reviews using the SALSA framework (Lopezosa et al., 2023a). The appearance of other AI tools such as Bard, renamed Gemini, or Bing Chat have also been the subject of research, with studies analysing the functionalities of the former (Lopezosa & Codina, 2023) or assessing the impact of these chatbots in higher education (Rudolph et al., 2023).

AI is becoming increasingly important in academia, and there is a need for studies to verify its capabilities in accelerating research on topics beneficial to society, in line with EU principles regarding the use of AI for the betterment of all humanity (European Commission, 2019). With the aim of contributing to this debate, and given the novelty of the object of study, this paper represents a first attempt to explore the functionalities and test the validity of Scopus AI.

1.3. Scopus AI

Scopus AI is a generative AI designed by Elsevier, launched in January 2024. This tool generates evidence syntheses in the form of summaries using a natural language, “drawing “from metadata and abstracts of Scopus documents published since 2013” (Elsevier, n.d). Therefore, the summaries are generated from previously validated research, offering researchers highly reliable results, in relation to other generative AI, although a verification process should always be carried out.

Scopus AI has an iterative structure that provides evidence syntheses until the user decides to conclude the session, either because the tool has provided an optimal response or because it has reached a saturation point where results no longer provide notable improvements. It offers a global overview of a given research area or the intersection of concepts or variables, facilitating multidisciplinary explorations. This stems from an initial summary supported by references and diagrams (Aguilera-Cora et al., 2024). It is, among other things, a valuable tool for streamlining literature reviews, as well as assisting in the elaboration of theoretical frameworks and state-of-the-art.

Scopus AI presents an easy-to-use interface that can be reached - under subscription- in the Scopus database, under the tab “Scopus AI”. Moreover, two types of pages can be distinguished in this tool. First, the landing page (Figure 1), which consists of a search box and suggested prompts serving as examples.



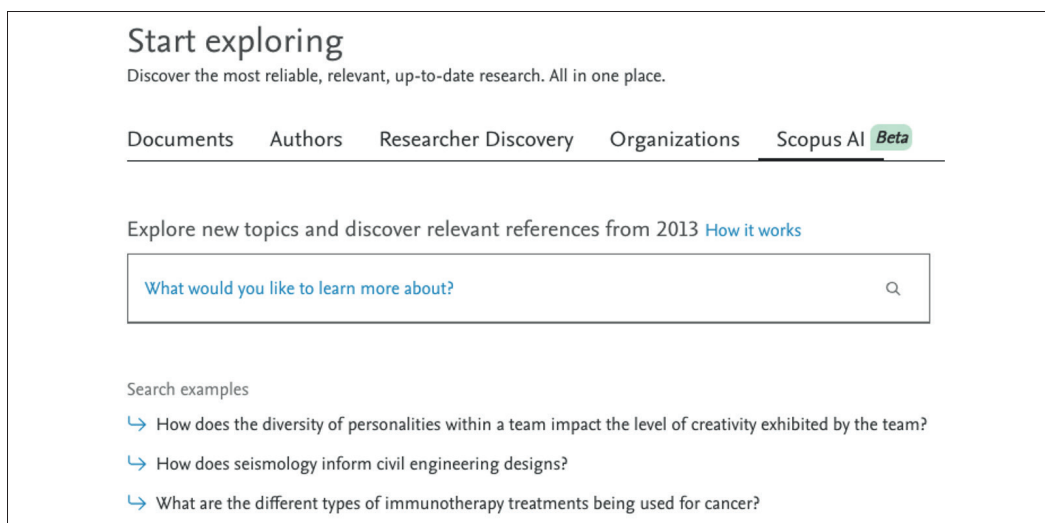


Figure 1. Landing page of Scopus AI, in the Scopus Database.
Source: Scopus AI beta.

Second is the results page, which loads after inserting a prompt in the search box or by selecting one of the suggested queries. This page presents several sections, including a summary and an expanded summary, a map of concepts, lists of references, foundational papers and topic experts, as well as three follow-up questions. Table 1 groups these features for the beta version, and provides an explanation for each item.

Table 1
Scopus AI beta features.

Landing page	Explanation
<i>How it works</i>	Insights into how the tool functions
Search box	Space designed to insert the prompt
Search examples	Suggested prompts provided by Scopus AI as examples
Results page	Explanation
Summary	AI-generated response to the prompt inserted in the search box
<i>Show concept map</i>	Visual diagram of abstract keywords and their connection
<i>Show all references</i>	List of references used to generate the response
<i>Expanded summary</i>	Enhanced version of the summary
<i>Foundational papers</i>	List of seminal studies in a given research area
<i>Topic experts</i>	List of leading experts and their work in a given research area
Follow-up questions	Prompts suggested by Scopus AI, related to the initial query

Source: Own elaboration, based on Scopus AI beta features.

Scopus AI synthesises results based on a query using natural language instead of presenting a list of results (Table 2). This stands out as a key distinction from conventional searches employing keywords and search equations. Another notable difference is the time commitment, as Scopus AI-oriented research involves a straightforward process with fewer steps. However,



the syntheses generated by Scopus AI do not share the exact same mission as conventional information retrieval systems (and likely do not intend to). To clarify this, we distinguish between two approaches: an information retrieval operation, which tends to be exhaustive and aims to collect all relevant information, and a generative synthesis, capable of producing selective summaries. The former is conducted through conventional searches, while the latter is achievable through Scopus AI.

Table 2
Differences between conventional and AI-oriented searches at the functional level.

Search	Tool	Language	Approach	Result	Interface	Search engine	Engagement	Date range
Conventional	Search equation	Keywords and boolean operators	Syntax-driven	List of results	Machine friendly	Static filtering	Passive	Entire database
Scopus AI	Prompt	Natural	Semantic-driven	Operational syntheses	Human friendly	Dynamic algorithm	Interactive	Since 2013

Source: Own elaboration.

1.4. Objectives

This study aims to assess the utility of Scopus AI in academic research. To do so, we carry out a simulation as a case study in the context of a doctoral thesis in Communication, centred on place branding and sustainable development in mountain areas. The simulation is performed with the goal of obtaining basic knowledge for a literature review on the topic. The intended output is a consolidated result, that is, a unified version of responses generated to several prompts. The consolidated result includes an initial list of references, a map of keywords of the field of interest, and an operational meta-synthesis, namely a recast of the summaries generated by Scopus AI into a unified synthesis, which can be used as part of the literature review.

2. Methodology

Scopus AI is targeted at researchers and is conceptualised as a tool that enhances researchers' understanding by providing "fast and accurate summaries and research insights that support collaboration and societal impact" (Elsevier, 2024). However, in light of the cumulative nature of science and the increasing adoption of inter and multidisciplinary approaches, this tool becomes particularly valuable, not only for early-career researchers but for those working across disciplines as well (Elsevier, 2023).

Therefore, to analyse the utility of Scopus AI, a case study complying with both factors is selected. Firstly, the case study is part of a doctoral thesis in Communication. This investigation is in its initial stage, requiring an understanding of the research domain it belongs to. The topic and effective methods have already been identified, but there is a need to gain insight into the field of study. Secondly, the case study delves into a complex intersection of topics, namely place branding and sustainable development in the specific context of mountain areas. Besides, a conventional search using keywords - and their synonyms - of these topics was previously undertaken, proving challenging and providing poor results under a single search, requiring more than one search equation. Hence, the early stage of research, the intersection of different topics, the need to delve deeper into the subject, and the difficulties encountered in information retrieval, all contribute to the rationale behind constructing this case study.



In addition, this case study is significant because it is an example of research with an inherent societal impact. Both place branding and sustainable development put communities at the core and strive to provide a prosperous future (Fernández-Cavia, 2009; IPBA, 2023). Moreover, sustainable development has become a major issue and plays a central role in debates and policies. In this context, the United Nations' 2030 Agenda for Sustainable Development has become a global reference framework in all areas, including place branding, to address global economic, social and environmental challenges (Sachs et al., 2023). As for mountain areas, they are popular tourist destinations, but are particularly vulnerable to global challenges such as climate change (Zeng et al., 2022), and susceptible to the impact of human activities (Roigé and Estrada, 2016). This doctoral thesis aims to provide valuable insight to help decision-makers in these fields make informed decisions and craft a resilient and sustainable future for their communities.

Following Gerring (2017) and Yin (2018), this case study intends to provide analytic generalisations - by proving that generative AI can eventually streamline some research processes-, and transferability - by adopting an approach that can be applied in other research domains. To achieve the aforementioned objective, an interactive search session was performed using the beta version of Scopus AI. To align with the principles of transparency and traceability, the entire process was documented with screenshots. In addition, both summaries and references were copied and included in a dataset, along with the concept maps.

The search session was carried out in December 2023, using a special access granted by Elsevier, whereby three of the authors were beta testers of the tool during November and December 2023. One of the authors was in charge of the data collection process, which took approximately 38 minutes. The search session consists of an initial instruction in the form of the following straightforward relational prompt, which was crafted through consensus among the authors: "What is the relationship between place branding and sustainable development in mountain areas?". This prompt is defined as relational, as it requires establishing a connection between different concepts. Assessing the utility of Scopus AI is conducted with this type of prompt due to its demand for a higher level of intelligence.

After inserting the prompt in the search box and pressing *enter*, Scopus AI automatically generates a summary and provides the features mentioned in Table 1. The search is complemented with an iterative process consisting of selecting the three follow-up questions suggested by Scopus AI (Table 3). It is important to highlight that the first prompt is written in English, as it is the language of the scientific community. In addition, better results are likely to be obtained, given that all documents indexed in academic databases feature abstracts in English, which is not the case for other languages.

Table 3

Prompt IDs and instructions.

Prompt ID	Instruction
1	What is the relationship between place branding and sustainable development in mountain areas?
2	How does place branding contribute to sustainable development initiatives in mountain areas?
3	What are the key strategies for integrating sustainable development principles into place branding efforts in mountain regions?
4	How can place branding be used as a tool to promote environmental conservation and community engagement in mountainous destinations?

Source: Own elaboration, based on Scopus AI.



For each prompt, an analysis of the different features is carried out, namely the initial summary generated by Scopus AI, the map of concepts, the expanded summary and the list of references used to build the summaries. Additionally, the resources “Foundational papers” and “Topic experts” are analysed for the first prompt. Since the other prompts are follow-up questions suggested by Scopus AI, these features are not provided in the beta version, which explains their exclusion for the rest of the prompts. In a further stage, the results for each prompt are analysed and combined in a consolidated result. This includes a list of unique references, an integrated overview of the four concept maps, and an operational meta-synthesis of all summaries and expanded summaries. The meta-synthesis is a manual recast by the authors that provides a cohesive and unified text suitable for inclusion in a literature review.

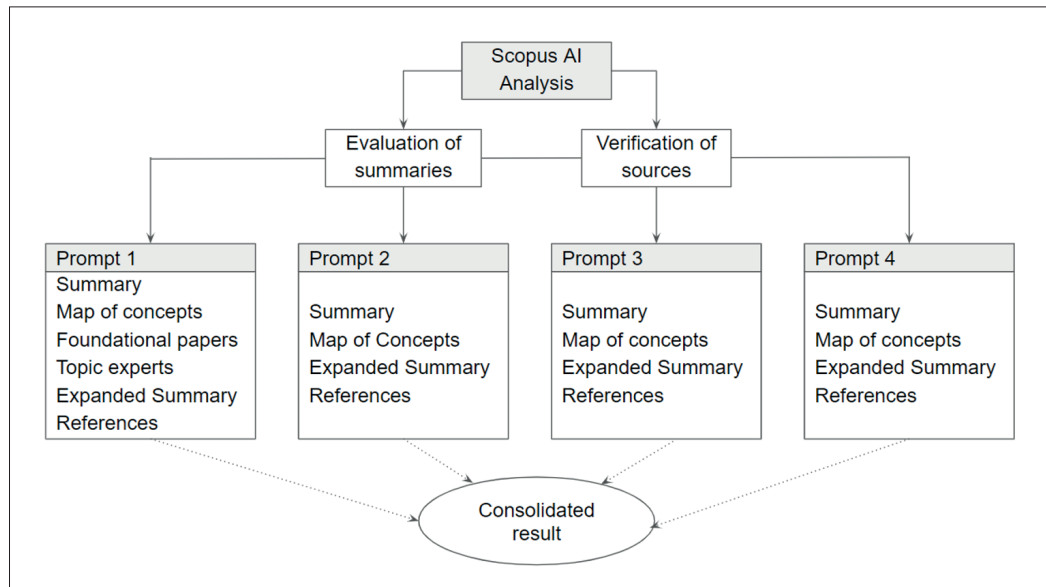


Figure 2. Approach adopted to analyse Scopus AI.
Source: Own elaboration.

The analysis of the results was conducted by one author and validated by another, with agreements reached through consensus, while the remaining two authors acted as reviewers. Lastly, all authors collectively reached consensus on value judgments. To validate outcomes produced by Scopus AI, a dual-dimensional approach was used, employing both evaluation and verification. The former concentrates on the writing style, and on structural, and relational aspects of the syntheses generated by the AI, while the latter focuses on the relevance and number of references (Figure 2).

3. Results

This section outlines the results for each of the four prompts concerning the different features mentioned in the methodology. The consolidated result obtained from the four prompts is presented at the end of the section.

Prompt 1: What is the relationship between place branding and sustainable development in mountain areas?

The summary generated by Scopus AI for the first prompt is based on five references, which are accessible by selecting “Show all references” (Figure 3). This feature unveils a menu housing an abbreviated version of the references, export options, as well as access to author and source pro-



files and full records. These sources include one research article and four book chapters, which have been written by different authors and published between 2016 and 2023. By looking at the titles, there is one reference that seems to address the prompt topic in a central way, namely the study by Roigé and Estrada (2016) on the management of a natural park in Spain.

Explore new topics and discover relevant references from 2013 [How it works](#)

What would you like to learn more about?
What is the relationship between place branding and sustainable development in mountain areas? 🔍

↳ **What is the relationship between place branding and sustainable development in mountain areas?**

Summary

Place branding and sustainable development in mountain areas are interconnected. Here are the key points to consider:

1. Place branding is a strategy used by governments to distinguish their regions from competitors and promote social, economic, and ecological sustainable development . [1](#) [2](#) It involves policies that have significant impacts on place branding performance, such as supply-side, demand-side, and environmental policies . [1](#) Demand-based policies are particularly important for place branding performance . [1](#)
2. Sustainable development in mountain areas involves the management and use of natural resources in a way that considers the social, political, and economic context . [3](#) It is influenced by human impact on the environment, which is a result of economic and population growth . [3](#)
3. Place branding can support the sustainable development of cities, regions, and communities by offering direction and supporting initiatives aimed at social, environmental, cultural, and economic well-being . [4](#) [5](#) It can contribute to solutions for challenges like overtourism, the climate emergency, and societal turmoil . [4](#)

In conclusion, place branding plays a crucial role in promoting sustainable development in mountain areas by distinguishing regions, influencing policies, and supporting initiatives for well-being and environmental sustainability . [1](#) [2](#) [3](#) [4](#) [5](#)

Show concept map [🔄](#) [🔄](#) [🔄](#)

Expanded summary [▼](#)

Foundational papers [▼](#)

Topic Experts [▼](#)

↳ How does place branding contribute to sustainable development initiatives in mountain areas?

↳ What are the key strategies for integrating sustainable development principles into place branding efforts in mountain regions?

↳ How can place branding be used as a tool to promote environmental conservation and community engagement in mountainous destinations?

References

- 1 The impact of government policies on place branding performance: evidence from China
Zhou H. [↗](#), Zhang Y. [↗](#), Zhou L. [↗](#)
Total Quality Management and Business Excellence [↗](#) 2023
- 2 The spatial planning-place branding nexus: A research agenda for spatial development
Oliveira E. [↗](#), Van Assche K. [↗](#), Beunen R. [↗](#)
A Research Agenda for Place Branding [↗](#) 2021
- 3 Landscape Management and Evolution: The Montseny Natural Park
Roigé X. [↗](#), Estrada F. [↗](#)
Social and Ecological History of the Pyrenees: State, Market, and Landscape [↗](#) 2016
- 4 How Place Branding Can Contribute to a Better World
Kaefer F. [↗](#)
Management for Professionals [↗](#) 2021

Show all references

Figure 3. Response generated by Scopus AI to the first prompt.
Source: Scopus AI.

As mentioned in the methods section, Scopus AI provides the “Foundational Papers” function every time the user inserts a new prompt. Foundational papers for prompt 1 include some highly cited papers (Kavaratzis & Ashworth, 2006; Hankinson, 2010; Kalandides, 2012), as well as one of the few studies looking into place branding and sustainable development from a nuclear perspective (Maheshwari et al., 2011). It is interesting to note that the references used to generate the response to the prompt are different from the ones in the section “Foundational papers”. That is, for this specific prompt, Scopus AI provides five references for building the summary and five foundational papers (n=10). In addition, when selecting the feature “Topic experts”, no information is displayed.

The initial summary generated by Scopus AI is structured into three main paragraphs covering different aspects. The opening paragraph provides a general conceptualisation of place branding, which is described as a governance strategy that enables regions to distinguish themselves from others and enhance sustainable development. The second paragraph focuses on sustainable development in mountain destinations, which is linked to the responsible use and ma-



nagement of natural resources. Moreover, economic and population growth are identified as pivotal factors of the impact of human activity on these landscapes. The following paragraph characterises place branding as being instrumental in promoting social, economic and environmental sustainability, and as a facilitator of solutions to global issues such as overtourism, climate change and social instability.

Additionally, Scopus AI also offers a map of concepts that illustrates the results of this first summary, based on abstract keywords. This visualisation tool consists of four levels, as shown in Figure 4. The matrix concept is *place branding*, which leads to a second level of concepts, namely *rural tourism*, *sustainability*, *inter-firm collaboration*, *government policy*, and *market environment*. At the same time, the terms *rural tourism*, and *sustainability* are divided into other sets of concepts, mainly focusing on the hospitality industry and rural and economic development.

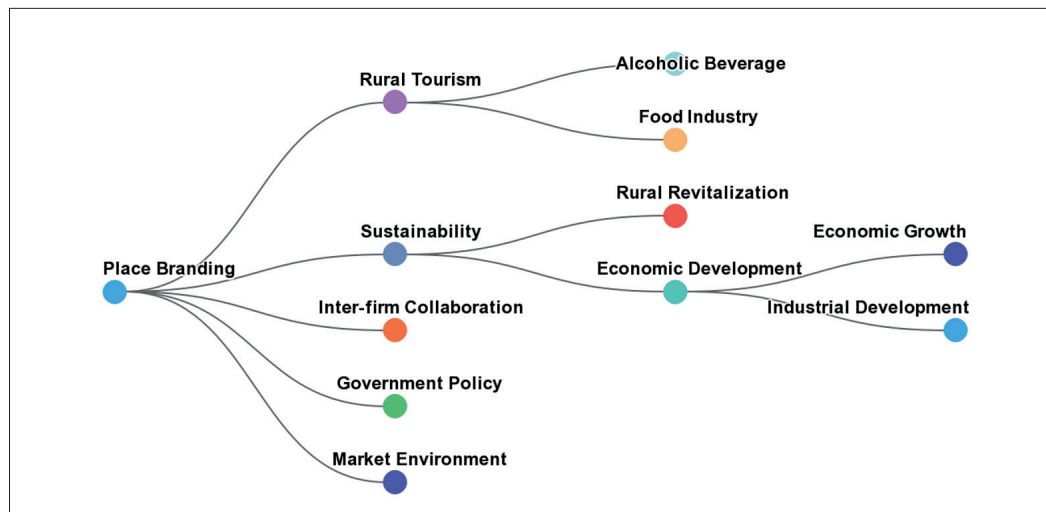


Figure 4. Map of concepts for the first prompt, generated by Scopus AI.
Source: Scopus AI.

The expanded summary provides a closer look at the intersection between place branding and sustainable development. It identifies unique attributes of regions as the main driver of branding efforts, whereas underdevelopment, environmental degradation and resource constraints are highlighted as issues challenging the implementation of sustainable development initiatives in mountain regions. Moreover, sustainable tourism serves as a focal point to illustrate place branding strategies in mountain locations. The expanded summary is generated from four references, three of which are new and did not appear in the list of references of the initial summary. References for the expanded summary are mainly book chapters, except for one research paper. These sources were published between 2014 and 2021.

Prompt 2: How does place branding contribute to sustainable development initiatives in mountain areas?

To get a deeper insight, interaction with Scopus AI is continued by accepting one of the suggestions provided by the tool, namely: “How does place branding contribute to sustainable development initiatives in mountain areas?”. This restarts the whole process, meaning the user can read a new summary and expanded summary, consult new references and visualise a new diagram. The resource “Foundational Papers” is not provided, at least in the beta version, since the prompt is a continuation of the initial search, where the foundational papers were not yet available.



The summary for this second prompt identifies three distinct ways in which place branding strategies contribute to sustainable development in mountain areas, namely attractiveness and resilience, guiding sustainable development and integrated socioeconomic development. Regarding references, the second response is based on two sources only, which were already part of the list of references in the first prompt.

Moreover, the second map of concepts is made up of three key concepts: *place branding*, *sustainable development* and *mountain areas*. Each of these terms is divided into a second level of concepts, with place branding and sustainable development presenting most subconcepts. The terms depicted in the map of concepts indicate a focus on policy, spatial planning and issues linked to the territory and its community.

In addition, the expanded summary is introduced by a first paragraph conceptualising place branding and sustainable development. The text is structured in two main sections. First, a passage highlighting ways in which place branding can promote sustainable development initiatives. Second, a list of examples showcasing successful place branding initiatives in this context, including a research centre providing insights for sustainable development in mountain areas, and specific examples in Aalborg (Denmark) and Zhejiang (China). The expanded summary is based on nine references, four of them being new sources, which did not appear in the brief summary nor in the summaries generated for the first prompt. References for the expanded summary are book chapters and research papers published between 2013 and 2023.

Prompt 3: What are the key strategies for integrating sustainable development principles into place branding efforts in mountain regions?

The interaction with Scopus AI continues by activating the suggested prompt: “What are the key strategies for integrating sustainable development principles into place branding efforts in mountain regions?”. The summary generated for the third response highlights three strategies in this direction, namely: considering specificities of the local context, adopting an integrated and balanced approach and aligning place branding strategies with governmental policy. In this case, Scopus AI generates the summary from three references, published in 2020 and 2023, including a new research paper that was not part of previous prompts.

Moreover, the third diagram is a balanced representation of various terms. At its core is the nuclear idea of *place branding strategies*, which extends into *environmental conservation*, *sustainable tourism*, *stakeholder engagement* and *collaborative governance*. In turn, each of these concepts is further divided into two new concepts. This subdivision portrays a multidisciplinary and participatory approach, involving an array of stakeholders.

The expanded summary provides a structured text divided into four sections. An opening paragraph highlights challenges faced when implementing sustainable place branding strategies in mountain areas. The second paragraph summarises some of the benefits derived from integrating sustainable development into place branding policies. These examples convey analogous insights to those in previous prompts, and address issues identified in earlier stages of the search session. In addition, the expanded summary provides a new example of a case study showcasing successful place branding strategies in the Lake District National Park (UK) through a partnership governance approach. The final section of the expanded summary brings together a variety of key stakeholders that take part in the incorporation of sustainable development principles into place branding initiatives in mountainous areas, mainly linked to the university and government realms. References for this version are also part of other responses generated in previous prompts. However, two new research papers are included, published in 2016 and 2020, respectively.



Prompt 4: How can place branding be used as a tool to promote environmental conservation and community engagement in mountainous destinations?

The interaction with Scopus AI finalises by selecting one last suggested prompt, specifically: “How can place branding be used as a tool to promote environmental conservation and community engagement in mountainous destinations?”. Generally speaking, the initial summary for this prompt provides similar information to previous instructions. The passage describes place branding as a strategic tool to advance environmental conservation and community engagement through the creation and assessment of advertising campaigns focused on the unique attributes of mountain destinations. It emphasises how place branding can make rural places more attractive and competitive, spur local growth and development, and address current challenges. At the same time, citizen engagement is described as a key factor in the effectiveness of branding efforts. This summary is based on five references published between 2015 and 2021. There are three research papers included in this list of references that are new to the search session and were published in 2015 and 2021.

Moreover, the diagram for this prompt originates with the central concept of *place branding* and is divided into two branches, delineating the main ideas of the prompt, namely *community engagement* and *environmental conservation*. The former is characterised by sub-nodes linked to processes and policies, while the latter exhibits a somewhat more compact structure, encompassing the main ideas of *co-creation* and *resource integration*.

The expanded summary is organised into four sections. The first section highlights the key principles of place branding, while the second lists strategies that promote environmental conservation in mountain areas. The following sections outline strategies to promote community involvement in mountain destinations and identify the benefits of place branding in these areas. The expanded summary is generated from seven references published between 2013 and 2021. Two new book chapters appear in the list of references, published in 2015 and 2016.

3.1. Consolidated result

This section provides a unified version of the responses generated by Scopus AI in the four prompts, which consists of three elements, namely: a) a list of unique references, b) an integrated overview of the four concept maps, and c) an operational meta-synthesis by the authors based on the summaries and expanded summaries generated by the tool.

a) List of references

This interactive session consisted of four prompts, providing AI-generated responses based on 25 unique references, as shown in Table 4, which lists authors and their work titles in the left column and the prompts that have used such references in the right column. This organisation allows to identify four highly recurrent references in this particular case study, namely: Kaefer, F. (2021), which is listed in all four prompts, and Kaefer, F. (2021b), Kohler, T., Von Dach, S.W.(2015) and Zhou, H., Zhang, Y., Zhou, L. (2023), which are listed in prompts 1, 2 and 3. Moreover, prompt 1 has also produced a list of five foundational papers (FP) that includes highly cited studies published between 2006 and 2017. Besides, prolific authors at the intersection analysed include Mihalis Kavaratizis with three references, and Florian Kaefer, Eduardo Oliveira, Nicole Porter, Jordi de San Eugenio, and Gregory J. Ashworth with two references each.



Table 4. Association of references and prompts.

Reference	Prompt ID
Bayraktar, A., Uslay, C. (2016). <i>Global place branding campaigns across cities, regions, and nations.</i>	4
Dax, T. (2020). <i>Neoendogenous rural development in mountain areas.</i>	2,3
De San Eugenio Vela, J., Nogué, J., Govers, R. (2017). <i>Visual landscape as a key element of place branding.</i>	1 (FP)
Ginesta, X., De San Eugenio, J. (2021). <i>Rethinking place branding from a political perspective: Urban Governance, Public Diplomacy, and Sustainable Policy Making.</i>	4
Gulisova, B. (2021). <i>Rural place branding processes: a meta-synthesis.</i>	4
Hankinson, G. (2010). <i>Place branding research: A cross-disciplinary agenda and the views of practitioners.</i>	1 (FP)
Kaefer, F. (2021). <i>How place branding can contribute to a better world.</i>	1,2,3
Kaefer, F. (2021b). <i>Introduction to an insider's guide to place branding.</i>	1,2,3,4
Kavaratzis, M. (2012). <i>From "necessary evil" to necessity: Stakeholders' involvement in place branding.</i>	1 (FP)
Kavaratzis, M., Ashworth, G.J. (2006). <i>City branding: An effective assertion of identity or a transitory marketing trick?</i>	1 (FP)
Kavaratzis, M., Warnaby, G., Ashworth, G.J. (2015). <i>Rethinking place branding: Comprehensive brand development for cities and regions.</i>	4
Kohler, T., Von Dach, S.W. (2015). <i>CDE Links regional research and global efforts for sustainable mountain development.</i>	1,2,3
Maheshwari, V., Vandewalle, I., Bamber, D.J. (2011). <i>Place branding's role in sustainable development.</i>	1 (FP)
Moretti, M., Belliggiano, A., Grando, S., Brunori, G. (2023). <i>Characterizing value chains' contribution to resilient and sustainable development in European mountain areas.</i>	3
Nagaynay, C., Lee, J. (2020). <i>Place branding and urban regeneration as dialectical processes in local development planning: A case study on the Western Visayas, Philippines.</i>	2
Oliveira, E. (2015). <i>Place branding as a strategic spatial planning instrument.</i>	4
Oliveira, E., Van Assche, K., Beunen, R. (2021). <i>The spatial planning-place branding nexus: A research agenda for spatial development.</i>	1,2
Porter, N. (2013). <i>"Single-minded, compelling, and unique": Visual communications, landscape, and the calculated aesthetic of place branding.</i>	2
Porter, N. (2020). <i>Strategic planning and place branding in a World Heritage cultural landscape: a case study of the English Lake District, UK.</i>	3
Roigé, X., Estrada, F. (2016). <i>Landscape Management and Evolution: The Montseny Natural Park</i>	1
Sati, V.P. (2014) <i>Socio-economy and population profile</i>	1
Therkelsen, A., James, L., Halkier, H. (2021). <i>Place branding for sustainable development: The role of tourism in sustainable place branding strategies</i>	2
Wehrli, A. (2016) <i>.Raise the Flag for Mountains: Enhancing Policy Dialogue and Knowledge Sharing through the World Mountain Forum Series</i>	3
Wilson, R.T. (2021). <i>The role of advertising in place branding</i>	1,4
Zhou, H., Zhang, Y., Zhou, L. (2023). <i>The impact of government policies on place branding performance: evidence from China</i>	1,2,3

Source: Own elaboration.

b) Integrated overview of the maps of concepts

The structure of these diagrams varies based on the prompt, ranging from simple two-level structures, as seen in prompt 2, to more complex four-level structures, as in prompts 1 and 4. The overview of all the concepts comprising the four diagrams enables the aggregation of most of them into four significant dimensions, as depicted in Figure 5. This approach delineates the interrelation between place branding and sustainable development in mountain areas along four axes, namely Governance and planning, Community participation and local development, Tourism and economy, and Preservation and conservation.





Figure 5. Fusion of concepts into key domains.
Source: Own elaboration based on concept maps generated by Scopus AI.

c) Operational meta-synthesis

Finally, with regard to the summaries, both in their brief and expanded versions, the four proposals offer an initial exploration of the interplay between place branding and sustainable development within the specific context of mountain areas. A recasting of the main ideas presented in these texts is provided below (Table 5), which shows the emphasis on the key domains outlined in Figure 5.

Table 5. Operational meta-synthesis suitable for inclusion in a literature review.

Place branding is a **governance strategy** that involves the creation and promotion of a distinct identity based on unique place attributes (Porter, 2013; Kaefer, 2021b). Therefore, it is **instrumental** in providing a competitive advantage for places. Moreover, place branding can also promote sustainable development (Kavaratzis, Warnaby and Ashworth, 2015), as well as **address challenges** such as overtourism, climate change and social instability (Kaefer, 2021).

In the context of mountain areas, **place branding can promote sustainable development** by enhancing the region's attractiveness and resilience (Kaefer, 2021b), guiding sustainable development governance strategies, and promoting an integrated approach to socioeconomic development (Oliveira, Van Assche and Beunen, 2021). In these locations, sustainable development entails the responsible **use and management of natural resources**, taking into account the social, economic and environmental context. Such an approach is **shaped by human activities** on the environment, as a result of economic and population growth (Roigé and Estrada, 2016).

Given these considerations, **specific place branding strategies** involve **promoting sustainable tourism** by showcasing the region's natural beauty and distinctive cultural assets. This includes encouraging visitors to **engage in environmentally friendly activities** and contribute to the prosperity of local communities (Kaefer, 2021; Therkelsen, James and Halkier, 2021). In terms of environmental conservation, it requires identifying distinct environmental attributes to emphasise their significance, aiming to **raise awareness and promote conservation** (Wilson, 2021). Furthermore, by positioning mountain regions as attractive places, place branding initiatives can attract investment and business opportunities aligned with sustainable development goals (Nagaynay and Lee, 2020; Oliveira, Van Assche and Beunen, 2021). Lastly, place branding can adopt participatory governance approaches involving **various stakeholders collaborating** to create and implement sustainable initiatives (Dax, 2020; Oliveira, Van Assche and Beunen, 2021).



However, **integrating sustainable development into place branding** also brings forth challenges, particularly in mountain areas where issues like underdevelopment, environmental degradation, and resource constraints are prevalent (Sati, 2014). Additionally, striking a balance between local and surrounding needs (Dax, 2020), as well as ensuring that the voice of mountain regions is further considered in global policies, can also be demanding (Wehrli, 2016).

Key strategies for the integration of sustainable development principles in place branding include taking into account local governance and institutional specificities, adopting a balanced and integrated approach to foster local development, and aligning place branding strategies with governmental policy (Dax, 2020; Moretti et al., 2023; Zhou, Zhang and Zhou, 2023). **Several stakeholders play a key role** in this integration process, such as governments, universities and research centres, as well as non-governmental organisations (Wehrli, 2016; Zhou, Zhang and Zhou, 2023). **Citizen engagement** is particularly crucial in this context (Ginesta and de San Eugenio, 2021).

Therefore, effective place branding initiatives rely on actively engaging the local community, fostering a mix of political and community initiatives, and tailoring specific engagement. (Gulisova, 2021). **Successful case studies** include a **partnership approach** in the Lake District National Park (UK), leading to the designation of the site as a UNESCO World Heritage Site (Porter, 2020), the promotion of **green attributes** in Aalborg, Denmark (Therkelsen, James and Halkier, 2021), the contribution of **supply-side and environmental policies** to sustainable development in the Chinese province of Zhejiang (Zhou, Zhang and Zhou, 2023), as well as **informed research** on sustainable development practices in mountain regions conducted by the *Centre for Development and Environment* (Kohler and Von Dach, 2015).

Source: Own elaboration based on summaries and expanded summaries generated by Scopus AI.

The consolidated result provides an initial list of references and authors, as well as some influential works in the research area of interest. This allows for the identification of renowned authors, such as Mihalis Kavaratzis and Robert Govers, which rank second and sixth, respectively, in Google Scholar's list of place branding authors, and foundational papers such as Maheshwari, Vandewalle, and Bamber (2011), which addresses place branding and sustainable development from a comprehensive standpoint. Likewise, Mihalis Kavaratzis stands out as the most prolific author with three references, two of which are foundational papers.

The integrated overview of the maps of concepts allows to locate four key dimensions at the intersection between place branding, sustainable development and mountain areas. The fusion of the four diagrams presents a research domain characterised by a modern approach to place branding. This is based on a collaborative approach to governance and planning that, in vulnerable areas such as mountains, which are heavily dependent on tourism, require sustainable preservation and conservation strategies to address issues like climate change and impact of human activity on these landscapes. Finally, the meta-synthesis elaborated by the authors based on the summaries generated by Scopus AI, provides an operational text that describes this intersection and can be used as part of a literature review.

4. Discussion and conclusions

This paper has used a case study to validate the utility of Scopus AI as a source in the context of doctoral theses and similar academic works using a method based on both evaluation and verification, therefore aligning with UN principles (UNESCO, 2019). It contributes to advancing previous literature on the use of AI in higher education by specifically focusing on the underrepresented graduate level of education (Crompton & Burke, 2023).

Scopus AI presents evidence syntheses based on previously validated research indexed in the Scopus database. These summaries are usually structured in coherent paragraphs, often highli-



ghting main topics or dimensions in bold and dividing them into sections or lists. In addition, the distinct arguments in the summaries are accompanied by their respective references, presented in square brackets, adhering to the conventional structure found in academic texts. The syntheses provided by the tool summarise scientific information in a natural language, facilitating the understanding of what can sometimes be complex ideas. Similarly, the concept maps allow for easy identification of keywords and their interconnection, helping visualise how a particular research area is structured.

In this study, the expanded summaries of the three follow-up questions have allowed to identify a valuable source of information, namely the Centre for Development and Environment of the University of Bern, which conducts sustainability research on topics including mountains, and is home to “the Mountain Research Initiative (MRI) and the editorial team of the scientific journal Mountain Research and Development (MRD)” (CDE, n.d.). Moreover, the initial summary for the first follow-up question has provided an interesting conceptualisation of how place branding serves as a significant contributor to sustainable development by “guiding development” (Oliveira et al., 2021). Both examples can be considered instances of information discovery.

Regarding references, Scopus AI (beta) has returned a list of twenty-five unique references, both book chapters and journal articles, including five foundational papers. The assessment of sources confirms their relevance for this particular case study. Documents address place branding from a general perspective, although there are some valuable sources focused on mountain areas as well. In addition, the foundational papers contain one of the few studies delving into the interplay of place branding and sustainable development from a conceptual perspective, namely Maheshwari et al. (2011). This feature is particularly valuable, since it is difficult to determine if the foundational papers would have been retrieved in a conventional search, which depends on many factors, such as the keywords used or the date range applied, among others. Importantly, Scopus AI is currently available under subscription as an integrated tool in the Scopus database. This integration confers a distinct advantage, compared to other tools discussed in prior literature, which consequently experience limitations in their practical usability (De La Torre-López et al., 2023).

Despite its unquestionable value, this tool has limitations worth noting, starting with the use of natural language. While this offers a clear advantage, it also comes with a restriction: the risk of oversimplifying concepts or losing important details in the information. Besides, initial responses to the prompts may seem somewhat superficial. However, this limitation can be countered by referring to the extended summaries, which offer more detailed and comprehensive information.

Scopus AI does not explicitly hierarchize arguments or offer an indication of their relative importance, nor does it provide interaction among them. This implies that, while the responses are not created strictly in a summarisation fashion, the writing style may sometimes result in juxtaposition. Moreover, we’ve identified a passage in the summary of prompt 4, that can face criticism. Specifically, it conceptualises place branding from an advertising approach, providing this factor an importance it does not have, and can therefore be misleading. Furthermore, the extended summary for prompt 1 appears to be overly wordy. These findings are consistent with previous research, suggesting that while AI-based technologies can automate routine tasks, they still require human interpretation and verification (Wagner et al., 2022; Whitfield & Hofmann, 2023).

Responses generated by Scopus AI in the version used at the time of our research, are based on abstracts of academic documents published from 2013 onwards. Therefore, responses are heavily dependent on information provided in abstracts, which in some cases may lack clarity and organisation, and even omit key information, since journals do not necessarily require



structured abstracts. While this date restriction may be considered a limitation, it also serves as an advantage, ensuring the incorporation of the latest findings, while the “Foundational papers” feature may counteract this shortcoming. Additionally, the possibility to save searches and access a query history - a feature present in the conventional system - would be desirable; although these functionalities are anticipated to be available in subsequent versions of Scopus AI.

The information displayed in the maps of concepts can be, at times, misleading, as the concepts shown in these diagrams are not representative of an entire field of study, nor are they necessarily the most important. This is precisely the case in Figure 4, where the term *Rural Tourism* is divided into the concepts *Alcoholic Beverage* and *Food Industry*. While these two concepts can be part of rural tourism they do not represent the totality of rural tourism, nor are they central segments within it. But the usefulness of this feature is undoubted as a first approximation, although it requires an evaluation by the researcher.

In this particular case study, the relationship between concepts appears to be limited to some extent. Passages in various summaries express similar ideas, sometimes leaning more towards the discipline of place branding than addressing the specific context of mountain destinations. Likewise, the summaries appear to emphasise the benefits or challenges of incorporating sustainable development principles into place branding strategies, rather than offering explicit examples of how to accomplish this. While the texts incorporate a few success cases, these are not always centred on mountain destinations.

One possible explanation for this is the limited research at this intersection. Place branding is a discipline yet to be consolidated, and research on mountain destinations is limited. Besides, place branding literature is focused on several geographic constructs (Dioko, 2016), and its intersection with sustainable development is still in its early stages (Carrizo Moreira et al., 2023), which might also explain the information gap in the feature “Topic experts”. Moreover, there is only one reference to the Sustainable Development Goals (SDGs). Specifically, this reference is located in the expanded summary of prompt 2, although these words are not capitalised, implying the passage could refer to sustainable development goals from a general perspective. Alternatively, the limited references to the SDGs may suggest a research gap, indicating that studies exploring this specific intersection are not considering the SDGs as a framework, at least not from a nuclear perspective.

It is important to refer to the algorithm or decision-making process of Scopus AI. AI technologies respond to a given instruction based on their experience; which is determined by the data they are exposed to (UNESCO, 2019). Scopus AI relies on vector search, employing semantic relevance to generate evidence-based synthesis containing the most relevant information in relation to a query (Scopus, 2024). This suggests relevance has a higher value than other dimensions, such as citations or the publishing date, indicating that the way in which a prompt is formulated can influence the results obtained.

It is also necessary to address aspects related to traceability and transparency. Using the same prompt at different points in time can yield varying results, which may be challenging to track. Therefore, it is imperative to comply with the aforementioned principles by documenting the entire process. Our test of Scopus AI incorporates high levels of transparency in that sense, as advocated by Wagner et al. (2021) and Tlili et al., (2023), and thus foresees one of the main challenges of AI-based studies: reproducibility (Gundersen et al., 2018).

This case study provides an example of academic research demonstrating advantages, as well as efficiency and accuracy of AI technologies in literature review processes, which had been identified as a restriction in previous literature (Van Altena et al., 2019; UNESCO, 2023). It also sheds light on the usage of automated tools for systematic literature reviews in the context



of Social Sciences, moving away from predominant fields such as Software Engineering and Medicine (Van Dinter et al., 2021). This study used the beta version of Scopus AI. Indeed, AI technologies are still in an embryonic phase (Wagner et al., 2021). It is foreseeable that some of the identified limitations will be amended in updated versions of the tool, as pointed out in other studies using AI beta technologies in academic contexts (Lopezosa et al., 2023b). For instance, the current version of the tool incorporates the features “Foundational papers” and “Topic experts” for both the initial prompt and the follow-up questions.

In the previous paragraphs we have highlighted the advantages and limitations of Scopus AI and put them in context with previous research. However, we would like to point out that the significance of generative AI tools lies in the advantages they provide, not their limitations, as they allow for new and improved paradigms across sectors; enabling, in the particular case of Scopus AI, to accelerate research processes. This does not mean that the limitations and challenges associated with these technologies should be ignored; rather, it means that they should be taken into account to ensure AI tools are used in the most effective and responsible way.

The objective of this study was to test the utility of Scopus AI in the context of academic research. To achieve this, a case study focused on place branding and sustainable development in mountain areas was selected, aiming to verify the effectiveness of this tool. In a short search session, consisting of an iterative and interactive process, Scopus AI has provided a general perspective of the interplay between place branding and sustainable development in mountain areas. This is perhaps one of the most remarkable takeaways, since obtaining an initial overview of a research area is possible with a search session under 40 minutes.

Another aspect is obtaining a consolidated result as the one presented in this paper, which requires elaborating a list of unique references, a diagram of keywords grouped into different key dimensions, as well as a literature synthesis which is operative for the specified research context. For this case study, this task was carried out by one author in a session lasting 8 hours. In this regard, the analysis of the responses generated by Scopus AI has allowed us to compile a varied list of references, learn concepts associated with a specific research intersection and help to elaborate an evidence-based meta-synthesis. The consolidated result underlines the value of this tool for summarising recent research in a given area, mapping its main characteristics, and enabling information discovery. In addition, a potential research gap has been identified, since literature on mountain areas at the intersection between place branding and sustainable development is limited. Another relevant finding is the lack of information in the field “Topic experts”, suggesting the number of scholars studying this intersection is also limited. Therefore, we confirm the validity of Scopus AI in this setting.

The results allow us to identify several associations between Scopus AI features and research needs. This finding is illustrated in Figure 6, which displays Scopus AI features on the vertical axis and research needs on the horizontal axis. Notably, a single feature can address multiple needs, while one need can be met through various features. For instance, the concept map enables users to familiarise themselves with keywords, explore related topics, trends and approaches, and identify potential research gaps. Similarly, both the summary and expanded summary fulfil three research needs: identifying gaps, reviewing the state of the art, and uncovering trends and approaches.



		Research needs								
		Identify seminal studies and authors	Become familiar with keywords	Locate relevant literature	Explore associated topics	Identify research gaps	Review the state of the art	Uncover trends, patterns and dominant approaches	Stay updated	Gain in-depth field insight
Scopus AI features	Foundational papers									
	Map of concepts									
	List of references									
	Summary									
	Expanded summary									
	Topic experts									

Figure 6. Uses of Scopus AI in research processes: associations between Scopus AI features and research needs. Source: Own elaboration based on Scopus AI beta.

An example of how a research need can be met through different features can be seen in need *Locate relevant literature*, which is facilitated by features, foundational papers, lists of references, and topic experts. Likewise, research gaps can be pinpointed through features like the concept map, summary, and expanded summary. It is essential to emphasise that these identifications operate in the negative, meaning that gaps in the research are not signalled as such, but the absence of certain issues may suggest potential research gaps. Therefore, it is important to avoid confusing absences with irrelevance.

The main limitation lies in the challenge of staying up to date with research and obtaining a comprehensive understanding of a field. Scopus AI does not allow to save searches or create alerts, which makes it difficult for researchers to stay updated through automated processes. However, citation alerts can be activated for references, which can contribute to minimising this shortcoming. In addition, Scopus AI provides a first approach to a research area of interest and contributes to gaining in-depth insight. Yet, an exhaustive overview may require long interactive sessions, and the use of other approaches, namely the conventional search system, but undoubtedly implies researchers to read research.

However, despite these constraints, the findings indicate that Scopus AI is an accelerator of academic processes, fulfilling its commitment to assist researchers in navigating and discovering relevant information. It provides the opportunity to conduct modern research, using a tool that accelerates academic processes by producing operational syntheses using natural language.

With the introduction of this new tool, three search scenarios emerge within the Scopus database. One using the conventional search system, another one involving Scopus AI, and a hybrid option combining both. In any case, it is noteworthy to highlight the potential and innovative nature of Scopus AI, as it complements - and, in some cases, may even substitute-conventional searches relying on information retrieval.

In light of the results, we confirm that Scopus AI allows researchers to obtain an overview of a research problem, as well as identify authors, theories and trends. It is a valuable tool for literature reviews, theoretical frameworks and state-of-the-art, as well as verification of relationships between variables, among other applications that are actually impossible to delimit. Therefore, it helps researchers fulfil the ethical requirements of research, particularly that related to the importance of taking into account the state-of-the-art in research practices (ALLEA, 2023).



5. Limitations and future research

While this study offers valuable insights into the use of Scopus AI in research processes, it is important to acknowledge its limitations. Primarily, this study is exploratory in nature, due to the novelty of Scopus AI, relying on a single prompt and three follow-up questions. Future research could benefit from expanding the scope by increasing the number of prompts and extending the duration of the search session to provide a more comprehensive understanding of the tool's feasibility. Another limitation is the ongoing evolution of the tool, which means that new versions are enhanced variants of the beta version tested in this case study. However, despite these limitations, the study significantly contributes to the growing body of knowledge on generative artificial intelligence technologies within academic research practices.

This study provides several implications and research avenues. First, this paper contributes to enrich literature exploring uses of generative artificial intelligence tools for academic purposes, specifically in the context of doctoral theses and similar academic works. Given the novelty of this topic, more research is required to gain a broader perspective and uncover the full potential of these technologies. The present research focuses on Social Sciences and, more specifically, on the field of Communication. Future research can explore similar uses in other disciplines. Second, the case studied illustrated in this paper uses a relational prompt to analyse the connection between different concepts. Considering the capabilities of generative AI, it would be interesting to explore research outcomes using other types of prompts. Third, the case study presented in this paper required a qualitative approach. Other methodological perspectives to generative AI can provide new research opportunities in this context. Last but not least, we believe this study makes a substantial contribution in the use of generative AI in academic research, as it is possibly one of the first research papers studying the utility of Scopus AI as an academic source of information.

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Conflict of interest

The authors declare no conflict of interest.

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Authors' contribution

Elisenda Aguilera-Cora: Project management; Formal analysis; Data Curation; Writing - original draft; Writing - proofreading and editing; Research; Methodology; Visualization.



Carlos Lopezosa: Conceptualization; Writing - proofreading and editing; Methodology; Resources; Supervision; Validation.

José Fernández-Cavia: Writing - proofreading and editing; Supervision; Validation; Visualization.

Lluís Codina: Conceptualization; Writing - proofreading and editing; Methodology; Resources; Software; Supervision; Validation.

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