Spanish and Portuguese contributions to the iConference 2024

Hybrid event, Changchun, China,
15-18/22-26 April 2024, Proceedings

Volume 7

Editors:
Alan Angeluci
Josep Cobarsí Morales
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FOREWORD

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About the Series

The Advanced Notes in Information Science (ANIS) book series publishes conference proceedings, monographs, and thematic volumes that explore the nexus of information, communication, and computer sciences. The ANIS series considers research works covering a range of topics, including but not limited to information retrieval, information systems, information architecture, information behavior, digital libraries, information literacy, information management, data management, library studies, user experience design, knowledge management, sociology of information, science communication, mass communication, organizational communication, and others. The series is intended to serve as a platform for students, researchers, and practitioners from the public or private sectors.

Series Editor
Adilson Luiz Pinto,
Federal University of Santa Catarina, Brazil

ABOUT THE CONFERENCE

Conference name: iConference 2024
Date: Online 15-18 April 2024, Onsite 22-26 April 2024
Place: Changchun (China)
Website: https://www.ischools.org/past-conferences/2024
Organizer(s): iSchools
Sponsor(s): iSchools
Organizing committee: Spanish-Portuguese Track

PREFACE

We are delighted to present the proceedings of the second Spanish-Portuguese Track of the iConference 2024. This conference was held in a hybrid format, allowing participants the flexibility to present either online or onsite at the physical venue in Changchun, China, from 15-18 April 2024. This track was designed to bring together researchers, professionals, and academics from various disciplines, focusing on Spanish- and Portuguese-speaking communities.

The event aimed to foster meaningful interdisciplinary dialogue and collaboration. It provided a platform for scholars and practitioners to explore the intersections of information, technology, and society while enhancing connections between research groups in these fields.

We are proud to have had diverse participation from researchers, students, and professionals representing a rich tapestry of countries such as Spain, Portugal, and Brazil. The hybrid format enabled us to feature presentations from international speakers who shared their insights on topics relevant to the evolving landscape of information science and technology, fostering a sense of global community.

A total of 10 full papers were accepted out of 13 submissions (only 8 included in this volume), reflecting the high quality and diversity of the contributions. Among the accepted papers, the research covered a wide range of topics, including the characterization and social network presence of environmental law research groups in Spain, trends in geographical information systems (GIS) within

academic libraries, and a methodological review of knowledge management in the Brazilian public sector. Other significant contributions explored the intersections between open government data and information science in Brazil, the dissemination of cancer research in Spain, and open access practices in addiction research. Further studies analyzed information policies in Brazilian open-access legal databases and the use of controlled vocabularies in indexing scientific literature related to the 1918 pandemic.

We extend our deepest gratitude to all authors, organizers, reviewers, and collaborators who contributed their time and expertise to make this track successful. Their efforts have been invaluable and greatly appreciated.

This track has significantly advanced our collective understanding of information science in Spanish—and Portuguese-speaking contexts. We look forward to continued collaboration and exploration in future editions of the iConference.

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CONTENTS

Open government data in Brazil: Spaces and intersections with information science

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ABSTRACT
In the context of information science, the topic of open data has emerged as a significant area of interest. This is due to the fact that the entire informational flow of data and information must be defined and managed. This involves elements related to its representation and organization, as well as its sharing and dissemination. The term "open data" is used to describe information from a variety of sources. When this information is related to government activities, it is defined as "open government data" (OGD). The objective of this study is to identify and characterize academic production on OGD in the Brazilian context, with a particular focus on mapping its location, knowledge area, and publication year. To this end, a bibliographic review was conducted based on the Brazilian Digital Library of Theses and Dissertations, which selected 68 documents for quantitative analysis in May 2023. The highest frequency of publication was identified in the South region, with 24 documents published and eight terms guaranteed to the Federal University of Santa Catarina in the areas of engineering and knowledge management and in the area of information science. It can be concluded that the majority of published works are concentrated in the areas of information

science and computer science. Additionally, the regions that stand out in academic production are the South and Northeast. Regarding the frequency of publication over the years, the study indicated an irregular distribution with some periods of increased publication. The years with the highest concentration were 2019 and 2021. In future studies, other analyses, in addition to quantitative guidance, will complement the mapping of studies on OGD in Brazil.

Keywords: open government data, information science, open data, academic production, Brazil

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1. INTRODUCTION

The open access movement originated in the 1990s as a result of data-sharing initiatives, most notably the Open Archives Initiative. A few years later, the 2002 Budapest Declaration (Budapest Open Access Initiative [BOAI]) reinforced open access to scientific documents via electronic means, promoting the dissemination, sharing, storage, and accessibility of data (BOAI, 2024). In the context of government, open government initiatives have emerged, and the concept of open data has been expanded. The Open Knowledge Foundation (2024) defines open data as data that can be used, modified, and shared freely by anyone, subject only to similar attribution and sharing requirements. Open data is available to society in general

and is made available in electronic formats, facilitating accessibility, reuse, and sharing (Open Knowledge, 2024).

The term "open data" encompasses information from a variety of sources. When it relates to government, it is defined as "open government data" (OGD). OGD has become increasingly relevant in society because open data legislation and policies require governments to publish datasets. It encourages advances in areas such as transparency, social participation, accountability, and integrity, which support democracy and inclusive growth (Controladoria-Geral da União, 2024). In this context, the objective of this study is to characterize the academic production on OGD in Brazil. To this end, the research question guiding this study is as follows: where is academic research on OGD located in Brazil? In which areas of study are they related? In what year were they published? The objective of this research was to identify and characterize the academic production on OGD within the context of Brazil. The objective was to identify publications on the subject and map the location of the institution involved, the areas of knowledge, and the year of publication. The research is justified by the need to understand the location of academic production on OGD in Brazil. This will enable the identification of institutions, areas of knowledge, programs, and regions that concentrate these activities in Brazil. To this end, data were collected from the Brazilian Digital Library of Theses and Dissertations (BDTD) because it integrates the country's existing thesis and dissertation information systems into a single portal.

It should be noted that this study is part of a larger project entitled "Observatório de Dados Abertos" (Observatory of Open Data), which is investigating the subject of OGD in the context of information science. The aim is to

map and investigate the research carried out in this area. Consequently, this study represents one of the project's artifacts and has the aspect of a brief literature review.

2. METHODOLOGY

The study was exploratory in nature, aiming to elucidate existing research on GAD. The investigation was conducted through a bibliographic search in the BDTD, employing a quantitative methodology. The database was selected for its centralization of the academic production (theses and dissertations) of all the country's postgraduate programs. The BDTD offers users a national catalog of theses and dissertations in full text, facilitating the Brazilian Science and Technology (S&T) community's ability to publish and disseminate its theses and dissertations produced domestically and abroad. This provides greater visibility to national scientific production, offering a distinctive means of searching for and accessing these documents (BDTD, 2024). The search in the BDTD was conducted using the advanced search option, with the following fields: title, subject, and abstract. The following descriptors were selected for their direct and indirect relevance to the topic: "open data," "open government data," "open data visualization," "information architecture," "open data accessibility," and "open data usability." This approach allowed for a comprehensive and systematic examination of the retrieved documents, including the various forms of the term OGD. The search string constructed was:

> ("dados abertos" OR "dados governamentais abertos" OR "dados abertos governamentais" OR "visualização de dados abertos" OR "open government data" OR "arquitetura da informação" OR

"acessibilidade de dados abertos" OR "usabilidade de dados abertos").

The process was conducted in May 2023 for the following three descriptors: title (string 1), subject (string 2), and abstract (string 3). This resulted in three distinct runs, each focusing on a specific field. The results were subjected to analysis in accordance with the following methodology: (1) The process involved the identification and removal of duplicate documents from each string and from the compiled result; (2) the exclusion of documents from the analysis of titles; and (3) the exclusion of documents from the analysis of abstracts. Inclusion criteria were defined on the basis of whether they met the GAD theme, with consideration also given to related studies such as those pertaining to visualization, information architecture, accessibility, and usability. The analysis of titles and abstracts did not take into account research involving OGD in specific contexts, nor did it encompass other types of analysis that did not involve the information phenomenon. Additionally, case studies that solely utilized the data as a source for other analyses were excluded.

3. RESULTS

In the initial stage of analysis (Stage 1), the number of documents retrieved for each string was 251, 362, and 194, respectively. Additionally, 14, 22, and nine duplicate documents were identified in each string. The documents retrieved in each string were collated in an Excel spreadsheet, resulting in a total of 807 documents. Following further analysis, 208 duplicate documents were identified, resulting in a sample of 599 documents. The inclusion and exclusion criteria were then applied to the analysis of titles

(Stage 2) and abstracts (Stage 3), with 383 and 148 documents, respectively, excluded, leaving a final sample of 68 documents for full reading. Figure 1 illustrates the number of papers retrieved and selected at each stage.

Figure 1. Number of papers retrieved and selected. Source: Authors.

Table 1 provides a comprehensive list of the document identifiers (IDs), titles, authors, publication years, institutions, states, areas of knowledge, and types (dissertation—D or thesis—T) for the 68 selected documents. The data in this table were retrieved from the BDTD.

4. ANALYSIS OF RESULTS

A geographic distribution analysis was conducted on the selected sample of documents (68) in relation to the regions of Brazil, the areas of knowledge, and the frequency of publications per year listed in the BDTD.

4.1. Geographic Distribution

With regard to the geographical distribution of the institutions where the papers were published, it was found that

Table 1. Group of recovered dissertations and theses.

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T1	Dados abertos governamentais: Uma análise aplicada ao Ministério Público do Trabalho	Joelson Souza Paulo	2018	Federal University of Espírito Santo (UFES)	Espírito Santo	Public management of the center of legal and economic sciences	Southeast	D
T2	Análise de contas públicas utilizando dados abertos governamentais: um estudo de caso no governo do estado do ceará	Daniel Teófilo Vasconcelos	2016	State University of Ceará (UECE)	Ceará	Computer science	Northeast	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T3	Comunicação e processos de criação em código aberto: um estudo sobre sistemas de visualização de dados	Guilherme Espíndula Rocha	2017	Pontifical Catholic University of São Paulo (PUC-SP)	São Paulo	Communication and semiotics	Southeast	T
T4	Centrando a arquitetura de informação no usuário	Guilhermo Almeida Reis	2007	University of São Paulo (USP)	São Paulo	Culture and information	Southeast	D
T5	Suporte à geração de dados abertos ligados em bioinformática	Gabriel do Couto Seabra Gusmão Paula	2019	USP	São Paulo	Applied computing	Southeast	D

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T6	Proposta de arquitetura para ecossistema de inovação em dados abertos	Murilo Silveira Gomes	2017	Federal University of Santa Catarina (UFSC)	Santa Catarina	Engineering and knowledge management	South	D
T7	A contribuição da arquitetura da informação para gestão do conhecimento	Mac Amara Cartaxo	2016	University of Brasilia (UNB)	Brasília	Information science	Midwest	T
T8	Acesso aberto aos dados de pesquisa nas universidades brasileiras e os indicadores de CT&I	Maria Fernanda Mascarenhas dos Santos Melis	2018	UNB	Brasília	Intellectual property and technology transfer for innovation	Midwest	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T9	Um banco de dados de perfis sigma aberto e extensível	Fabrício Ferrarini	2017	Federal University of Rio Grande do Sul (UFRGS)	Rio Grande do Sul	Chemical engineering	South	D
T10	Um sistema de controle de integridade para um modelo de dados aberto	Marinaldo Nunes da Silva	2000	Federal University of Campina Grande (UFCG)	Paraíba	Computer science	Northeast	D
T11	Do mapeamento de dados abertos à modelagem conceitual: um Data Warehouse para análise de informações multidimensionais	Paulo Alberto Coutinho Precht	2019	UFRGS	Rio Grande do Sul	Computer science	South	D

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T12	Um processo para publicação de dados abertos em institutos federais baseado em BPM	José Mário de Mendonça Lemos	2017	Federal University of Pernambuco (UFPE)	Pernambuco	Computer science	Northeast	D
T13	Uma Abordagem Baseada em Ontologias para Obtenção de Indicadores a partir de Dados Abertos	Vinícius Gama Valory Frauches	2014	UFES	Espírito Santo	Computer science	Southeast	D
T14	Estudo da base de dados abertos E-Saúde da prefeitura de Curitiba usando técnicas de mineração de dados	William Hamilton dos Santos	2018	Federal Technological University of Paraná (UTFPR)	Paraná	Biomedical engineering	South	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T15	Repositórios Institucionais de dados de pesquisa como estratégia do movimento de acesso aberto a informação científica	Bruna Marques Vieira	2022	UFRGS	Rio Grande do Sul	Information science	South	D
T16	Rastreia saúde: um sistema de rastreamento espaço-temporal de doenças através de dados abertos não estruturados	Luiz Henrique Anjos Cardim	2021	UTFPR	Paraná	Applied computing	South	D

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T17	Análise exploratória e visualização de dados florestais brasileiros a partir do sistema DOF do IBAMA	Matias Emir Luemba	2021	São Paulo State University (UNESP)	São Paulo	Computer science	Southeast	D
T18	Um modelo para implementação de aplicações da Argument Web integradas com bases de dados abertos e ligados	Roberto Niche	2015	University of Vale do Rio dos Sinos (UNISINOS)	Rio Grande do Sul	Applied computing	South	D
T19	OpenData Manager: uma ferramenta para gerenciar o processo de criação e monitoramento do plano de dados abertos	Fernando da Cruz Lopes	2021	Federal University of Rio Grande do Norte (UFRN)	Rio Grande do Norte	Information technology	Northeast	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T20	Mineração de dados abertos: uma análise do uso de bots em pregões eletrônicos	Hugo Medeiros Souto	2019	Federal University of Paraíba (UFPB)	Paraíba	Management of learning organizations	Northeast	D
T21	Uma análise de possíveis anomalias em dados da administração para gastos públicos	Flávio e Souza, Damires Silva	2021	Federal Institute of Paraíba (IFPB)	Paraíba	Information technology	Northeast	D
T22	Um modelo de avaliação de conformidade de portais de dados abertos de governo	Murilo Silveira Gomes	2021	UFSC	Santa Catarina	Engineering and knowledge management	South	D

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T23	Dados abertos: categorias e temas prioritários a serem disponibilizados pelas instituições federais de ensino superior (IFES) aos cidadãos	Daniel Fernando Carossi	2016	UFPE	Pernambuco	Computer science	Northeast	D
T24	Modelo de maturidade de dados abertos: uma matriz de referência para organizações	Lidiane Visintin	2021	UFSC	Santa Catarina	Engineering and knowledge management	South	T
T25	Plano de dados abertos nos Institutos Federais de Educação, Ciência e Tecnologia	Vivian Kelly Andaki Nunes	2018	Federal University of Viçosa (UFV)	Minas Gerais	Administration	Southeast	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T26	Uma Abordagem Para Enriquecimento Semântico de Metadados Para Publicação de Dados Abertos	Márcio Angelo Bezerra de Lira	2014	UFPE	Pernambuco	Computer science	Northeast	D
T27	Uma proposta de processo para implantação de dados abertos em instituições públicas brasileiras	Renan de Oliveira Silva	2018	UFRN	Rio Grande do Norte	Systems and computing	Northeast	D
T28	Dados governamentais abertos: métricas e indicadores de reúso	Patrícia Nascimento Silva	2018	Federal University of Minas Gerais (UFMG)	Minas Gerais	Knowledge management and organization	Southeast	D

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T29	Contribuições para o aprimoramento do acesso e visualização da informação em repositórios institucionais	Júccia Nathielle do Nascimento Oliveira	2015	UFPE	Pernambuco	Computer science	Northeast	D
T30	Pensamento computacional como uma aplicação em dados abertos conectados	Ândrea Völz Garcez	2022	Federal University of Pelotas (UFPEL)	Rio Grande do Sul	Computer science	South	D
T31	Uma arquitetura orientada a serviços para visualização de dados em dispositivos inteligentes	Jairo de Jesus Nascimento da Silva	2014	Federal University of Pará (UFPA)	Pará	Computer science	North	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T32	O estado de anomia dos dados no acesso aos dados governamentais abertos no Brasil	Diana Vilas Boas Souto Aleixo	2020	UNESP	São Paulo	Computer science	Southeast	D
T33	Visualização de informações a partir de dados abertos governamentais, baseadas em perfis de usuário	César AlencarAssumpção	2021	UNESP	São Paulo	Computer science	Southeast	D
T34	Dados abertos na administração pública de cidades inteligentes promovendo transparência aos cidadãos	Vinícius Almeida Teles Barreto	2019	Federal University of Sergipe (UFS)	Sergipe	Computer science	Northeast	D

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T35	Panorama sobre a utilização de dados governamentais abertos no Brasil: um estudo a partir dos aplicativos desenvolvidos	Diogo Luiz de Jesus Moreira	2015	Brazilian Institute of Information in Science and Technology (IBICT)	Brasília	Information science	Midwest	D
T36	O estado de anomia dos dados no acesso aos dados governamentais abertos no Brasil	Diana Vilas Boas Souto Aleixo	2020	UNESP	Rio Grande do Sul	Computer science	South	T
T37	Dados abertos governamentais: implicações e possibilidades em políticas públicas	Marcelo Kali Issa	2013	PUC-SP	São Paulo	Social sciences	Southeast	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T38	Modelo de infraestrutura para publicação de dados abertos governamentais conectados de qualidade	Bruno Elias Penteado	2020	USP	São Paulo	Computer science and computational mathematics	Southeast	T
T39	Uma proposta de modelo de processo para publicação de dados abertos conectados governamentais	Thiago José TavaresÁvíla	2015	Federal University of Alagoas (UFAL)	Alagoas	Computational knowledge modeling	Northeast	D
T40	OGDPub: uma ontologia para publicação de dados abertos governamentais	Larissa Mariany Freiberger Pereira	2017	UFSC	Santa Catarina	Engineering and knowledge management	South	D

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T41	Dados abertos governamentais no processo de tomada de decisão baseada em evidências: um estudo de caso em organizações públicas do Rio Grande do Sul	Marcelo Andrade Mesquita	2020	Pontifical Catholic University of Rio Grande do Sul (PUC-RS)	Rio Grande do Sul	Administration and business	South	D
T42	Dados abertos governamentais: desafios na publicação	Paula Assumpção Campos	2018	UFSC	Santa Catarina	Engineering and knowledge management	South	D
T43	Governança e a sustentabilidade em ecossistema de dados abertos governamentais	Edson Carlos Germano	2019	USP	São Paulo	Administration	Southeast	T

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T44	OpenData Processor: uma ferramenta para a automatização do processo de extração e publicação de Dados Abertos	Allyson Bruno Campos BarrosVilela	2018	UFRN	Rio Grande do Norte	Software engineering	Northeast	D
T45	Um modelo para integração de informações de bases de dados abertos, com uso de ontologias	Thyago de Melo Tosin	2016	UNISINOS	Rio Grande do Sul	Applied computing	South	D

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T46	Dados abertos do governo brasileiro: entendendo as perspectivas de fornecedores de dados e desenvolvedores de aplicações ao cidadão	Narallynne Maciel de Araújo	2017	UFRN	Rio Grande do Norte	Systems and computing	Northeast	D
T47	Percepções do principal sobre a qualidade dos dados abertos governamentais: uma análise à luz da Teoria Principal-Agente	Thiago Emídio Esteves da Silva	2019	UFPB	Paraíba	Administration	Northeast	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T48	Mapeamento de tecnologias informacionais sobre dados abertos em saúde pública: destino de repasses financeiros federais	Fernando de Assis Rodrigues	2012	UNESP	São Paulo	Information science	Southeast	D
T49	A ciência aberta no Brasil: a experiência da Fundação Oswaldo Cruz na tentativa de abertura de dados governamentais no âmbito do Sistema Único de Saúde brasileiro	Fernanda dos Santos Rodrigues	2019	Oswaldo Cruz Foundation (FIOCRUZ)	São Paulo	Public health policies	Southeast	D

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T50	Governança de dados abertos governamentais: framework conceitual para as universidades federais, baseado em uma visão sistêmica	Júlio César Costa Casaes	2019	UFSC	Santa Catarina	Engineering and knowledge management	South	T
T51	Plano de dados abertos: estudo multicaso para a priorização de dados a partir da transparência passiva na Universidade Federal de Santa Catarina	Patrick Cunha	2020	UFSC	Santa Catarina	University administration	South	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T52	Dimensões institucionais associadas à abertura de dados governamentais: uma análise transnacional	Jaedson Gomes dos Santos	2020	UFPB	Paraíba	Public management and international cooperation	Northeast	D
T53	Integração de dados abertos na geração de modelos 3D baseados em CityGML	Mcdonnell Araújo Maieron	2021	UFRGS	Rio Grande do Sul	Computer science	South	D

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T54	Ciência Aberta e gestão da informação científica institucional: modelo proposto para gestão de dados científicos na Universidade Federal Rural da Amazônia	Ana Cristina Gomes Santos	2022	Federal Rural University of Amazonia (UFRA)	Pará	Information science	North	D
T55	Recuperação de dados governamentais: uma análise de aceitação de tecnologia no acesso a dados em planilhas eletrônicas	Pedro Henrique Santo Bisi	2019	UNESP	São Paulo	Information science	Southeast	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T56	Transparência ativa e Open Government Data: uma proposta para a abertura de dados na Polícia Federal	Rodrigo Borges Correia	2021	UFSC	Santa Catarina	Information science	South	D
T57	Mecanismos de ampliação da transparência em portais de dados abertos governamentais brasileiros à luz da accountability theory	Rodrigo Hickmann Klein	2017	PUC-RS	Rio Grande do Sul	Administration and business	South	T

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T58	Caracterização da comunidade que utiliza dados abertos governamentais sobre a educação brasileira	Lorena Santos Pereira	2022	UFCG	Paraíba	Computer science	Northeast	D
T59	Dados abertos governamentais: uma proposta de classificação e estruturação para abertura dos dados de IFES	Wagner Soares de Arruda	2019	Federal Rural University of Pernambuco (UFRPE)	Pernambuco	Public administration	Northeast	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T60	Profissional da informação no contexto de dados abertos nos legislativos da cidade de Salvador, Bahia: uma análise a partir da lógica paraconsistente	Normaci Correia dos Santo Sena	2019	Federal University of Bahia (UFBA)	Bahia	Information science	Northeast	D

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T61	Sistema brasileiro de sementes: uma análise da oferta e do empreendedorismo da indústria de sementes de algodão, aveia, milho e soja a partir de bases de dados abertos governamentais	Marcelo Matos de Sá	2021	UFRGS	Rio Grande do Sul	Agribusiness	South	D
T62	Web service RESTful para Manipulação, Catalogação, Publicação na Web e Eventual Manutenção de Dados Abertos Governamentais	Bruno Iran Ferreira Maciel	2014	UFPE	Pernambuco	Computer science	Northeast	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T63	Contribuições ao ecossistema de dados abertos do Governo Federal com enfoque em tecnologias cívicas	José Antonio de Carvalho Freitas	2016	Catholic University of Brasilia (UCB)	Brasília	Computer science	Midwest	D
T64	Minha escola transparente: uma análise comparativa do uso de dados governamentais abertos na educação básica no Brasil e Inglaterra	Otávio Albuquerque Ritter dos Santos	2014	Getulio Vargas Foundation (FGV)	Rio de Janeiro	Public administration	Southeast	D

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T65	Um método para análise e visualização de dados georreferenciados relacionados ao trânsito de veículos	Jonathan Machado	2017	UNISINOS	Rio Grande do Sul	Computer science	South	D
T66	Criação de conhecimento em acordos de cooperação interorganizacionais com uso e geração de dados abertos: caso de estudo UTFPR	Ana Carolina Benelli	2019	UTFPR	Paraná	Technology and society	South	D

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	INSTITUTION	STATE	FIELD	REGION	TYPE
T67	Traduções e desvios, mobilizações e desmobilizações na transparência pública: o processo de abertura de dados governamentais no município de São Paulo	Thomaz Anderson Barbosa da Silva	2019	FGV	Rio de Janeiro	Public administration and government	Southeast	T
T68	Vis-Scholar: uma metodologia de visualização e análise de dados na educação	Jean Carlos Araújo Costa	2016	UNISINOS	Rio Grande do Sul	Applied computing	South	D

Source: Authors.

in each region of Brazil, in the North, two published documents were identified. One was published by the UFRA and the other by the UFPA, which is located in the capital of Pará. With regard to the Northeast region, a total of 20 published documents were identified, with five documents published at the UFPE, four at the UFRN, three at the UFPB, two at the UFCG, and one document at the following institutions: UECE, Federal University of Alagoas (UFAL), UFS, UFBA, IFPB, and UFRPE. With regard to the Southeast region, 18 published documents were identified, five of which were published at UNESP, four at USP, and two at the following institutions: UFES, FGV, and PUC-SP. One document was published at the following institutions:

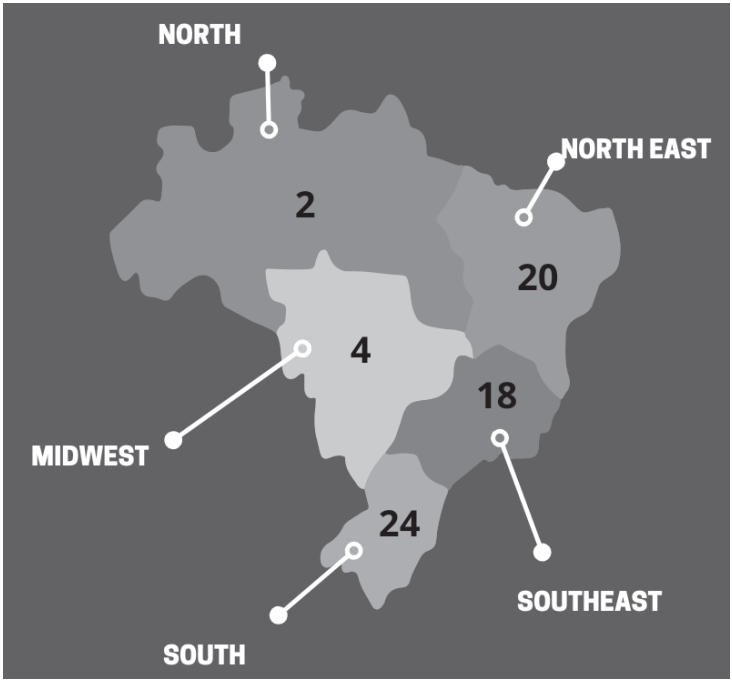

Figure 2. Distribution of works in the regions of Brazil. Source: Authors.

UFV, UFMG, and FIOCRUZ. With regard to the Southern region, a total of 24 published documents were identified, eight of which were published at UFSC, six at UFRGS, four at UNISINOS, three at UTFPR, two at PUC-RS, and one at UFPEL. In the Midwest region, four published documents were identified, two of which were published by the University of Brasilia (UNB), one by the UCB, and one by the IBICT.

The institutions with the highest number of publications were the UFSC (eight) in the South, the UFRGS (six) in the South, and the UFPE (five) in the Northeast. The distribution of institutions by region is illustrated in Figure 2.

4.2. Knowledge Areas

With regard to the examination of the subject areas associated with the chosen documents, the categorization employed was that indicated by the "area" field of the BDTD and followed the following distribution: A total of 20 documents were classified within the field of computer science, eight within the field of information science, six in the area of engineering and knowledge management, five in the area of applied computing, and three in the area of administration. Two documents were identified in the following areas: systems and computing, public administration, administration and business, and information technology. One document was identified in the following areas: public management of the center of legal and economic sciences, communication and semiotics, culture and information, intellectual property and technology transfer for innovation, chemical engineering, biomedical engineering, management of learning organizations, knowledge management and organization, political science, social

sciences, computer science and computational mathematics, computational knowledge modeling, software engineering, public health policies, public administration and government, university administration, public management and international cooperation, agribusiness, and technology and society. The knowledge areas of the papers are illustrated in Figure 3. The total area identified with a document is presented in the other set.

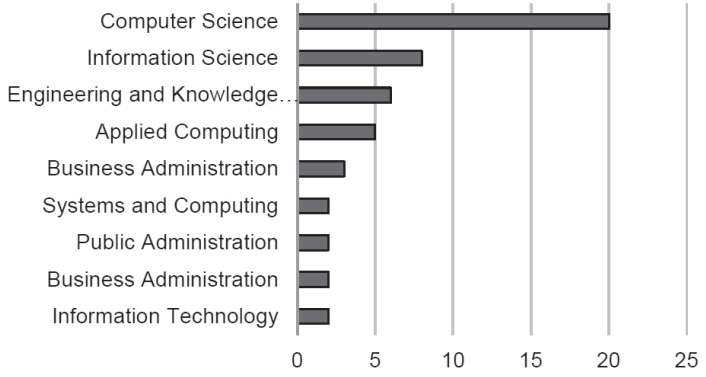

Figure 3. Number of scientific productions in relation to the area of knowledge. Source: Authors.

With regard to the examination of geographical regions and the domains of knowledge elucidated in the selected documents, it was ascertained that the South region exhibited the highest number of published documents, amounting to 24 in total. These documents predominantly pertained to the following areas: computer science, information science, and engineering and knowledge management. The Northeast region was the next to be examined, with 20 published documents falling into the following categories: computer science, information science, software engineering, systems and computing. The Southeast region had 18 documents published, with the

most frequent areas being: computer science, knowledge management and organization, public administration, and communication and semiotics. The Midwest region yielded four published documents, with the most frequent areas of focus being information science and computer science. In the North, one document was published in information science and one in computer science.

4.3. Period

The quantitative analysis of academic production by year used the "year of publication" field indicated in the BDTD. In the period between 2000 and 2022, with the exception of 2012 and 2018, there were publications in the area of computer science, with four publications in 2014, three publications in 2016 and 2021, two publications in 2019 and 2022, and one publication in 2000, 2015, 2017 and 2020. In the field of information science, two publications were released in 2019 and 2022, respectively, while one

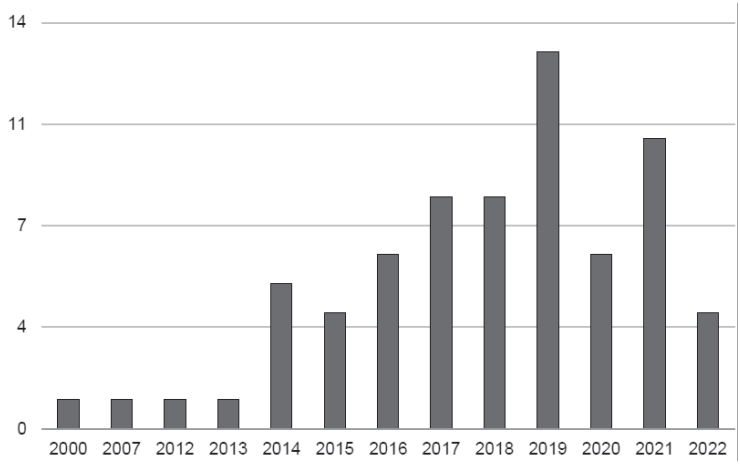

Figure 4. Number of scientific outputs per year. Source: Authors.

publication was released in 2012, 2015, 2016, and 2021. In the field of engineering and knowledge management, two publications were released in 2017 and 2021, respectively, while one publication was released in both 2018 and 2019. In the field of applied computing, two publications were released in 2016, while one publication was released in 2015, 2017, 2019, and 2021. Figure 4 illustrates the distribution of production by year and its frequency for all areas.

With regard to the analysis of scientific productions by year and the most frequent areas of knowledge in the selected documents, 13 publications were identified in 2019, of which two were in the areas: information science, computer science, and administration and one in the areas: engineering and knowledge management, applied computing, management of learning organizations, public health policies, public administration, technology and society, and public administration and government.

In 2021, 10 publications were identified in the areas of engineering and knowledge management, applied computing, information science, computer science, information technology, and agribusiness. In 2017 and 2018, eight publications were identified in each year. In 2017, two publications were identified in the area of engineering and knowledge management, and one publication was identified in the areas of computer science, applied computing, communication and semiotics, chemical engineering, Systems and Computing, and administration and business. In 2018, the following areas were covered in one publication: engineering and knowledge management, public management of the center of legal and economic sciences, intellectual property and technology transfer for innovation, biomedical engineering, administration, systems and computing, knowledge management and organization, and software engineering.

In relation to 2016 and 2020, six publications were identified, of which three were in the area of computer science, two in the area of applied computing, one in the area of information science, and one in the area of political science. In 2020, there was one publication in the following areas: computer science, computer science and computational mathematics, administration and business, university administration, and public management and international cooperation. In 2014, five publications were identified; four of the publications were in the field of computer science, while the remaining one was in public administration. In both 2015 and 2022, four publications were identified in each year. In 2015, one publication was identified in the areas of computer science, information science, applied computing, and computational knowledge modeling. In 2022, two publications were identified in the areas of computer science and information science.

With regard to the years 2000, 2007, 2012, and 2013, a single publication was identified in each year. In 2000, a single publication was identified in the field of computer science; in 2007, culture and information; in 2012, information science; and in 2013, social sciences. The three analyses conducted permitted the identification of the geographical distribution of the institutions associated with the academic productions on OGD, the areas of knowledge, and the year of publication for the 68 documents comprising the selected sample. It was observed that the most frequent areas of knowledge intersect with information science and are related to computing or administration. The number of publications, though not entirely consistent, demonstrates an upward trajectory in certain periods, including 2016, 2019, and 2021. With regard to geographic regions, the papers are distributed across all regions of the

country, with the South, Northeast, and Southeast regions standing out, with 24, 20, and 18 papers, respectively. Finally, it should be noted that this brief review has presented important quantitative results for the study of the subject in Brazil, comprising one of the artifacts of ongoing research that will be complemented by other analyses and in-depth discussions on the subject of GAD in information science.

5. CONCLUSIONS

This study permitted the preliminary examination of academic output on GAD in Brazil and its associated spaces and intersections with information science. This was achieved by mapping the geographical location, areas of knowledge, and period of publications on the subject. A sample of 68 documents pertaining to the subject matter was selected for analysis based on the survey conducted in BDTD in May 2023. The regions with the highest frequency of published works were the South (24) and the Northeast (20). The institutions with the highest frequency of published papers were UFSC (eight), UFRGS (six), and UFPE (five). The areas with the highest frequency of published papers were computer science (20), information science (eight), engineering and knowledge management (six), and applied computing (five).

The year with the highest frequency of academic publications was 2019 with a total of 13 publications: six in the areas: information science, computer science, and administration and one in the areas: engineering and knowledge management, applied computing, management of learning organizations, public health policies, public administration, technology and society, and public administration and government. It can be concluded that the areas of information

science and computer science account for the majority of published works. The regions that demonstrated a notable level of academic production were the South and Northeast. With regard to the frequency of publication over the years, the study indicated an uneven distribution, with some periods of increased output. The years with the highest concentration of publications were 2019 and 2021. In future studies, other analyses, in addition to the quantitative one, will complement the mapping of studies on GAD in Brazil.

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Heuristic analysis of the presence of information policies in open access legal databases in Brazil

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ABSTRACT
This study was conducted as part of the project entitled "Management of Scientific Information in the Context of Open Science," which was funded by the National Council for Scientific and Technological Development (CNPq). The objective of this study is to analyze the information policies of open access databases dedicated to the field of law in Brazil. The study's specific objectives are threefold: (a) to define the concept of information policy and its impact on the creation of a national open access database dedicated to the field of law, (b) to map the main databases in the field of law based on the recognition of their maintaining institutions, and (c) to describe the elements that make up the existing information policies in the databases analyzed in this research. The research employs an exploratory approach and a heuristic analysis based on an analytical tool. The results demonstrate the existence of these policies in the databases under examination, although not always explicitly. This, therefore, highlights the importance of this presence in order to consolidate information management in legal databases and to fulfill one of the principles of open science, namely transparency.

Keywords: information, policy, law database, information source, open science

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1. INTRODUCTION

The advent of digital information has had a profound impact on the manner in which knowledge is produced across a multitude of domains, including the social, scientific, and professional realms. The digital transformation has had an impact on even the most conservative fields, such as law. The objective of accelerating access to information through electronic sources is now a tangible reality across the entire spectrum of knowledge. It is evident that the humanities and social sciences encounter challenges when assessing their scientific output. This is due to the distinctive attributes of this literature, which restrict its inclusion in the international databases most pertinent to evaluations that consider citation indicators. However, this situation has evolved over time (Spera & Mugnaini, 2019). This change is gradual, and thus, the indexed international databases that generate bibliometric indicators do not reflect the scientific literature in areas such as law. This reinforces the need to create regional sources of information that encompass the fields of the humanities and social sciences in a more comprehensive and complete way. The recommendation to create regional citation indexes is not a new one; indeed, it was even made by one of the world's leading scholars on the subject, Garfield (1995).

Santin and Caregnato (2019) emphasized the significance of regional and national databases and indexes for the

assessment of peripheral science, with a particular focus on Latin America. The authors posit that, among other reasons, the "low representation of publications is certainly the main reason for creating local indexes in LA and other peripheral contexts." Regional citation indexes have already been established in countries such as Brazil, China, Korea, India, and Russia, with the Scientific Electronic Library Online (SciELO) serving as a notable example. Additionally, Latin America has another comprehensive database, Redalyc. Nevertheless, these initiatives are inadequate to ensure comprehensive coverage of scientific output in these countries. This research was conducted as part of the project "Management of Scientific Information in the Context of Open Science," funded by the National Council for Scientific and Technological Development (CNPq). One of the planned outcomes is the establishment of a research database in the field of law, initially planned for national coverage of literature in this area.

One of the initial stages in the planning process for the database was to identify and evaluate existing sources of information within this field, benchmarking their documentation and functionalities. In regard to the documentation required for the creation of a database, it is believed that information policies are essential for its planning and for guaranteeing the quality, reliability, and accessibility of the information available in these repositories, as well as regulating its use. Considering the problem presented so far, which shows that the coverage of scientific literature in regional and national databases, especially in the areas of humanities and social sciences, is scarce and lacks more effective and adequate evaluation mechanisms, the question is how are the information policies of open access databases dedicated to the field of law in Brazil characterized?

In order to respond to this question, the objective of this research is to analyze the information policies of open access databases dedicated to the field of law in Brazil. In order to achieve this, the following steps have been taken:

a. The concept of information policy has been defined, and its impact on the creation of a national open access database dedicated to the field of law has been recognized.
b. The main databases in the field of law have been mapped based on the recognition of their maintaining institutions.
c. The elements that make up the existing information policies in the databases analyzed in this research have been described.

The function of an information policy is to establish the legal and institutional framework for the formal exchange of information. Accordingly, an information policy addresses technical and bureaucratic political objectives (Caridad Sebastián et al., 2000). Information policies are designed to meet the needs of a diverse range of actors, including individuals, organizations, and machines, while also regulating access, use, transmission, and storage of information of varying types. Furthermore, information policies delineate the obligations of the various parties with respect to the proper management of the information they possess (Hill, 1995). Once the concept and purpose of information policies are understood, it can be stated that publishers, scientific journals, information systems, portals, and databases are some of the organizations and/or sources of information that should make information policies available in an objective, transparent, and accessible

way. Following this introduction, the literature review is presented, after which the methodological path is outlined. The results are then presented and discussed, and the work concludes with final considerations and a list of references.

2. LITERATURE REVIEW

The subject of information policy is a complex and multifaceted area, comprising a variety of concepts, definitions, and approaches. Lemos (1987) defines policy as a set of guidelines and principles that are based on generic and consensual foundations, directing actions toward specific objectives. This suggests that information policy is inherently linked to the principles that govern the acquisition, production, dissemination, and circulation of information in particular contexts. Caridad Sebastián et al. (2000) further develop this perspective by arguing that information policy aims to guarantee citizens' right to information, emphasizing the significance of clearly defined objectives as a fundamental aspect of formulating effective information policies. Similarly, González de Gómez (1999) posits that information policy introduces a systemic concept of a set of actions and decisions that shape society's information environment.

It should be noted that:

> an information policy, in its broadest form, can be defined as the set of actions and decisions aimed at preserving and reproducing, or changing and replacing an information regime, and can be either tacit or explicit, micro or macro policies, and in principle the locus of its manifestation would be the state and public policies (González de Gómez, 1999, p. 2).

It is, therefore, crucial to define what is meant by an information regime. González de Gómez (2002, p. 34) defines an information regime as

> […] a dominant mode of informational production in a social formation, according to which informational subjects, institutions, rules and authorities are defined, the preferred means and resources of information, the standards of excellence and organizational arrangements for its selective processing, its preservation and distribution devices.

In the view of Frohmann (1995), policies must be founded upon an information regime, which is defined as "more or less stable set of formal and informal networks in which information is generated, organized and transferred from different producers, through many different means, channels, and organizations, to different recipients or receivers of information." In light of the aforementioned concepts and the significance of establishing an information policy, the intricacy and importance of information policies on database websites become evident.

Delaia and Freire (2010, p. 109) posit that "the concept of Information Regime highlights components that contribute to the understanding of an Information Policy and to relations between and among communities and institutions with regard to information actions." As this research project is designed to examine information policies and subsequently identify optimal practices for formulating information policies for a particular information source, it is deemed pertinent to define information policy as "[…] the result of a process of developing rules, regulations or guidelines that affect the information cycle, encompassing processes related to the creation, production, distribution,

access and use of information" (Pasek, 2015, p. 298). It is, therefore, anticipated that national databases will encompass a range of policies, including those pertaining to indexing, privacy, information security, access to information, data, copyright, and ethics.

It is similarly crucial to situate information policies within the broader context of open science. If open science is conceived of "as a process, something under construction, which mobilizes different (and, in some respects, antagonistic) interests and points of view; and which also allows for multiple (and sometimes conflicting) interpretations," many important dimensions can be linked to this understanding (Albagli, 2015). Open science is regarded as a movement that promotes transparency and accessibility throughout the entire scientific process, from its inception to its dissemination. It can thus be surmised that the information policies of a scientific journal database, for instance, will provide transparency with regard to the guidelines and standards pertaining to information sources across a range of dimensions in accordance with the recommendations of open science. Furthermore, it is recommended that open access information sources, such as scientific journals and databases, establish an information policy focused on open science, for example, for the sharing of scientific research data. Furthermore, it is argued that "open science—as an international movement that has been advocating the openness of publications, research data, methodologies, software codes, among others—expands the possibility of innovation not only in scientific research, but also in the way science is communicated" (Shintaku & Sales, 2019, p. 13).

The UNESCO Recommendations on open science identify transparency, scrutiny, criticism, and reproducibility as

one of the fundamental principles that should be upheld in the scientific community. Accordingly, the recommendations state that:

> greater openness should be promoted at all stages of the scientific enterprise, with the aim of enhancing the power and rigor of scientific results, increasing the societal impact of science and expanding the capacity of society as a whole to solve complex and interconnected problems (UNESCO, 2022).

Therefore, "more openness leads to more transparency and trust in scientific information and reinforces the fundamental characteristic of science, as a distinct form of knowledge based on evidence and verified against reality, logic and the scrutiny of scientific peers" (UNESCO, 2022).

3. METHODOLOGY

This research was conducted using a mixed-methods approach, combining elements of exploratory research and heuristic analysis. Initially, data were collected by reviewing the literature and consulting relevant academic studies, which provided an understanding of the context of law databases in Brazil. Additionally, an analysis protocol was developed to guide the heuristic experience during interaction with the databases' web pages. The protocol included the following variables:

- Database maintainer: Identification of the entity or institution responsible for maintaining the database.
- Country of origin: Identification of the country where the database is based.
- Area of concentration: Identification of the specific area of law to which the database is dedicated.

- Policies: Analysis of the policies present on the databases' web pages.
- Licensing: Evaluation of information related to content licensing.

The sample for the research experiment consisted of seven legal databases, selected on the basis of their institutional relevance in the area. This criterion was applied in order to ensure that the databases included in the sample play a significant role in the production and dissemination of legal information in Brazil. Furthermore, the selection was based on the criterion of open access databases, reflecting a commitment to transparency and the availability of information. Furthermore, it was resolved that the databases should encompass disparate spheres of the Brazilian legal system, including the legislature, the judiciary, and the Public Prosecutor's Office. This ensures a more comprehensive view of information policies across diverse legal domains. Additionally, the databases should offer a multifaceted content array, encompassing legislation, case law, legislative documents, opinions, and other pertinent materials. This facilitates a nuanced examination of information policies across various legal documents. Furthermore, the databases are digital and allow online access and heuristic analysis, which aligns with the theme of information management in the context of open science. Consequently, all the selected databases are maintained by Brazilian federal authorities and are representative of the national legal context, providing information relevant to the entire country.

Of the databases selected, three are maintained by the Federal Senate, which is one of Brazil's foremost federal institutions in the legislative domain. This deliberate choice of databases maintained by specific institutions

underscores the importance of institutional and federal relevance, offering a more precise and focused approach to the examination of information policies in legal databases in Brazil (Table 1).

Table 1. Sample of digital databases from the law domain of this research.

LAW DATABASES
Digital Library of the Chamber of Deputies
Library of the Higher School of the Public Prosecutor's Office of the Union
LexML Brazil
RVBI
Federal Senate Digital Library
BDJur—Superior Court of Justice
Federal Supreme Court

Source: Author.

The heuristic analysis was conducted by navigating the web pages of the databases in accordance with the established protocol. During the analysis, the policies present in the databases were identified. In addition, the level of information maturity was determined, which may indicate the degree of definition, clarity, and accessibility of these policies. This methodology permitted an in-depth analysis of the information policies in law databases in Brazil, emphasizing the significance of the presence of these policies for the effective management of information on these platforms, in accordance with the objectives of the "Management of Scientific Information in the Context of Open Science" project.

4. RESULTS

The research experiment included a sample of seven databases, selected for their relevance in the field and for being open access. All of the databases are maintained by Brazilian federal government institutions, with three of them being maintained by the Federal Senate (Figure 1).

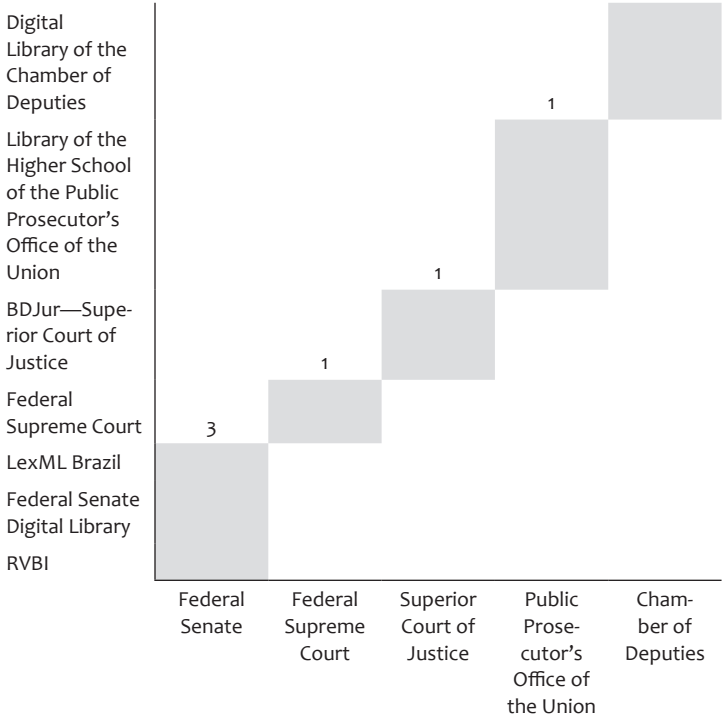

Figure 1. Maintaining institutions of the digital databases of this research. Source: Author.

A review of the digital databases revealed that the majority of the databases listed are focused on the area of law. However, three databases cover areas other than law, including public administration, political science, political

history, economics, public budgeting, and humanities and social sciences (Figure 2).

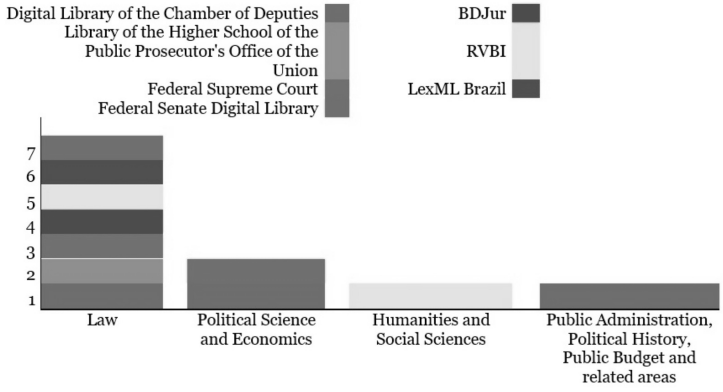

Figure 2. Areas of knowledge of the digital databases in this research. Source: Author.

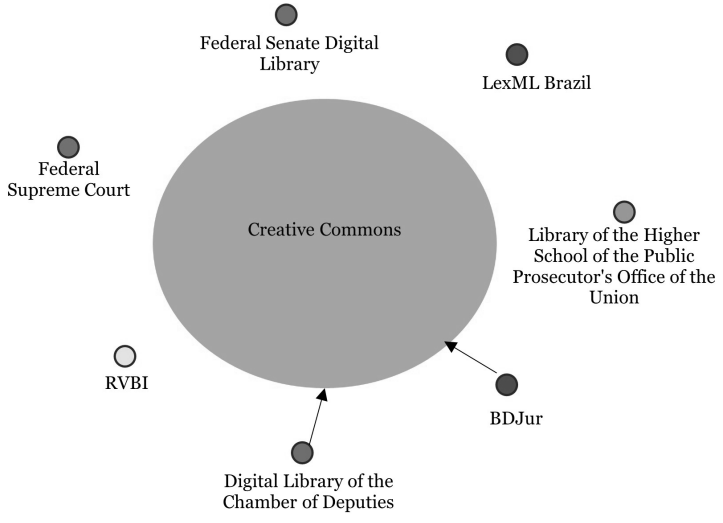

Figure 3. Licensing and licenses for the use of the digital databases in this research. Source: Author.

The investigation into the licensing of the digital databases revealed that BDJur—Superior Court of Justice and the Digital Library of the Chamber of Deputies employ Creative Commons licenses, whereas the remaining databases lack explicit information regarding their licensing terms (Figure 3).

The results indicate that information policies and practices vary between the different digital databases. Some demonstrate a comprehensive approach, with explicit policies and practices in areas such as indexing, privacy, information security, and digital preservation. In contrast, others have explicit policies, mainly related to access control and copyright (Figure 4).

5. DISCUSSION

The diversity of information policies identified underscores the urgent necessity for enhanced clarity and transparency in the governance of information within legal databases. This variability indicates the necessity for a more standardized methodology for the formulation and dissemination of information policies within the country's legal databases. Furthermore, it emphasizes the necessity of clearly defining and disseminating these policies as a means of safeguarding rights and demonstrating accountability. The absence of transparent information regarding the utilization of licensing policies employed by legal databases may result in ambiguity surrounding the permissions for data usage and sharing. This could potentially limit the scope and impact of legal research. It is thus incumbent upon the custodians of these databases to accord due attention to the pivotal role of information policies in facilitating effective data sharing and research, thereby contributing to the dissemination of open science knowledge in the legal domain.

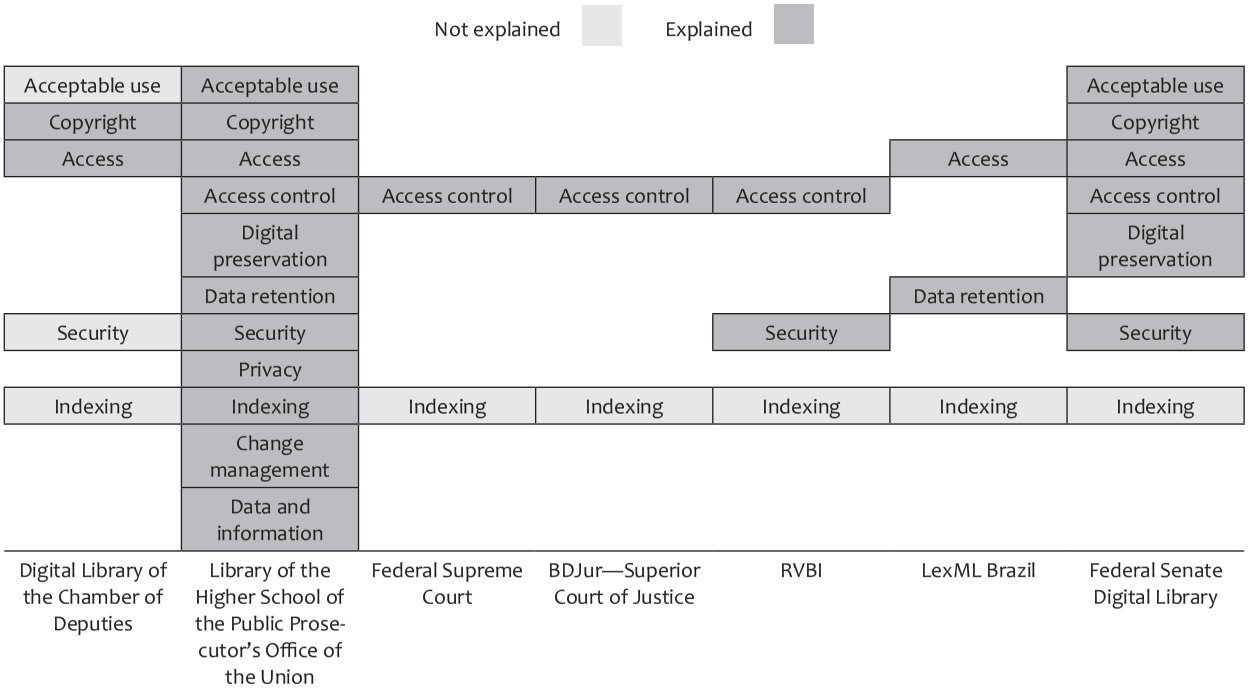

Figure 4. Information policies and practices in the digital databases of this research. Source: Author.

It is acknowledged that the research is constrained by certain limitations, either due to its exploratory nature or the analysis of a limited number of databases. This approach was selected in view of the scope of the project to which the research is linked, with these limitations viewed as potential avenues for future investigation.

The overarching objective of this research project was successfully achieved through the attainment of the project's specific objectives. The literature review facilitated the identification of the concept of information policy, particularly in the context of this research. Objective (b), which involved mapping the principal databases in the field of law based on the recognition of their maintaining institutions, was also met. For the purposes of this research, seven of these databases were analyzed. Ultimately, the preceding two sections enabled the fulfillment of objective (c), namely the delineation of the constituent elements of the information policies observed in the databases subjected to analysis in the course of this research. The policies of the Library of the Higher School of the Public Prosecutor's Office of the Union were found to be the most comprehensive, with those of the Federal Senate Digital Library representing a close second. The review of information policies in Brazilian law databases reveals a notable absence of this crucial instrument for regulating access, use, organization, and administration of these sources of information. The results also indicate a gap that can be addressed by the teams responsible for maintaining these databases, underscoring the importance of developing a comprehensive normative instrument for the database that will be created as part of the research project to which this research is linked. One of the limitations of this study is the analysis of a sample selected for this research. This limitation

could be addressed by evaluating other relevant databases. Furthermore, future research could include proposing an information policy model for national databases, as well as other more in-depth analyses of the policies identified in this research.

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Open access in addictions, associated data, and collaboration between countries

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ABSTRACT
Open access (OA) publications and the publication of associated data represent fundamental pillars of open science. The existence or absence of OA and the type of access available may be contingent upon the presence or absence of associated data. The two policies of scientific production may be of interest for advancing knowledge in the field of addictions due to their significant social and health impact. This study aims to ascertain how the publication patterns of articles on addictions have evolved over the past two decades, to determine the relationship between these patterns and the presence of associated data, and to investigate whether cross-country collaboration varies depending on whether the articles are published in OA journals. In order to conduct this study, a comprehensive search was conducted using the Web of Science Core Collection database, with the objective of retrieving all articles related to addiction. Additionally, the PubMed database was consulted in order to ascertain the presence of associated data. The total number of articles published during the period between 2003 and 2022 is 67,027. Of these, 51% were published in OA journals, with the "green accepted" and "green published" routes being the most frequent. However, these routes have declined over time, with a shift towards the "gold" and "gold-hybrid" routes. The "green accepted" and "free to read" models exhibit the highest percentage of articles with associated data. Nevertheless, the different types of access, OA or non-OA, are inconsequential for a higher percentage of papers with associated data. The data indicate that there is no discernible difference between the countries' collaborative efforts based on the publication status, with the United States exhibiting the highest level of involvement in both OA and non-OA contexts.

Keywords: addiction, open access, international collaboration

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1. INTRODUCTION

The advent of open science has given rise to a number of controversies within the field of addiction research, primarily due to its implications for public policy (Monaghan, 2011). Nevertheless, it presents a promising avenue for future research (Scheibein et al., 2022). These open science practices include, among others, the registration of projects, the use of open data, open access (OA) to publications, quality control, reproducibility, control of sessions in publications, and the allowance of a thorough examination of the evidence transferred (Louderback et al., 2023; Munafò & West, 2020). Additionally, open science has been considered an accelerator of research (Woelfle et al., 2011). Similarly, open science and access to gambling and associated problems have resulted in increased citations (Louderback et al., 2023). In the field of addiction research, open science is gradually being addressed (Scheibein et al., 2022). The necessity for its immediate implementation in studies examining novel consumption patterns, such as those related to electronic cigarettes, has been emphasized (Munafò & West, 2020). In this vein, the journal *Addiction* has permitted authors to participate in the Open Science badge program of the Center for Open Science since 2018 (Addiction endorses the Open Science badge scheme, 2022). A study conducted in 2020 on the

practice of data sharing in randomized clinical trials in the field of addiction revealed that none of the trials had shared their data (Vassar et al., 2020). Additionally, a separate study demonstrated that only 4.7% of addiction articles indexed in PubMed Central contained supplementary material (Vidal-Infer et al., 2019).

One of the earliest actions in the field of open science was the implementation of the OA policy for journals and articles in the SciELO (Scientific Electronic Library Online) project in 1998. This was subsequently followed by a series of declarations on the subject, including the Budapest Open Access Initiative Declaration (BOAI, 2002), the Bethesda Declaration on Open Access Publishing, and the Berlin Declaration on Open Access (2003). A second action in open science, which has been prioritized in international funding policies for research projects, has been the importance of open data. The term "open data" emerged in 1995 in a U.S. agency report on geophysical and environmental data dissemination (Connor, 2023).

The definition of OA in relation to published works encompasses a number of established routes (green, gold, bronze, diamond), the most prevalent of which are "green" (self-archiving in an institutional or thematic repository) and "gold" (institutions or funding agencies remunerate publishing companies for the publication of their articles). The Web of Science (WoS) database employs a different classification system, ranging from "gold" to "green submitted" publications. It is possible for the same scientific work to be included in different types of OA. With regard to open data, it is evident that the goal of ensuring the availability of all open data has not yet been met. Nevertheless, data associated with publications can accommodate various formats, including open data (Sixto-Costoya

et al., 2022). It is hypothesized that articles disseminated through more open-access channels have a greater availability of associated data and that there are differences in the collaborative networks between countries when they publish or not in OA. The objective is to analyze the evolution and determine if there is a correlation between the OA routes of articles on addictions from 2003 to 2022 and the existence of associated data or if there are differences in the collaboration networks.

2. METHODOLOGY

The databases utilized in this study were the WoS Core Collection and PubMed. The WoS was employed to identify pertinent articles on substance abuse, while the PubMed database was utilized to retrieve papers with associated data according to the access type designated by WoS. The inclusion criteria were as follows:

- The document type was limited to articles.
- The articles were published between 2003 and 2022.

The articles were included in the thematic category "substance abuse" of the WoS.

The search was conducted on October 10, 2023. The OA typologies assigned to each article were obtained from WoS: gold (gold or gold-hybrid), free to read, and green (published, accepted, or submitted), as well as the authors' countries of affiliation. Subsequently, a PubMed search was conducted using the PubMed identification number (PMID) of the retrieved articles. This allowed us to determine whether the articles had associated data according to the type of access contemplated in the WoS. The data analysis involved calculating the frequencies of each of the

OA typologies and the presence of associated data. The VOSviewer program was used to represent the visual representation of collaboration between countries.

3. RESULTS

3.1. Open Access

The total number of articles published between the years 2003 and 2022 is 67,027. Of these, 34,201 (51%) are in the OA category. Figure 1 illustrates the evolution of the articles according to whether or not they are published in OA journals. It demonstrates that OA articles began to predominate in 2009, and since then, they have accounted for between 50% and 60% of the total number of articles.

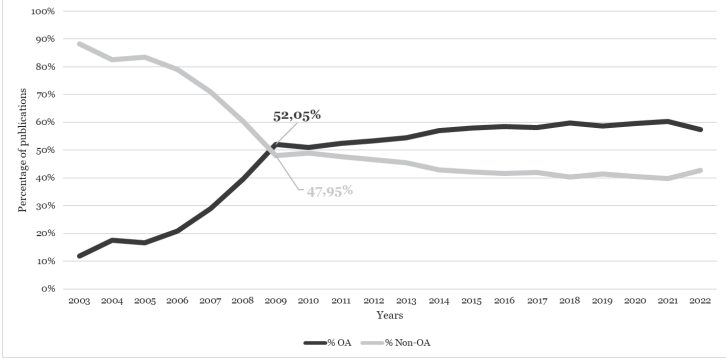

Figure 1. Evolution of articles according to whether they are published in OA or non-OA.

The most prevalent OA typologies are "green accepted" (57% of the articles) and "green published" (33.6% of the articles). The remaining typologies are present in 12% of the articles, and an article can be assigned to multiple types of access. Figure 2 illustrates the evolution of the articles according to OA typology, demonstrating that the "gold"

and "gold-hybrid" typologies have exhibited a gradual increase over the two decades, while the "green accepted" typology has demonstrated a decline.

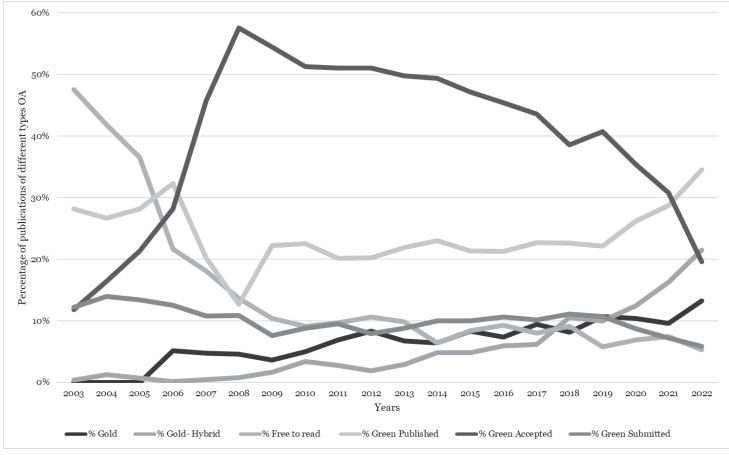

Figure 2. Annual evolution of OA publications according to the different types of OA.

Figure 3. Map of countries with OA percentage of their articles above 23%.

The countries with more than 100 articles and the highest percentage of OA publications are Ukraine, Lebanon, Vietnam, and South Africa. The United States is in the 10th position (Figure 3).

3.2. According to the Access Model

As illustrated in Figure 4, the evolution of the percentage of publications that have associated data according to PubMed exhibited a notable surge in 2012, followed by a decline in 2015 and a subsequent rise in all OA models sustained until 2018, after which a decline was observed. The "green accepted" and "free to read" models exhibit the highest percentage of articles with associated data. No discernible differences are observed in the percentage of related data according to whether the articles have been published in OA.

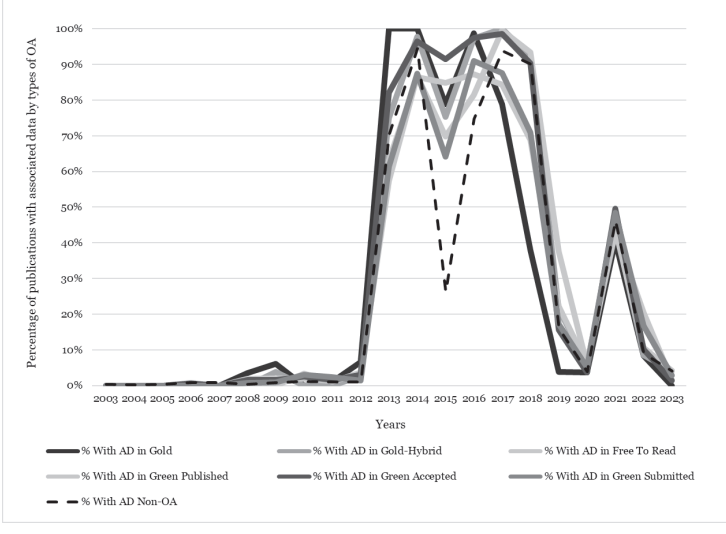

Figure 4. Evolution of the presence of associated data according to type of access.

3.3. Cross-Country Collaboration Networks for Open Access Articles

Figure 5 illustrates the collaborative network of countries that have published articles in OA journals. The United States occupies the first position, with 23,980 published papers and collaborates with 131 countries. Among these, Canada ($n_{\text{Link Strength}} = 919$), Australia ($n_{\text{Link Strength}} = 653$), England ($n_{\text{Link Strength}} = 634$), and China ($n_{\text{Link Strength}} = 344$) stand out as particularly prominent partners. England occupies the second position, with 3,226 published papers and 78 countries with which it is linked, primarily Australia ($n_{\text{Link Strength}} = 501$) and Canada ($n_{\text{Link Strength}} = 310$). Canada is in third position, with 2,406 papers and 87 countries with which it is linked. Australia is in fourth position, with 636 publications and 85 countries with which it is linked overall.

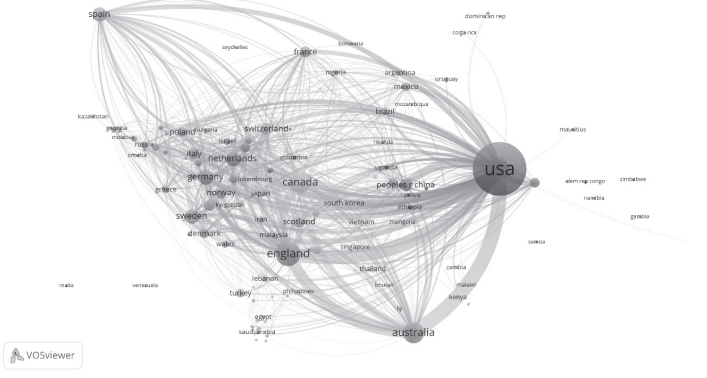

Figure 5. Collaborative networks of countries in OA publications.

3.4. Cross-Country Collaboration Networks for Non-Open Access Articles

Figure 6 presents a visualization of the collaboration between countries for non-OA publications. The United

States occupies the top position in terms of the number of published papers, with 15,723, and has collaborated with 125 countries. Among these, Canada ($n_{\text{Link Strength}}$ = 502), Australia ($n_{\text{Link Strength}}$ = 358), China ($n_{\text{Link Strength}}$ = 257), and England ($n_{\text{Link Strength}}$ = 210) stand out as particularly prominent partners. Australia is in second place, with 3,393 published papers linked to 79 countries, including England ($n_{\text{Link Strength}}$ = 223), Canada ($n_{\text{Link Strength}}$ = 179), and New Zealand ($n_{\text{Link Strength}}$ = 552). Canada occupies the third position, with 2,766 published documents and 78 countries with which it is linked, particularly Germany ($n_{\text{Link Strength}}$ = 124) and England ($n_{\text{Link Strength}}$ = 92). England is in fourth position, with 2,194 published documents and 64 countries with which it is linked, especially Scotland ($n_{\text{Link Strength}}$ = 117) and Italy ($n_{\text{Link Strength}}$ = 93).

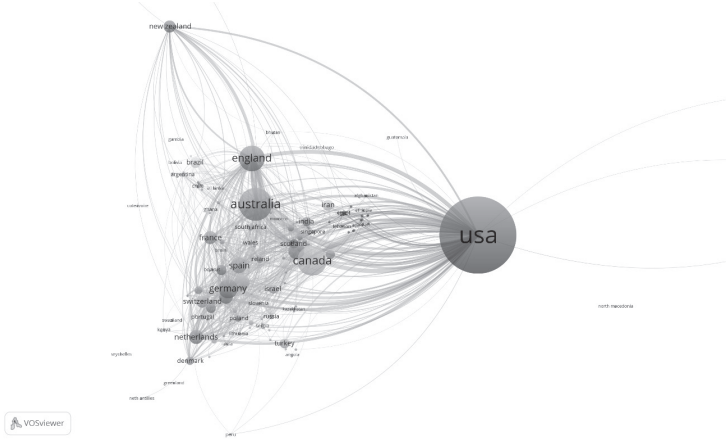

Figure 6. Collaborative networks of countries in non-OA publications.

4. CONCLUSION

This study demonstrates that OA publications in the field of addictions have been on the rise over time, a trend that is

also evident in the broader landscape of scientific research. The implementation of the various forms of OA has not been significantly correlated with an increased presence of associated data. The proportion of articles with associated data in those non-OA is comparable to other access routes. The study demonstrates that a considerable number of papers in the field of addiction continue to be published without OA. Consequently, it would be prudent to maintain the implementation of public policies that promote OA publication and the presentation of raw research data as associated data. In contrast, the examination of the associated data indicates that PubMed may be experiencing difficulties in accurately allocating associated data due to the fluctuations observed in certain years, such as in 2015 and 2019. Consequently, the data presented in the study should be interpreted with caution. It is noteworthy that the United States occupies a central position within the collaborative networks of publications, irrespective of whether they are in OA. This may be attributed to the Anglo-Saxon bias inherent in the database utilized. Furthermore, while the United States ranks first in terms of the production of OA articles, it currently occupies 10th position with regard to the percentage of OA articles in relation to its total production.

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Conflict of interest

The authors declare that there is no conflict of interest.

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Legislative information on Brazilian women's rights in the making: How to organize according to the 2030 Agenda

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ABSTRACT

The article presents a theoretical, methodological, and practical framework for the study of legislative information pertaining to the representation and organization of Brazilian women's rights in a state of flux. The objective is to present a categorization system that can be used to classify legislative proposals currently being considered by the Chamber of Deputies, which pertain to women's rights under construction. This will demonstrate legislative progress or setbacks in relation to the 2030 Agenda, in particular Sustainable Development Goal 5 (SDG 5) and its targets. The methodology establishes arguments and structures actions that facilitate the design of applied research projects within the field of information science. A bibliographic approach is employed to construct the fundamental theory, while exploratory research and a qualitative methodology are utilized to generate categories and explanatory notes. These are based on the tenets of the knowledge organization and in alignment with the assertions set forth in the 2030 Agenda. The guiding thematic units are based on a quantitative analysis of the subjects found in the legislative data and metadata of 1,041 legislative proposals initiated and underway in the 56th Legislature (2019–2023). Consequently, 12 categories were devised. It can be concluded that the creation of a categorization for Brazilian legislative proposals on the rights of Brazilian women under construction, with a view to the 2030 Agenda, addresses the necessity for legislative information on women's development. Furthermore, it reveals the necessity for public policies and transparency of information in order to gauge the intentions and attention of the Brazilian Parliament and to meet the goals of the SDGs.

Keywords: categorization, Agenda 2030, legislative information, women's rights in the making, information science

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1. INTRODUCTION

The legislative information that coordinates and represents the legislative proposals currently under consideration in the Brazilian Parliament with regard to the rights of Brazilian women lacks records of the specific goal and/or Sustainable Development Goal (SDG) to which it contributes. In light of the aforementioned circumstances, the question arises: How can society find out about the effectiveness of the legislative proposals underway in the Chamber of Deputies, which address the rights under construction of Brazilian women, in relation to achieving the goals of the SDGs of the 2030 Agenda? In order to address this question, the overarching objective of this research is to present a categorization system for the classification of legislative proposals currently being processed in the Chamber of Deputies that pertain to the advancement of women's rights. This system will demonstrate the extent to which legislative progress is being made towards achieving the 2030 Agenda, particularly SDG 5 and its nine goals aimed at achieving gender equality and empowering all women and girls. The rationale for employing an applied feminist research approach in this study is to ascertain the extent to which the legislative branch is contributing to the construction of future laws and public policies that promote the sustainability of Brazilian women.

It is of significant importance to be aware that Brazil is one of the 193 countries that has pledged its commitment to the document, "Transforming Our World: The 2030 Agenda for Sustainable Development," an instructive global plan that presents, among other things, equitable parameters for a prosperous future for women, under the motto "Leave no one behind." The 2030 Agenda, as it is known, presents 17 SDGs and 169 targets that must be met by the year 2030 (United Nations, 2015). It is, therefore, evident that measures and efforts are required to create legal and administrative structures that promote regulations and public policies to ensure compliance with and monitoring of gender equality. However, it is notable that the instructive documents of the information policies adopted by the Chamber of Deputies do not present any procedure for identifying legislative proposals in relation to the 2030 Agenda. In this study, we turn to the field of information science, which is due to its interdisciplinary nature; multiple insertions, interactions, and interfaces; relationship with the knowledge organization (KO); and social and human dimensions.

2. ORGANIZING KNOWLEDGE TO MAKE WOMEN'S VULNERABILITY VISIBLE

Theoretical and methodological foundations indicate that KO is a new scientific discipline. It offers a significant contribution to the establishment and ordering of our conceptual world (Dahlberg, 2006). Additionally, it encompasses activities such as description, indexing, and classification of documents. There are various historical and theoretical approaches that relate to different views of knowledge, cognition, language, and social organization (Hjørland, 2008). As a field of study, KO is recognized for its role

in understanding the nature and quality of organizational processes, as well as the KO systems used to structure documents and document representations and concepts. Schneider (2013, p. 63) warns that KO "reveals its decisive strategic character, both in the cooperation and conflict that permeate the political game, given the key role of information in power disputes, which includes adequate knowledge of the forces in dispute […]."

Furthermore, Miranda (1999) delineates KO as the study of resources and instruments for identifying, extracting, and describing information recorded in documents. This is based on an analysis of their content or mode of production, with the objective of classifying and ordering them in a manner that enables the most effective and satisfactory retrieval, taking into account user demands. Despite the objective and neutral intent of classification and categorization in KO, the schemes they represent are historically and culturally conditioned. They reflect social, political, and religious thinking, as well as the state of scientific evolution and the mentalities of information professionals of their time (González Casanova, 1996; Shera, 1961).

In KO, subjects are organized through a formal categorization of concepts that encompass objects, phenomena, processes, properties, and relationships that are important in the formation and combination of concept systems (Dahlberg, 1978). However, Smith and Medin (1981) propose a classic model in their book, "Categories and Concepts," which suggests that items can be grouped in innumerable ways to form categories. Furthermore, they posit that individuals can learn to identify or construct these categories in accordance with their cultural norms, as there are no inherent limitations in the world or in our

nervous system that dictate the manner in which we categorize our observations. In the view of Smith and Medin (1981), categories are characterized by defining or critical attributes, which are shared by all members of a category and not by non-members. There is no overlap between members and non-members, and the extent of a category (which items are members) is determined by the intent (or set of attributes) in question.

This method is employed for the purpose of establishing bottom-up groupings, that is, from the perspective of the object's meaning within its cultural context. This is achieved through a process of constant grouping by similarity, which ultimately leads to the formation of a broader category. Accordingly, the notion of an internal structure within a category, whereby some items are regarded as superior to others, is untenable (Smith & Medin, 1981). In this vein, from the perspective of a flexible organization, Olson (1998, 2007) asserts that KO studies should be based on values oriented towards a critical and flexible cataloging of women's issues and suggests an alternative model. This approach rejects the notion of a universal model and accepts the idea of a singular concept of truth. It also emphasizes network relationships, eschewing the traditional pyramidal hierarchy in favor of a web-like structure. Furthermore, it considers the contextual situation and experience, involves knowledgeable communities, and recognizes power as a factor in knowledge.

It is widely acknowledged that institutions adopt distinctive forms of organization, representation, and management in order to adapt to their respective missions. However, the flows required to meet user needs and sociocultural demands are not always clearly defined (Cordovil & Francelin, 2022). From this perspective, Spivak

(2010) challenges the assumption that the mere production of information equates to knowledge and access. In her interventionist, engaged, and contesting writing, the author presents an alternative model for the organization of information related to the act of producing knowledge for women who lack power and a voice, drawing on appropriate ideals to inform this approach. Those whose voices are not heard belong to the lower classes, the so-called subaltern. They are excluded from markets, political and legal representation, and even from the possibility of membership in the dominant social stratum. For the author, speaking on behalf of the other inevitably encounters hegemonic discourses. Even when a discourse of resistance is constructed, it is challenging to create a space for the subaltern to speak and be heard. This is particularly evident in the context of women, given the inherent complexities of gender issues and the subalternity of women (Spivak, 2010).

The act of speaking on behalf of women does not inherently entail the provision of a voice or the act of making their wishes heard. In the production of knowledge, the woman-subaltern is reflected in discourses that do not belong to her intellectually, as well as narratives that are not accessible to her within her obliterated world. Spivak (2010) acknowledges her complicity in the unease of representing the other as an object of knowledge. However, she seeks to engage with a productive space that allows her to challenge the very foundations of her theoretical approach. In light of Spivak's (2010) critique of academic theoretical productions that seek to speak for and/or represent the dilemmas of the subaltern, it becomes evident that KO, in addition to its theoretical approaches, also allows for the utilization of its theories for creative praxis. This may

be exemplified by the formulation of a thematic–interpretative categorization that can structure data in an information system motivated by women's vulnerabilities and needs, with a view to analyzing the degree of relevance of the proposals in relation to the goals of the 2030 Agenda.

Olson (1998) draws upon the conceptual framework established by Catharine Stimpson to develop a framework of four assumptions that define the field of women's studies. (1) The study of women is a field of inquiry that is worthy of attention in its own right; (2) sexism is a pervasive phenomenon; (3) our models of the world require reexamination; and (4) issues of sexual difference must be addressed. First, acknowledging the intrinsic value of studying women establishes the legitimacy of examining a group and a set of topics that are commonly marginalized. The realization that women are valued members of information user populations indicates the importance of works about and for women as sources of appropriate access. The second assumption is that the existence of sexism demonstrates the impossibility of achieving neutrality in practice. Rather, the prejudices that inform our actions are constructed by social discourses, including the pervasive sexism that characterizes our society (Olson, 1998). Consequently, the third assumption requires us to question the ontological and epistemological assumptions of our systems in their imposition of metanarratives and the privileges of hierarchy that are based on the tacit assumption that there is a singular reality and that people come to know it by universally definable means (Olson, 1998). The fourth assumption, which recognizes the necessity of addressing issues of sexual difference, challenges the assumption that equal treatment will necessarily produce equitable results. There is a need to contextualize women's

issues in order to replace misguided attempts at objectivity, which consist of using the same approach for all topics and materials (Olson, 1998).

It is, therefore, essential to undertake the classification of people, objects, texts, documents, events, and ideas when there is a need to gain an understanding of the specific characteristics that define these groups. Vignaux (2000, p. 10) posits that "society is no longer seen as a whole. [...] we have to classify, subdivide, hierarchize and decompose it, as if we were always looking for labels, in order to try to understand something." Souza (2006, p. 29) defines the process of classification as "a middle process that develops based on two basic references: the nature of the information—the object of classification, and the specific characteristics and needs of the user community in relation to the ultimate purpose of using the information […]." Langridge (1977, p. 11) highlights the attention to "the fact that most people do not realize how much classifying is merely an indication of the fundamental nature of the process of classification." The fact is that "we constantly seek to classify things in order to name them, and we seek to name them in order to categorize" (Vignaux, 2000, p. 18).

The classification of documents enables the separation of documents into groups in order to identify their subject or theme. This process is based on the fundamental principles of indexing, which utilize terms to represent the text thematically. Thematic classification serves as the primary means of accessing a document, as the user seeking information can retrieve it by searching for the subject in the catalog. Lancaster (2004, p. 27) posits that the factors influencing the performance of an information retrieval system are the indexing policy and the accuracy of the

indexing. ABNT Standard 12676 delineates the indexing process as comprising three stages, which are not mutually exclusive but rather tend to overlap: "(a) examining the document and establishing the subject of its content; (b) identifying the concepts present in the subject; (c) translating these concepts into the terms of an indexing language" (ABNT, 1992, p. 2). Lancaster (2004) posits that indexing involves two stages: conceptual analysis and translation. This view is corroborated by Fujita (2012), who refers to the two stages of the indexing process as the same:

a. Analysis of the subject: determination of intrinsic thematicity (representation by concepts of the most significant subject of the content considering the author), identification of concepts (conceptual indexing), concept selection, and determination of extrinsic thematicity (representation of the most significant subject considering the user reader).
b. Translation: translation of the terms into documentary language (Fujita, 2012, p. 43).

The process of indexing is an intermediary process that is contingent upon the completion of other processes. In other words, the implementation of an indexing process requires the establishment of an information policy, which serves to ensure the operational conditions and, consequently, access to the subject for searches. Accordingly, Lancaster (2004, p. 1) asserts that "[...] indexing processes identify the subject matter of the document […]" and "[...] involve preparing a representation of the content" (Lancaster, 2004, p. 6). Furthermore, the author posits that "subject indexing is usually done with a view to meeting the needs of a particular clientele—the users of

an information center or a specific publication" (Lancaster, 2004, p. 9). In this context, an indexing policy is constituted by a set of procedures, materials, standards, and techniques, which are informed by decisions that reflect the practice and theoretical principles of the organizational culture of an information system (Fujita, 2012). Thus,

> […] indexing is not an end in itself. 'Good indexing' is defined very pragmatically as indexing that allows items to be retrieved from a database during searches for which they are useful answers, and that prevents them from being retrieved when they are not useful answers. (Lancaster, 2004, p. 83)

As Foskett (1973, p. 45) notes, "the indexer must be careful not to introduce unnecessary bias and the user must be warned of its possible existence." This suggests that indexing and information retrieval are inextricably linked processes, with the former directly influencing the latter. Consequently, to evaluate indexing, one can consider the elements that condition its results in information retrieval.

3. METHODOLOGY

The methodology presents a structured approach to research, delineating the rationale and methodology behind the actions taken. This approach is designed to facilitate the idealization of applied research. A bibliographic approach is employed to construct the fundamental theory, while exploratory research and a qualitative methodology are utilized to generate categories and explanatory notes. These are based on the tenets of the KO and in accordance with the statements set forth in the SDGs and associated targets of the 2030 Agenda. The resulting categorization

represents a critical, functional, and flexible classification. The creation of categories in alignment with the 2030 Agenda serves to mitigate the potential for informational injustices (Viola & Sales, 2022) pertaining to the data and metadata of legislative proposals. This, in turn, facilitates a more comprehensive and systematic organization of information, thereby enhancing the accuracy and comprehensiveness of knowledge regarding the needs of women. The categories allow for the effective representation and organization of legislative data and metadata, with clear reference attributions that demonstrate Parliament's intentions to achieve the 17 SDGs with regard to women's rights and vulnerabilities (Figure 1).

Figure 1. The 17 SDGs of the 2030 Agenda. Source: United Nations Brazil (2023).

In between, the teachings of Jacob (1991, 2004) are referenced, which highlight the distinction between classification and categorization. The process for flexible categorization with cognitive properties is also indicated. The author elucidates that classification and categorization

systems are mechanisms that establish order through the grouping of related phenomena and that fundamental differences between them influence the manner in which this order is achieved. The traditional approach to classification is characterized by a high degree of rigidity, whereby an entity is either classified as a member of a given class or excluded from it. Conversely, the categorization process is flexible and creative, forming non-binding associations between entities. These associations are not based on a set of predetermined principles; rather, they are the result of the simple recognition of similarities that exist between a set of entities. Categorization divides the world of experience into groups or categories whose members have some immediate similarity within a given context. The composition of the category may be influenced by variation in context. This fact is the basis for both the flexibility and the power of cognitive categorization (Jacob, 1991, 2004).

In the search for parameters for this categorization, we added the foundations laid down by Schütz (1970) for the creation of categories based on three types of the conception of relevance (motivational, thematic, and interpretive) in the cognitive context of the world of life. This world adds specificities to the various vulnerabilities encountered by women in their daily lives in search of equity and rights. The model created and developed by Schütz (1970) allows for new applications, such as the one below, to be created. This is used to create a functional, critical, and flexible categorization of legislative proposals in progress on the rights of Brazilian women, which is associated with information retrieval. This is in line with the goals of the SDGs of the 2030 Agenda.

In order to achieve this objective, the categorization system is designed to prioritize the three types of relevance

that are essential for the advancement of women's sustainable development. The initial category is that of motivational relevance, which is determined by the interests inherent in the goals and interconnections of the SDGs of the 2030 Agenda. This category is particularly pertinent in situations where the three dimensions of sustainable development—economic, social, and environmental—are blended in a balanced way to achieve gender equality and empower all women and girls. The aforementioned elements serve to define the relevance of the categorization in light of its stated purposes. The principle of motivational relevance is demonstrated to operate effectively in the selected volitional situation. The second type is based on thematic relevance. This type will determine the elements that define the problem in a given situation due to specific interests. The metadata, comprising index terms and terms included in the amendments, constitute the pertinent thematic units for classification into the categories established. The third type is interpretative relevance, which builds upon the second type by recognizing the problem (e.g., how are legislative proposals dealing with the rights of Brazilian women classified with a view to achieving the goals of the SDGs of the 2030 Agenda?). It should be noted that the formulation—categorization—as such requires interpretation. From the interpretative relevance, it is possible to verify the need for explanatory notes of the categorization to define which goals and objectives each category refers to.

This paper presents a proposal for the creation of categories using a bottom-up method of categorization. This method is based on the goals and SDGs of the 2030 Agenda and forms non-hierarchical, flexible, functional, and critical groupings. The aim is to meet the real needs

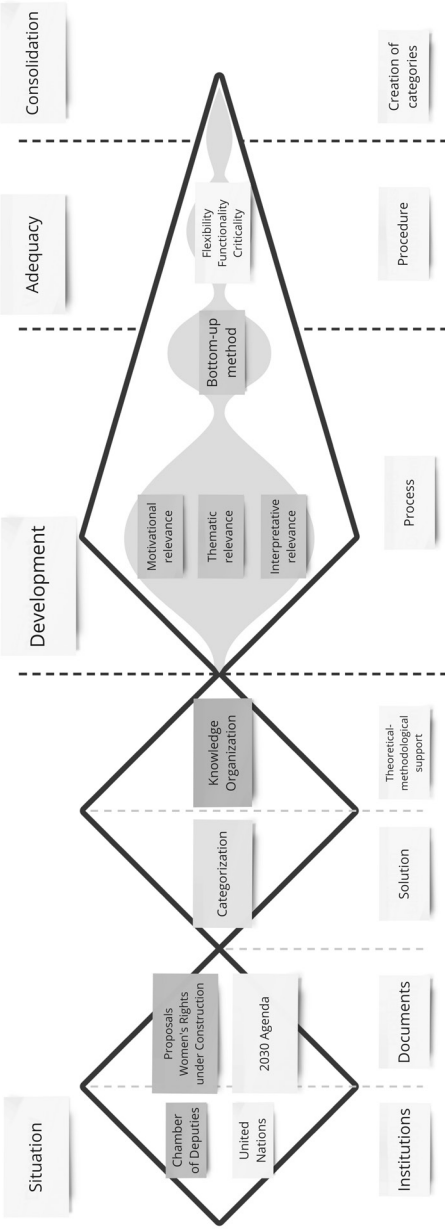

Figure 2. Situation, development, adequacy, and consolidation of the creation of categories. Adapted from Chen (2020) and the author (2023).

and vulnerabilities of Brazilian women. The figure was constructed based on the Zendesk Triple Diamond model, developed by Mike Chen, Kim Lenox, and Jennifer Chang, in order to facilitate the visualization of the proposed categorization construction process. The diamond model was selected for its utility in elucidating the convergences that enable the discovery of resources, processes, and procedures for problem-solving (Figure 2).

In an adequacy of the Zendesk Triple model (Chen, 2020) for the purposes of this research, the initial phase presents the context of the situation, comprising institutions and documents. These include the Chamber of Deputies and legislative information, as well as legislative proposals currently being processed on the rights of Brazilian women. Additionally, the United Nations is included, with reference to the Agenda proposed in 2015, which comprises SDGs and targets to be met by 2030 (Figure 2). Subsequently, the solution identified is a categorization based on the theoretical framework of KO. The second phase demonstrates the development of the process in terms of motivational, thematic, and interpretive relevance, as well as the utilization of the bottom-up method, which enables the implementation of flexible, functional, and critical procedures to consolidate the creation of categories in the third phase.

4. RESULTS

In light of the epistemological and methodological framework that has been elucidated, a proposal for a categorization system is put forth, with the objective of classifying legislative proposals in a manner that is aligned with the goals of the SDGs. The categories classify legislative proposals pertaining to the rights of Brazilian women, as set

Table 1. Categories, thematic units, and explanatory notes.

CATEGORIES	THEMATIC UNITS	CATEGORY EXPLANATORY NOTES
CAT 1 (Elimination of poverty and hunger)	Farmer; Agriculture; Artisanal agroindustry; Food; Food aid; Basic food basket; Council for transparency and evaluation of policies to combat poverty; Right to food; **Hunger**; Bolsa Família program law; School meals; Alimony; **Poverty**; Food allowance; Food allowance.	Eradicating extreme poverty, reducing by at least half the proportion of women of all ages living in poverty, implementing adequate social protection measures and systems, eliminating hunger and all forms of malnutrition, achieving food security, and doubling the agricultural productivity and income of women small-scale food producers. (SDG 1—targets 1.1, 1.2, and 1.3; SDG 2—targets 2.1, 2.2, and 2.3).

(*Continued*)

Table 1. *Continued*

CATEGORIES	THEMATIC UNITS	CATEGORY EXPLANATORY NOTES
CAT 2 (Universal access to health and reduction of maternal and premature mortality)	Agência Nacional de Saúde Suplementar (ANS); Agência Nacional de Vigilância Sanitária (Anvisa); Agente Comunitário de Saúde; Agente de combate às endemias; Agosto Lilás; Aleitamento; Amamentação; Ambulatório; Anticonceptcional; Assistência à saúde; Assistência farmacêutica; Assistência Fisioterapêutica; Assistência médica; Atenção à saúde; Primary health care; Comprehensive health care; Outpatient care; Emergency care; Medical care; Certificate; Well-being; Women's check-up campaign; Health center; Cesarean section; Surgery; Clinic; Health Council; Consultation; Coronavirus; diagnosis; Postpartum depression; Right to health; Reproductive rights; Illness; Doula; Sterilization; Fertilization; Pregnant woman; Pregnancy; Hospital; Infertility; Artificial insemination; Hospitalization; Disability;	Ensuring universal access to health and health services, including sexual and reproductive health, reproductive rights and family planning, and reducing the maternal mortality rate and premature mortality from diseases, and promoting women's mental health and well-being. (SDG 5—target 5.6; SDG 3—targets 3.1, 3.4, and 3.7)

CATEGORIES	THEMATIC UNITS	CATEGORY EXPLANATORY NOTES
	Laboratory; Infant; Infant; Tubal ligation; Medical report; Health insurance law; Mammography; Mastectomy; Medication; Medicine; Doctor; Menopause; **Maternal mortality**; Death; Birth; Unborn child; Stillbirth; Obesity; Patient; Pandemic; Childbirth; Family planning; Health plan; Premature; Prenatal; Puerperium; Newborn; Women's health care network; maternal and child care network (RAMI); Private health care network; Public health care network; Human reproduction; **Health**; **Sexual and reproductive health**; Unified Health System (SUS); Treatment; Health unit; Medical emergency; Vaccine; Vaccination.	

(*Continued*)

Table 1. *Continued*

CATEGORIES	THEMATIC UNITS	CATEGORY EXPLANATORY NOTES
CAT 3 (Guaranteed education)	Access to education; Student; University environment; Illiteracy; Educational assistance; Student assistance; Educational assistance; Pedagogical assistance; Educational activity; Pedagogical activity; Daycare aid; Library; Scholarship; Educational campaign; National Education Council; Course; Right to education; **Education**; Teaching; School; Student; Law of Guidelines and Bases of National Education; Book; School network; Teaching network; National week; University.	Ensuring equal access to quality, affordable technical, vocational, and higher education to eliminate gender disparities in education. (SDG 4—targets 4.3 and 4.5)
CAT 4 (Eliminating forms of violence)	Aggression; Aggressor; Domestic environment; Threat; Analgesia; Criminal record; Weapon; Harassment; Attended; Police authority; Police report; Panic button; Register of women aggressors; Brazilian Women's houses; Convicted; Specialized Women's Police Station (DEAM); Non-compliance; Right to safety; Confrontation; Rape, Feminicide; Maria da Penha Law; Protective measure; Public security body; Prison; **Violence**; Victim.	Elimination of all forms of violence, discrimination in the public and private spheres, and harmful practices against women. (SDG 5—targets 5.1, 5.2, 5.3)

CATEGORIES	THEMATIC UNITS	CATEGORY EXPLANATORY NOTES
CAT 5 (Guaranteed work and employment)	Accident at work; Agreement; Addition; Admission; Work environment; Retirement; Apprentice; Activity; Professional category; Consolidation of Labor Laws (CLT); Employment contract; Social security contribution; Regional Labor Office; Dismissal; Dismissal; Diarist; Labor law; Labor law; Dismissal; Entrepreneurship; Employee; Employer; **Employment**; Stability; Professional exercise; Vacations; Severance Indemnity Fund (FGTS); National Institute of Social Security (INSS); Working hours; Young apprentice; Just cause; Labor justice; Labor legislation; Leave; Domestic employee law; Internship law; Weekly rest law; Unemployment insurance law; Labor law; Woman entrepreneur; Labor market; Labor obligation; Social Security; Labor reform; General Social Security System (RGPS), Remuneration; Termination; Salary; **Worker**; Labor.	Recognition and appreciation of unpaid care and domestic work, public policies, protection of labor rights, promotion of safe working environments, the achievement of full and productive employment, decent work, and equal pay for women. (SDG 5—target 5.4; SDG 8—targets 8.5 and 8.8)

(*Continued*)

Table 1. *Continued*

CATEGORIES	THEMATIC UNITS	CATEGORY EXPLANATORY NOTES
CAT 6 (Political, economic, and public participation and leadership opportunities)	Candidate, Candidacy; Empowerment; Women's empowerment; Party fund; Women's soccer; Heritage, Equality; Gender equality, Equality between sexes; Party legend; Electoral legislation; Elections law; Sports incentive law; Political parties law; **Leadership**; Electoral observatory; **Participation**; Political party; Electoral reform; Political reform.	Ensuring the full and effective participation of women and equal opportunities for leadership at all levels of decision-making in political, economic, and public life. (SDG 5—target 5.5)
CAT 7 (Access to information and communication technologies and information)	**Access to information**; Apparatus; **Communication**; Right to Information; Technological innovation law; Fundamental freedoms, Civil Rights Framework for the Internet; Digital environment; Electronic environment; Means of communication; Information technology; Telephone, Telephony; Television.	Increasing the use of basic technologies, in particular, information and communication technologies and public access to information, and protecting fundamental freedoms in accordance with national legislation and international agreements. (SDG 5—target 5.b; SDG 16—target 16.10)

CATEGORIES	THEMATIC UNITS	CATEGORY EXPLANATORY NOTES
CAT 8 (Creation of public policies, equality, and empowerment legislation and access to justice)	**Access to justice**; Creation; National day; Guardianship; Paternity investigation; Racial discrimination; Equality; Empowerment; Percentage; Person with disabilities; **Public policy**; Social policy; Prejudice; Recognition of paternity; Property separation regime; Succession; Stable union; Widow; Income vulnerability; Social vulnerability.	Adoption and strengthening of solid policies and applicable legislation to promote gender equality, empower women, and guarantee equal access to justice. (SDG 5—target 5.c; SDG 16—target 16.3)
CAT 9 (Access to drinking water, basic sanitation, and hygiene)	Supply; **Water**; Drinking fountain; **Basic sanitation**; **Hygiene**.	Universal and equitable access to safe drinking water, adequate sanitation and hygiene, and an end to open defecation, with special attention to the needs of women. (SDG 6—targets 6.1 and 6.2)

(*Continued*)

Table 1. *Continued*

CATEGORIES	THEMATIC UNITS	CATEGORY EXPLANATORY NOTES
CAT 10 (Housing guarantee and financial services)	Affirmative action; Financial autonomy; Fiduciary alienation; Rent; Apartment; Settlement; Rental assistance; Tax benefit; Financial benefit; Real estate; Own home; Condominium; Right to housing; **Housing**; My House, My Life Program law; National Social Interest Housing System law; Microfinance; Housing; Property; Family provider; Residence; **Financial services**.	Guaranteed equal rights to economic resources, access to ownership and control over land and other forms of property, financial services, inheritance, and natural resources and access to safe, adequate, and affordable housing. (SDG 5—target 5.a; SDG 1—target 1.4; SDG 11—target 11.1)
CAT 11 (Access to transportation systems and safe public spaces)	Traffic agent; App; Seat; Parking; **Public spaces**; Means of transport; Urban mobility; **Transportation**.	Guaranteed access to safe, accessible, inclusive, sustainable, and affordable transportation systems and public spaces. (SDG 11—targets 11.2 and 11.7)
CAT 12 (Against the 2030 Agenda)	**Issues not** covered by the SDGs, for example, proposals that deny women sexual and reproductive rights.	Negative relevance.

Source: Own authorship (2023).

forth in the principal document: "Transforming Our World: The 2030 Agenda for Sustainable Development." Building on Schütz (1970), it is acknowledged that the motivational, thematic, and interpretative relevance attributed to the SDG targets, proposals, and thematic units are eminently modelable. Consequently, the categories have been devised to illustrate actions based on relevance for classifying legislative proposals in relation to the 2030 Agenda (Table 1).

The categories (CAT) were constructed on the basis of the statements set forth in the SDGs of the 2030 Agenda and their associated targets. Thematic units were extracted from the metadata of 1,041 legislative proposals initiated and underway in the 56th Legislature (2019–2023) using the index terms "woman" or "sex education" or "sexual health" or "family planning" or "human reproduction" or "artificial insemination" or "alimony" or "alimony payment" or "paternity investigation" or "recognition of paternity" or "stable union" or "divorce" or "widow" or "civil marriage" or "couple" or "partner" or "spouse*" or "maternity leave" or "parental leave" or "maternity salary" or "birth allowance" or "home education," on the Chamber of Deputies portal, which make up the legislative metadata of the proposals until January 2023 (Brazil, 2023). A thematic analysis and integrative synthesis of the terms were conducted to ascertain which terms were most appropriate for representing the thematic units of each category. The terms/thematic units with the greatest emphasis in each category were highlighted in bold. Additionally, the categories are accompanied by explanatory notes that provide the relevant correspondence to the goals and targets of the 2030 Agenda.

5. DISCUSSION AND CONCLUSION

In the pursuit of theoretical and methodological foundations to underpin the categorization and classification of proposals under consideration in the Chamber of Deputies, we encountered KO, which enables the assessment of the quality and efficacy of legislative proposals, with due consideration to the principles of justice. Furthermore, the inviolability of the right to life, liberty, equality, security, and property, as prescribed in the Brazilian Federal Constitution (Brazil, 1988), is aligned with the goals and SDGs of the 2030 Agenda. Furthermore, the KO references enabled the formulation of a proposed categorization for the optimal systematization of legislative proposals pertaining to the rights of Brazilian women, with a view to the goals of the SDGs of the 2030 Agenda. The 12 categories, which consider motivational, thematic, and interpretative relevance, are flexible and creative and are based on an understanding of similarities rather than a set of predetermined principles. This approach allows for the demonstration of the quality and effectiveness of the proposals being processed with a view to the 2030 Agenda. In this regard, the categories are associated with the SDG targets, which address women's needs. The organization is based on situated knowledge when the necessity for action arises. Consequently, the KO encompasses contemporary critical and pluralistic assessments of women's actual needs and vulnerabilities, as recorded in the 2030 Agenda.

The categorization of legislative proposals on the rights of Brazilian women thus provides insight into the extent to which the Brazilian Parliament is committed to the SDGs, especially SDG 5, and whether its initiatives represent progress or setbacks for women. The categories

provide a concise and structured overview of the key issues affecting Brazilian women and their alignment with the 2030 Agenda. These arguments are further reinforced by SDG 16 and its target 10, which seek to advance the establishment of peaceful and inclusive societies for sustainable development, guarantee access to justice for all and foster the establishment of effective, accountable, and inclusive institutions at all levels. This is to be achieved by ensuring public access to information and protecting fundamental freedoms. In light of national legislation and international agreements, including SDG 9 and its target 5, which are based on the construction of resilient infrastructure, the promotion of inclusive and sustainable industrialization, and the fostering of innovation through the strengthening of scientific research (United Nations, 2015), it would be beneficial to encourage studies that facilitate greater accessibility to legislative information.

It can be concluded that the creation of a categorization for Brazilian legislative proposals on the rights of Brazilian women, with a view to the 2030 Agenda, meets the need for legislative information on women's development. Furthermore, it reveals the need for public policies and transparency of information in order to gauge the intentions and attention of the Brazilian Parliament, with the ultimate goal of meeting the targets of the SDGs. The categorization represents a structure of existing intentions within the 2030 Agenda, addressing issues affecting women with the objective of organizing knowledge of legislative proposals currently in progress. It is evident, therefore, that the systematization of the categorization for legislative proposals, which aims to measure the degree of effectiveness in relation to the SDG goals of the 2030 Agenda, corroborates public transparency and access to information.

The 2030 Agenda represents a state commitment, rather than a government commitment. It sets out guidelines, objectives, and targets for humanity to achieve a transition to a more sustainable development model. Nevertheless, the transition hinges on the implementation of long-term structural changes and shifts in cultural and social paradigms that extend beyond the tenure of a parliamentary term and an executive mandate. Progress in achieving the SDGs will lead to an enhanced quality of life for the population, a more productive and efficient economy, a more protected and stable environment, and a more sustainable future for the planet. It is imperative to maintain compliance with this Agenda to guide Brazil's reconstruction and transformation process.

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Controlled vocabularies in scientific literature's indexing: The case of the 1918 pandemic

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ABSTRACT

The scientific interest in the 1918 flu pandemic has been reinforced by the emergence in the early 21st century of epidemic pneumonia diseases caused by a virus, and more recently, the emergence of the SARS-CoV-2 virus, which caused the global pandemic known as "COVID-19," in 2020. This paper presents the findings of an exploratory study on the use of controlled languages in the scientific community, with the aim of identifying the knowledge generated and needed. This research has two objectives. The first is to identify the relevant controlled languages used by the scientific community to label the knowledge produced. The second is to ascertain the role played by controlled vocabularies in the recovery of scientific production. The research is centered on the production of literature concerning the 1918 pandemic, which has been indexed in two widely utilized databases: Web of Science and Scopus. Additionally, the investigation encompasses the controlled vocabularies pertinent to medical and health sciences subjects. Following the identification of articles pertaining to the subject matter, the scientific journals from which the articles have been retrieved are selected. Subsequently, the paper examines the instructions and guidance provided to authors by the journals in question, with the objective of analyzing the role played by keywords and controlled vocabularies in the scientific literature with regard to indexing and recovering knowledge in scientific databases. The preliminary results indicate that controlled vocabularies are infrequently utilized by journal publishers, as they are not included in the instructions provided to authors.

Keywords: controlled vocabularies in health field, scientific information retrieval, 1918 pandemic, scientific edition, scientific authorship

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1. INTRODUCTION

Keywords are an essential tool for the representation of knowledge. They are employed in the context of scientific production for the purpose of storage and subsequent retrieval in scientific databases. The words are collated and stored in databases as metadata in the keyword field. Additionally, keywords are utilized to represent the content within the title, abstract, and body of the text, with this content subsequently undergoing automatic indexing. The insufficient utilization of keywords in the indexing of scientific literature pertaining to the 1918 pandemic has been observed (Barry, 2004; Garcia-Alsina & Cobarsí, 2022; Knobler et al., 2005; World Health Organization, 2015). We will discuss these points in more detail below. In light of the aforementioned context, the aim of this paper is to examine the languages that the scientific community deems most appropriate for indexing the knowledge produced concerning the 1918 pandemic, which is often erroneously referred to in colloquial language and in the scientific literature as the "Spanish flu."

The study of indexing, encompassing both automatic and manual approaches, along with the role of controlled languages and natural language, has been a prominent area of research (Anderson & Perez, 2001; Baeza-Yates & Ribeiro-Neto, 2011; Ghanbarpour & Naderi, 20; Harter, 1975a, 1975b; Hong et al., 2009; Ishida et al., 2020; Jahoda, 1970; Lancaster, 1968; Veyette, 1961). The use of author-provided keywords and controlled vocabularies is a topic of ongoing debate and study (White, 2013). The identification of appropriate keywords is a matter of contention, with some scholars advocating for the unrestricted selection of words by the author, while others favor automated extraction (Ghanbarpour & Naderi, 2019; Harter, 1975a, 1975b; Ishida et al., 2020; Kwon, 2018; Lu et al., 2020; Zhang, 2008). In particular, controlled languages (such as thesauri, ontologies, taxonomies, or lists of headings) facilitate the representation of knowledge by ensuring the univocity of meanings, taking into account existing polysemies and synonymies (Keyser, 2012; Leise, 2008).

The decision to utilize controlled languages, both in manual and automatic indexing, is initially left to the discretion of the publishers who disseminate the scientific literature and the database managers who oversee its storage. Secondly, in the event that authors are permitted to select their own keywords, they are confronted with a multitude of potential options. One such option is to select keywords without fully understanding their relevance for the article to be found and without employing a strategy to do so (Lu et al., 2020). This ultimately results in suboptimal indexing. Another avenue available to authors is the voluntary choice of controlled languages to identify the most pertinent words (Ishida et al., 2020).

In any case, the cost of automatic versus manual indexing leads publishers to prefer automatic indexing (Zhang, 2008), which may result in the selection of keywords being regarded as a secondary consideration. Similarly, studies have indicated that keywords created by authors are less efficient than those extracted automatically (White, 2013; White et al., 2012). Other studies indicate that both methods of indexing (human and automatic) can be combined, thereby extracting advantages from both (Anderson & Perez, 2001). Furthermore, keywords and controlled languages are currently gaining even more strength for automated indexing, especially for retrieval. However, automation still requires further development and the incorporation of controlled vocabularies (Ahmad et al., 2020; Golub, 2021).

Another factor that has been considered in the study of indexing is the disparate utilization of keywords across disciplinary boundaries. In this regard, prior research suggests a tendency for authors in different disciplines to utilize keywords in a less interdisciplinary manner (Kwon, 2018). In the context of literature pertaining to the 1918 pandemic, the term "Spanish flu" is not merely a colloquialism but is also employed in scientific discourse (Garcia-Alsina and Cobarsí, 2022). The utilization of geographical terms associated with diseases contravenes the recommendations set forth by the World Health Organization (2015). Furthermore, the findings of several studies have challenged the hypothesis that the 1918 pandemic originated in Spain (Barry, 2004). It is essential that controlled vocabularies achieve consistency between the description of the content and its subsequent retrieval, through proper integration into the database. This indicates a failure in the indexing of the scientific literature related to this topic in

the databases, particularly if we consider the use of different terms (including "Spanish flu") to retrieve a single concept such as "pandemic of 1918." It is also necessary to consider the treatment of this term in controlled languages, including generalist (Library of Congress Subject Headings or UNESCO) and specialized languages in the fields of health (Medical Subject Headings [MeSH]) and humanities and social sciences (HASSET). An exploration of the Basic Register of Thesauri, Ontologies and Classification (BARTOC) indicates the existence of specific terms linked to pandemic or influenza, which do not include the term "Spanish flu."

In essence, this study examines the instructions that scholarly journals provide to authors regarding the use of keywords and the framework they must adhere to for their work to be indexed. This research phase begins with the following question: What are the criteria that scientific journals recommend to authors for selecting the languages in which they label the knowledge they produce?

2. METHODOLOGY

The research is based on articles produced between 2000 and 2019 on the 1918 pandemic, which have been indexed in two databases. The databases utilized for this research are Web of Science (WoS) and Scopus. The choice of years is motivated by the interest that arose from 2003 onwards in this topic following the onset of the SARS epidemic that led to an increase in research prior to the COVID-19 pandemic. To identify relevant journals for fieldwork, a search was conducted using four keywords in English: "Spanish influenza," "Spanish flu," "1918 influenza," and "1918 flu." The selected terms included synonyms pertaining to the disease itself and the various forms in which it was

referred to, including country and year of occurrence. A total of 70 articles published in 61 journals were identified through these searches. The aforementioned journals were then located on their respective websites, where the publication guidelines for authors could be accessed. After examining the websites, we excluded certain journals from the study based on the following criteria: those that have published informative or discussion articles; those published in a language unknown to the authors of this study (Korean, Icelandic, Norwegian, and Swedish), as we were unable to identify the instructions for authors; and those that are no longer published, thus lacking access to the instructions that the authors had at that time. In total, our study was based on a list of 49 journals.

The following information was extracted from the instructions to authors:

a. The fields to which the journal belongs: health sciences, experimental sciences, computer engineering, social sciences, humanities, and interdisciplinary.
b. The existence of instructions to authors on how to select keywords.
c. The specification of whether a controlled vocabulary should be used or whether the terms to be used are of free creation.
d. The vocabulary to be used by the author, if applicable.
e. The indication linked to search engine optimization (SEO), if applicable.

3. RESULTS

A content analysis of the instructions for authors on the websites of academic journals reveals a preponderance of

journals in the health sciences, followed by those in the social sciences and humanities (Table 1).

Table 1. Thematic scope of the journals.

FIELD	NUMBER OF JOURNALS	PERCENTAGE (%)
Health sciences	29	59.18
Humanities	8	16.32
Social sciences	6	12.24
Experimental sciences	4	8.16
Computer engineering	1	2.04
Interdisciplinary	1	2.04

Source: Own elaboration.

A total of 59.18% of the journals examined provide instructions to authors. The majority of these journals (68.97%) are in the field of health sciences, while 10.34% are in the fields of humanities and social sciences and offer instructions to authors on keywords (Table 2).

Table 2. Scope of journals with instructions to authors.

FIELD	NUMBER OF JOURNALS	PERCENTAGE OF JOURNALS WITH INSTRUCTIONS (OUT OF THE TOTAL OF JOURNALS WITH INSTRUCTIONS) (%)
Health sciences	20	68.97
Social sciences	3	10.34

(*Continued*)

Table 2. *Continued*

FIELD	NUMBER OF JOURNALS	PERCENTAGE OF JOURNALS WITH INSTRUCTIONS (OUT OF THE TOTAL OF JOURNALS WITH INSTRUCTIONS) (%)
Humanities	3	10.34
Experimental sciences	2	6.90
Computer engineering	1	3.45
Interdisciplinary	0	0

Source: Own elaboration.

A significant proportion of journals (40.81%) still fail to provide any indication of keywords in their guidelines for authors seeking to publish, which suggests a lack of evaluation of keywords by these journals (Table 3).

Table 3. Existence of instructions on keywords.

INSTRUCTIONS ON KEYWORDS	NUMBER OF JOURNALS	PERCENTAGE OF JOURNALS (%)
Journals without instructions	20	40.81
Journals with instructions	29	59.18

Source: Author.

In the case of journals that provide guidance, the majority of keywords are left to the dis cretion of the author, with only a minority of journals suggesting the use of a controlled vocabulary. Consequently, the selection of

keywords and their corresponding indexing is at the discretion of the authors, which may result in content being difficult to retrieve in searches. Table 4 provides a summary of this aspect.

Table 4. Specification of instructions on keywords.

INSTRUCTIONS ON KEYWORDS	NUMBER OF JOURNALS	PERCENTAGE OF JOURNALS (%)
Keywords by free choice	20	69
Keywords by controlled vocabulary	9	31

Source: Own elaboration.

In the case of keywords freely chosen by the author, a common guideline refers to establishing a minimum and/or maximum number of keywords (23 of the 29 journals that offer instructions to authors do so). It is uncommon for other guidelines to be provided, except in some cases where advice is given regarding the use of terms that will facilitate the dissemination of articles. In regard to the journals that indicate the specific use of a controlled vocabulary, three languages stand out, two of which are in the field of health and one in the social sciences. In the field of health, the two most commonly used languages are MeSH and Cumulative Index to Nursing and Allied Health Literature (CINAHL). In the social sciences, the Journal of Economic Literature (JEL) classification system is the most prevalent. This system is utilized to classify scientific literature in the field of economics, as indicated in the guide for authors (Table 5).

Table 5. Use of controlled languages in journals with instructions.

VOCABULARY	FIELD	NUMBER OF JOURNALS	PERCENTAGE OF JOURNALS (IN RELATION TO THE ONES PROVIDING WITH INSTRUCTIONS) (%)	PERCENTAGE OF JOURNALS (IN RELATION TO THE TOTAL EXAMINED) (%)
MeSH	Health Sciences	6	66.66	12.24
MeSH and CINAHL	Health Sciences	2	22.22	4.08
JEL	Social Sciences	1	11.11	2.04

Source: Own elaboration.

Furthermore, when the total number of journals studied (49) is considered alongside the number of journals that utilize controlled languages (nine), it becomes evident that there is a notable lack of promotion of the representation and indexing of knowledge. Indeed, only 18.36% of the journals in question advocate for the use of controlled languages. Conversely, in a subset of journals (12.24%), there is a necessity to inform authors of the importance of keywords, not only in the dedicated keyword section but also in the title, abstract, and the body of the article itself. The recommendations are designed to enhance SEO, thereby facilitating the discovery of articles on the Internet, whether in Google Scholar or other open repositories. It is notable that none of the instructions pertain to the automatic indexing of publishers' databases. It is also noteworthy that the focus is on SEO rather than on the efficiency and quality of information retrieval, with the aim of eliminating noise and documentary silence. An analysis of the instructions reveals that the journals that value and emphasize SEO do so from the perspective of disseminating the authors' production and, therefore, that of the journal itself. The retrieval of information in a more relevant and comprehensive manner is not secondary to the importance of keywords given in these journals and their instructions.

A review of the available evidence suggests that keywords and, in particular, their optimization for indexing and retrieval are not a primary concern for authors submitting articles to journals. This is particularly noteworthy when compared to the more frequent and explicit requirements set forth in journal instructions to authors, such as formatting of bibliographic references and anti-plagiarism guidelines. Thus far, our analysis of journal instructions

has been limited to those published on open access websites. Consequently, we have not considered the forms and applications employed by many journals to collect submissions, which may contain supplementary instructions embedded in their interface.

4. DISCUSSION

The findings of this preliminary investigation indicate that the majority of scientific journal publishers do not utilize controlled languages to effectively represent, index, and retrieve knowledge. This is due to the fact that they do not include such languages in their instructions to authors. Consequently, they are unaware of the potential of these languages to eliminate the effects of irrelevant or missing information. This use appears to be inconsistent with the requirements of information retrieval systems and indexing tools, both automatic and manual, as identified by researchers in this field, as pointed out by some of the countless studies in the field (Anderson & Perez, 2001; Baeza-Yates & Ribeiro-Neto, 2011; Ghanbarpour & Naderi, 2019; Harter, 1975a, 1975b; Hong et al., 2009; Ishida et al., 2020; Jahoda, 1970; Lancaster, 1968; Veyette, 1961).

It is worth noting that in some instructions, the relevance of keywords is becoming apparent, although the focus is more on the dissemination of articles on the Internet than on the efficiency of information retrieval. In light of the aforementioned considerations, it can be concluded that the criteria proposed by scientific journals to authors for selecting the languages in which they represent the knowledge produced remain unduly focused on formal aspects such as the number of keywords. Furthermore, there is a notable tendency to disregard the

potential of such criteria to facilitate the efficient search for information.

In conclusion, it can be stated that the majority of journals are currently unaware of recent advances in the field of indexing and information retrieval, as well as the value of controlled languages in representing and retrieving knowledge. A subsequent line of inquiry will be to examine the role of controlled languages in the retrieval of scientific publications within the databases where they are stored. This should be based on a comparison between the instructions and how articles are indexed in the databases of journal publishers (manual, automatic, or mixed). In the case of automatic indexing, it is essential to examine the specifications of the tools used and how polysemies and synonymies are treated to neutralize silence and documentary noise. Furthermore, it is crucial to understand the linkage of these journals' databases with reference databases such as WoS and Scopus.

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Knowledge management in the Brazilian public service: A review under the methodological optics

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ABSTRCAT
The field of knowledge management (KM) is situated within the broader domain of information science. It is concerned with the generation and dissemination of knowledge and its role in fostering innovation and competitiveness. In the context of public service, KM refers to the organization and processing of information with the aim of facilitating its sharing with the relevant teams, thereby enhancing institutional productivity and the efficiency of service delivery to citizens. The objective of this study was to conduct a brief bibliographical review of KM in the public sector within the context of information science, with a particular focus on the methodological instruments recently employed in Brazil. This was done with the aim of delineating the methodological approaches used in research on KM in the public sector. Accordingly, a bibliographic research was conducted in the Portal of Periodicals of the Coordination of Higher Education Personnel Training (CAPES) in August 2023, with a time frame encompassing the previous five years (2019–2023). The result was a mapping of 25 works, categorized according to the following methodologies: case/field study, documentary research and literature review, survey, bibliometric research, and use of models in the most diverse public institutions in Brazil. The value of this work lies in its ability to synthesize the diverse methodologies employed in the field of KM within the Brazilian public sector. It provides researchers with a comprehensive overview of the avenues they can pursue in their future studies. As future research

endeavors, it is recommended that the investigation be continued, with a particular focus on the distinctive characteristics of the methodologies in question.

Keywords: knowledge management, methodology, public service, information science, Brazil

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1. INTRODUCTION

Knowledge management (KM) is a field that falls under the umbrella of information science. As a result, the two fields are related (Lima & Álvares, 2018). In the context of information science, the field of study is dedicated to the examination of the phenomena pertaining to its diffuse object, information. It has its origins as a branch of knowledge related to the generation of documentary products and information services, with a view to the organization of information. This is subject to the use of information retrieval technologies for its availability and access, with the aim of its use (Rabello, 2012). The term "knowledge management" was first introduced by Davenport and Prusak (1998). They define "knowledge" as a dynamic entity comprising practices, values, contextual information, and structured understandings. These elements collectively provide a foundation for evaluating and integrating new experiences and information.

In the view of Takeuchi and Nonaka (2008), KM denotes the manner in which organizations address the generation, dissemination, and utilization of internal knowledge. These authors devised a model that has informed the approach of companies seeking to comprehend and implement effective KM practices. Since that time, KM has become a crucial consideration for organizations striving to distinguish themselves, being perceived as capable of adapting to the dynamic and complex nature of the contemporary environment. In the context of public institutions, the importance of KM is increasing, as it can facilitate innovation and, subsequently, enhance competitiveness. In the context of public service, the objective of KM is to organize and process information in a manner that enables its sharing with the team of servers. This enhances both the institutional productivity and the efficiency of service delivery to citizens (Costa and Castro, 2022).

As asserted by Santana and Pereira (2023), KM is a crucial element in the realm of public service for a multitude of reasons. Primarily, it enhances the efficiency and effectiveness of public services, facilitates the process of continuous improvement, enables individuals and institutions to act in a more intelligent manner, influences and facilitates renewal processes, promotes innovative environments, and makes possible the sustainability of administrative modernization. Similarly, Snoeijer et al. (2019) assert that KM in public spaces should be presented as a policy that encourages the creation, transfer, and application of knowledge, subject to monitoring by the organization.

As Batista (2012) notes, KM models developed for the private sector may not be readily applicable to the public sector. Therefore, there is a need to develop a

generic, holistic, and specific KM model that is tailored to the unique context of Brazilian public administration. The author notes that it is expected to find examples in which authors utilize pre-existing models that were not explicitly designed for public administration. Additionally, Batista (2012) emphasizes that the literature on KM in the public sector is limited and still largely fragmented. Knowledge management can serve as a pathway for institutions seeking to enhance their capacity for knowledge generation and improve their performance in society (Teixeira, 2022).

In light of the aforementioned context and the existing gap, the research question that guided the study was: How are researches on KM in the public service methodologically delineated? The objective of this study was to conduct a concise bibliographic review of KM in the public sector within the context of information science, with a particular focus on the methodological instruments recently employed in Brazil. Accordingly, a bibliographic research was conducted with a time frame encompassing the last five years (2019–2023), with the objective of recovering the most recent studies. The intention is to present a list of the principal research studies conducted in this period within the field of KM in public institutions, with a particular focus on the methodologies employed. This will be achieved through a brief literature review.

2. METHODOLOGY

A bibliographic research project may be considered an initial path to enter a field of study. Its aim is to provide the researcher with more knowledge about the topic in perspective (Mattar, 2012). As posited by Gil (2017), bibliographic research facilitates a more profound

familiarity with the problem at hand, thereby enabling its more explicit articulation and/or the formulation of hypotheses. These definitions align with those put forth by Lakatos and Marconi (2003), who stipulate that bibliographic research is not merely a reiteration of existing discourse on a given subject. Instead, it entails an examination of a topic from a novel perspective, thereby potentially leading to groundbreaking conclusions. Accordingly, an exploratory bibliographic research was conducted for this study, as defined by Boccato (2006) as a review of the literature on the principal theories that inform a scientific inquiry. This approach was undertaken to enhance comprehension through the examination of published theoretical references and the analysis of diverse contributions pertaining to the subject matter.

The methodological procedures were conducted in five stages. The initial stage of the process entailed the selection of the newspaper database and the determination of the search terms. The database selected for the research was the Portal of Periodicals of the Coordination of Higher Education Personnel Training (CAPES), as it integrates several databases, thereby enabling an integrated search across all indexed databases. The search was conducted in August 2023 using the keywords "knowledge management" and "public." This approach was selected because a search limited to "public service" yielded a minimal number of results. By using the aforementioned descriptors, it was possible to include KM in public service and public administration. With regard to the time frame chosen, the works published in the last five years were selected, that is, in the period from 2019 to 2023.

Furthermore, the selection of these keywords for the search is substantiated by the objective of this study, which

is to examine, in particular, the context of public service and the potential methodologies employed in this field. Subsequently, the search expression was executed, the documents were retrieved, and the material was compiled in an Excel spreadsheet. During this process, the following groups of documents were excluded: those that were duplicated, those published outside the period of interest, and those whose objective was outside the scope of this research.

The third stage of the process involved the initial selection of works for analysis. This was conducted by reading the titles and abstracts of the works in question. The selection was based on the presence of a record of the methodologies employed, as indicated in the title and/or abstract. In the course of this process, papers whose abstracts and/or titles did not provide sufficient data on the methodologies applied or incomplete information on these were subjected to additional analysis in order to ensure a more accurate selection of the sample. Ultimately, the works that did not address the topic of KM in the context of public institutions were excluded from the selection process. It is also important to note that the objective was not to gain a deeper understanding of the discussions presented by each author or group of authors.

In the fourth stage, the selected documents were read and analyzed to identify the research objects and primary methodologies used in the area of public service over the past five years. Finally, in the fifth and last stage, a table was constructed to organize the information from each selected work, including the title, authors, year, objective, methodology, and results and conclusions. This resulted in a comprehensive overview of the methodologies identified in the selected studies.

Table 1. Details of analyzed documents.

ID	TITLE	AUTHORS	YEAR	OBJECTIVE
1	Knowledge Management: Analysis of the Maturity Level of a Public Institution	Leandro Alves Martins, Danilo De Melo Costa, Dárlinton Barbosa Feres Carvalho, Cristiana Fernandes De Muylder, and Fabio Corrêa	2023	To analyze the level of KM maturity of a public institution, specifically in the Municipal Government of the city of Contagem, Minas Gerais, Brazil.
2	Model of Knowledge Management: A proposal for the public university context	Wênyka Preston Preston Leite Batista Da Costa, Jandeson Dantas Da Silva, Lydia Maria Pinto Brito, and Sérgio Luiz Pedrosa Silva	2023	To provide a KM model for the public university context.
3	Diagnosis of knowledge management: a study in a public interest civil society organization	Ismael De Mendonça Azevedo, Lydia Maria Pinto Brito, Manoel Pereira Da Rocha Neto, and Maria Valéria Pereira Araújo	2020	To diagnose the current level of KM of a Civil Society Organization of Public Interest (OSCIP) based on the perception of the unit coordinators of the Northeast Citizenship Institute, in Rio Grande do Norte, through the application of the Bukowitz and Williams KM Diagnosis.

METHODOLOGY	RESULTS AND CONCLUSIONS
Survey.	The results showed that the Municipal Government of Contagem is at level three of KM maturity, being incipient, as it seeks to manage knowledge and its critical areas for its success.
Case study.	Based on the data obtained, the objective was achieved by proposing a KM model with pillars centered on the institution's mission, creation of the KM body or sector, and dissemination of the KM policy. The model is structured in four stages, being the first one composed of the acquisition, construction, and socialization of knowledge, followed by the stage where knowledge is codified and stored, then there is the transfer and use of knowledge, and finally, there is the fourth stage represented by the discarding of knowledge.
Case study.	The results reveal that the institute has a high level of KM in thematic and strategic processes. It is concluded, however, that it is necessary to work on some indicators in order to refine the KM process.

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	OBJECTIVE
4	The perception of the use of the case method for knowledge management: experience of the Ministério Público de Minas Gerais	Alessandra De Souza Santos and Frederico De Carvalho Figueiredo	2021	To verify the perception of the use of the case method as a potential KM tool within the Ministério Público de Minas Gerais (MPMG), which could serve as a basis for other public administration bodies.
5	Diagnóstico da Gestão do Conhecimento no Setor Público: Estudo de Caso no Corpo de Bombeiros Militar De Alagoas (Diagnosis of Knowledge Management in the Public Sector: Case Study of the Alagoas Military Firefighters Corps)	Luiz Augusto De Medeiros Lira and Ibsen Mateus Bittencourt Santana Pinto	2021	To diagnose the degree of maturity in KM of the Corpo de Bombeiros Militar de Alagoas (CBMAL), identifying strengths and opportunities for improvement.
6	Knowledge Management in the Public University of the Northeastern Semiarid Region	Naeldson Expedito Alves Da Silva, Lydia Maria Pinto Brito, Ahiram Brunni Cartaxo De Castro, Arthur William Pereira Da Silva, and Juliana Carvalho De Sousa	2021	To measure the perception of educational administrators on KM in the thematic and strategic processes of a public university, whose main resource is the knowledge about the Semiarid region of Northeastern Brazil.

METHODOLOGY	RESULTS AND CONCLUSIONS
Qualitative field research, whose data collection was carried out through documentary research, participant observation, and semi-structured interviews.	The study reveals that the case method follows all the stages of the SECI model, indicating its potential as a KM tool. It is concluded that the case method is relevant for KM by correlating it with a recognized model, using data triangulation and practical application of the theory. This highlights its usefulness in organizational management and real application.
The evaluation instrument that integrates the KM Model for the Brazilian Public Administration (MGCAPB) was used.	In view of the results obtained, it found a development gap up to the highest level of KM maturity, which corresponds to the institutionalization stage (...) the self-assessment collaborated in the identification of strong points and opportunities for improvement of KM in the organization, providing a basis for the consolidation of the other stages of the institutionalization process.
Quantitative research, descriptive in nature and with technological characteristics, which was operationalized by means of a survey research.	From the results obtained, the institution seeks to implement the model of learning organizations, no longer relying exclusively on pedagogical projects for management, enabling individuals and partners to address social, environmental, political, and economic challenges in the Semiarid region of Brazil, contributing to state solutions by means of state involvement.

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	OBJECTIVE
7	Knowledge Management Applied to Public Policy on Sport and Leisure	Luiz Carlos Pessoa Nery, Pedro Henrique Iglesiaz Menegaldo, and Temistocles Damasceno Silva	2021	To present KM as an instrument applicable to public policy on sport and leisure, taking into consideration the various stages that make up the policy cycle.
8	Knowledge in Public Administration: An Integrative Review of the Literature	William Koga Silva Filho, Jordana Alves De Aguiar, Geraldo Sadoyama Leal, and Hewerton Renato Fleury Silva	2023	To systematize the knowledge produced about KM in the public sphere.

METHODOLOGY	RESULTS AND CONCLUSIONS
The methodology adopted consisted of the presentation of theoretical assumptions related to the subject, connecting them to the phases of the policy in the sports area: agenda formation, formulation, implementation, and evaluation. This approach made it possible to analyze the management of actions by identifying social indicators, legal and bureaucratic aspects, the participation of various agents, as well as financial, human and material resources, among others.	Given the panorama and reflections presented in the paper, according to the authors, the results point to the institutionalization of KM in public sports management despite recognizing challenges in the governmental environment. Knowledge management is seen as a valuable tool to systematize political knowledge, improve decision-making, and strengthen sports management based on technical evidence.
Integrative literature review (RIL)—four repositories.	Regarding KM, the results identified the importance of intellectual capital, the need for knowledge sharing in organizations, as well as the relevance of socialization and outsourcing processes for knowledge production. The challenges presented in the study were: the need to review the processes themselves in high-performance management/commissioning, the lack of standardization of KM between sectors, the important process of combination, the need for more resources in TCi's and not in people, and high turnover of employees. Knowledge management is important to avoid the centralization of knowledge and the possibility of adapting management tools and models applied in conventional organizations so that they can contribute to the state.

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	OBJECTIVE
9	Agenda Ambiental na Administração Pública (A3P) Aliada à Gestão do Conhecimento: Caso Prático da Ecoliga-Ro	Davisson Lucas Vieira Afonso, Isis Bruna Gomes Pacheco, and Iluska Lobo Braga	2023	To analyze ecoLiga's sustainability actions based on the theory of KM and the actions of the Environmental Agenda of Public Administration.
10	Gestão do Conhecimento: Diagnóstico Sobre o Perfil de uma Instituição Pública de Ensino Superior	Paula Carolina Empinotti Pereira, Rosângela de Fátima Stankowitz, and Henrique Oliveira da Silva	2023	To analyze the profile of KM at the Federal University of Paraná (UFPR)

METHODOLOGY	RESULTS AND CONCLUSIONS
Case study and descriptive and qualitative research.	The results showed that ecoLiga's strategic planning follows two pillars of the Environmental Agenda of Public Administration and is related to KM, although the transfer, storage, and application of knowledge are in an initial stage. After applying the model, the need arose to diagnose sustainability and increase the dissemination of actions to analyze the results. The Environmental Agenda provides guidelines for ecoLiga to implement sustainable actions aligned with KM, improving the maturity of knowledge on sustainability in the network.
Case study and descriptive and qualitative research.	In evaluating the results found, the authors identified that 52.8% of the respondents did not identify or recognize KM policies and training strategies, 43.4% do not know how to evaluate the level of KM maturity, and 17.0% believe that KM is in the strategic planning phase. Furthermore, 79.2% disagreed that employees recognize the institution's KM processes and practices. It was concluded that the Public Institutions of Higher Education (IPES) analyzed the need to institutionalize KM. The university has a more formal structure in relation to knowledge, in which strategies related to the subject are developed at the level of senior management.

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	OBJECTIVE
11	Relevant Aspects of the Application of Knowledge Management in Public Administration	Ieda Pelógia Martins Damian, Márcia Cristina De Carvalho Pazin Vitoriano, Marcelo Ricardo Martelo, Meiriellen Cristina Faria Bussadori, and Simone Cristina Ceron Ripoli	2021	To approach KM in the context of public administration from the identification of critical success factors of KM.
12	Knowledge Management at a Federal Public University: The Transformation of Scientific Knowledge into Organizational Knowledge	Patrick Pereira Costa and Biancca Scarpeline De Castro	2022	To understand how KM occurs at the Federal Rural University of Rio de Janeiro, from the transformation of scientific knowledge produced about the institution in the area of administration into organizational knowledge, in order to contribute to university management.
13	Knowledge Management and Remote Work: A Case Study in a Public Distance Education Academic Unit	Jéssica Silva Xavier, Lorena Santos Pattas, Tânia Moura Benevides, and Milena Siqueira Santos Mendonça	2023	To measure KM in the Academic Unit of Distance Education (UNEAD) of the University of the State of Bahia (UNEB) during remote work.

METHODOLOGY	RESULTS AND CONCLUSIONS
Bibliographic review on the topics of KM and public administration, considering works published in the last 10 years.	The results indicate that the implementation of KM in public administration requires consideration of the specific characteristics of the sector, identifying critical success factors such as organizational culture, leadership, strategic public policies, technology, infrastructure, processes, resources, and people management. According to the authors, these factors should be strategically addressed to ensure positive results in the implementation of KM and to improve public management for the benefit of society.
Bibliometric research.	Based on the results obtained, an incipient environment for KM was found, with advances in the valorization of personnel qualification and the use of information and communication technologies, but with few formalized processes that could transform scientific knowledge into organizational knowledge. The authors defend the need to expand research that relates the two types of knowledge (scientific and organizational) and that considers the particularities of HEIs for the promotion of KM.
Literature review, field study, descriptive, quantitative, and quantitative research.	The results show that the respondents attribute value to knowledge in the sense of optimizing organizational performance and responsibility in fulfilling their functions.

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	OBJECTIVE
14	O Método de Casos para a Gestão do Conhecimento no Ministério Público: um manual técnico para a implementação da ferramenta	Alessandra De Souza Santos	2020	To present a technical manual to subsidize implementation processes of the case method as a KM tool within the MPMG, which can serve as a basis for other public administration bodies.
15	Assessment of the Maturity of Knowledge Management in Public Administration	Vanessa Dos Santos and Rogério Cid Bastos	2019	To Assess the maturity of KM in Public Administration in a Catarinense Public Institution
16	Knowledge Management in Public Companies: Practices and Initiatives Adopted by Poupatempo	Ruggero Ruggieri, Marcos Antonio Gaspar, Celia Hatsumi Aihara, and Simone Martins Olivero	2021	To verify which KM practices and initiatives contributed the most to the adoption, operationalization, and management of the KM and Innovation Policy of Decree N. 53.963/2009 (São Paulo, 2009), which instituted the KM and Innovation Policy for public organizations in São Paulo.

METHODOLOGY	RESULTS AND CONCLUSIONS
Data collection was carried out by means of a narrative and systematic literature review, documentary research, and semi-structured interviews.	Analyzing the data collected, the manual, according to the author, consisted of a technical product derived from field research that investigated whether the case writing method could be effectively applied to the creation and dissemination of organizational knowledge by the institutional school of the MPMG. The construction of this manual had the objective of subsidizing the process of writing and construction of cases and presenting the methodology for teacher training in that organization.
Case study, the methodology developed by Helou (2015), which adapted the models proposed by APO (2009), and MGCAPB (Batista, 2012).	The results highlight that the public institution evaluated is at the level of expansion 102 points, indicating awareness of KM. However, the process is still incipient, with isolated practices in some areas, evidenced by the intermediate scores in each dimension.
Qualitative and descriptive research that used a semi-structured interview, direct observation, and documentary analysis of public records.	In summary, the Poupatempo implemented effective practices, including: high hierarchical priority, engagement of top management and middle management, adequate financial resources, real examples of success to convince collaborators, emphasis on KM and information for program quality, use of methodologies for implementing the KM model, and focus on technology, not on management issues or people. The need for a clear KM policy to speed up the institutionalization of the practice in the public administration of the poorest countries is highlighted.

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	OBJECTIVE
17	Adaptation and Validation of the Diagnosis of Knowledge Management for the Brazilian Public University	Wênyka Preston Preston Leite Batista Da Costa, Jandeson Dantas Da Silva, Lydia Maria Pinto Brito, Ahiram Brunni Cartaxo De Castro, and Walid Abbas El-Aouar	2021	To adapt and validate an instrument for the diagnosis of KM practices originally from the private sector to the context of the public university.
18	The Implementation of Knowledge Management Practices in Public Schools	Caio Pisconti Machado, Arthur Gualberto Bacelar Da Cruz Urpia, Letícia Fleig Dal Forno, and Ely Mitie Massuda	2020	To examine the level of implementation of KM practices of organizational processes in public educational institutions, considering possible implications for the level of school management.
19	Knowledge Management Practices in Public Schools: A Case Study	Marcio Pedro Cabral, Flávio Bortolozzi, Ely Mitie Massuda, and Arthur Gualberto Bacelar Da Cruz Urpia	2019	To recommend KM practices to public school managers in order to consolidate them in their institutions.

METHODOLOGY	RESULTS AND CONCLUSIONS
Survey.	The results of the work include the diagnosis of KM practices in the context of Brazilian public universities, structured with 45 questions. The results also showed that KM is a multidimensional construct that can be evaluated based on the following factors: incentive to the propagation of knowledge, competencies and skills of employees in learning from experience, stimulus to knowledge creation, knowledge enhancement, documentation and sharing of knowledge, management of knowledge for the benefit of society, socialization of knowledge in social interactions, valorization of human capital, and management of knowledge to fulfill the social mission.
Survey.	According to the results, the majority of KM practices in organizational processes are not being taken advantage of. The low perception of these practices can affect the efficiency of institutional management and limit the development of human capital of teachers, students, staff, and school community. It observed the need for the creation of measures that expand these levels of implementation in the school context.
Multiple case studies in schools in Sarandi (PR).	Based on the results, it was verified that the evaluated schools use the analyzed practices but only partially. Based on the results, recommendations were made to managers to strengthen the KM processes in the institutions surveyed.

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	OBJECTIVE
20	Social Networks and Their Use as Tools for Knowledge Management Practices: An Analysis of Public Schools in Paraná	Arthur Gualberto Bacelar Da Cruz Urpia, Letícia Fleig Dal Forno, Flávio Bortolozzi, Ely Mitie Massuda, and Tatiana Carla Faccin	2019	To analyze if the networks offer as KM tools for the creation, sharing, and dissemination of knowledge among students and teachers.
21	Qualidade Decisória dos Gestores Públicos: Contribuições da Inteligência e Gestão do Conhecimento	Claudia Melati, Raquel Janissek-Muniz, and Carla Maria Marques Curado	2021	To analyze how public managers apply intelligence and KM aiming at higher decision-making quality
22	Theoretical Formation and Trends in Public Administration Knowledge Management Studies	Marcelo Roger Meneghatti and Roberto Lima Ruas	2020	To analyze the theoretical formation of the subject over time by identifying the latest researched topics in this field of study.
23	Knowledge Management: A Case of a Colombian Public Sector Entity	Diego Armando Jurado-Zambrano and Sandra María Valencia Upegui	2021	To present results of the incorporation of a KM initiative in a Colombian public sector organization, as well as its benefits, organizational facilitators, and difficulties experienced in it

METHODOLOGY	RESULTS AND CONCLUSIONS
Multiple case studies. exploratory and descriptive and quantitative approach.	According to the results, even though there are traces of KM in the institution, it still does not fit into the context of the knowledge society. There are punctual actions of using social networks to create and share knowledge, but there is a lack of balance in investments, infrastructure, content, support, and training. It is necessary to build a sustainable knowledge base for educational innovations requiring effort.
Qualitative and exploratory approach, with literature review, followed by semi-structured interviews with the use of combined techniques for the analysis of the collected data: analysis of the data and qualitative comparative analysis.	The results emphasize the need for effective data and KM for the decision quality of public managers. They also show that the low decision quality is linked to the lack or limited use of KM and intelligence practices in public administration.
Bibliometric research.	From the results obtained, it was possible to identify the main theoretical constructions on KM in the environment of public administration and social management and also the theoretical distribution corresponding to these publications since the beginning of the subject in the base until the last few years.
Case study with a qualitative and descriptive approach.	The results show that the Colombian public entity has made progress in building an organizational culture of KM through its model and tools, although it needs to focus more on leadership and technology as facilitators. KM is still on the rise

(*Continued*)

Table 1. *Continued*

ID	TITLE	AUTHORS	YEAR	OBJECTIVE
24	Organizational Culture as a Critical Factor in Knowledge Management: Reflections Based on the Case of a Public Industrial Company in Uruguay	Tommy Wittke	2020	To discover and analyze the aspects of the company's organizational culture that favor or limit knowledge sharing.
25	A Framework for Implementing Knowledge Management in Public Banking Institutions in Brazil	Darci de Borba Santos Júnio	2021	To provide a framework for the implementation of KM in public banking institutions in Brazil.

Source: Research data.

METHODOLOGY	RESULTS AND CONCLUSIONS
Case study with a descriptive, qualitative, and quantitative approach.	Based on the evidence collected, the results on the relationships between cultural profile, values and practices, and modalities of exchange and conversion of knowledge are highlighted.
Qualitative research and exploratory and cross-sectional interviews.	The work presented the elaboration of a Framework for Knowledge Management in Financial Institutions (FIGCIF), with 60 factors from the analysis of 10 literary and practical structures in financial institutions. In addition to enriching academic research with new variables, the FIGCIF innovates by suggesting performance measures that adjust to different levels of maturity in the implementation of KM.

3. RESULTS

The methodological procedures, conducted in accordance with the prescribed sequence of stages, yielded a total of 34 papers following the completion of the initial and secondary stages. The third methodological stage resulted in the exclusion of nine works, yielding a total of 25 documents, comprising 24 articles and one dissertation. The fourth stage, initiated with the analysis of the 25 selected papers, entailed reading the documents, identifying the research objects and the principal methodologies employed in the field over the previous five years. The fifth methodological stage culminated in the elaboration of a table synthesizing the works, as presented in Table 1.

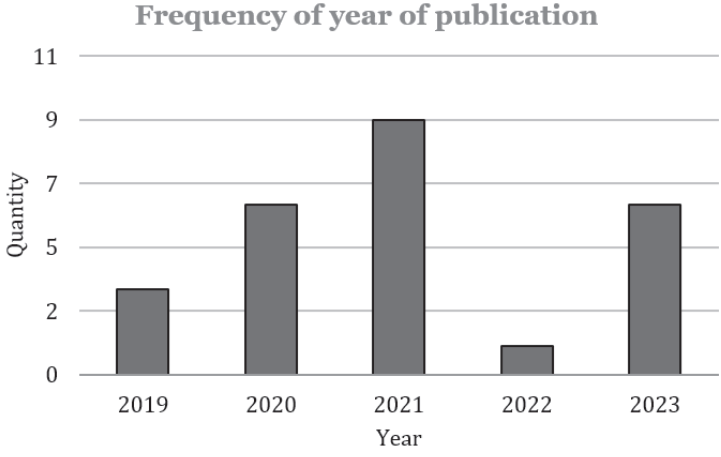

Figure 1. Frequency of year of publication. Source: Authors.

A review of the frequency of publication year (Figure 1) reveals that 2021 was the period with the highest number of publications (nine), followed by 2020 (six) and 2023 (six). These years were identified as the periods with the highest volume of publications related to KM in the

public service within the analyzed sample. Furthermore, it can be observed that between 2019 and 2021, there was a discernible upward trend in research output, followed by a precipitous decline in 2022. However, this decline was short-lived, with a swift recovery evident in 2023. These findings align with the assertion put forth by Câmara and Nunes (2021) that KM is gaining recognition within the academic literature. This assertion is supported by the consistent growth trend observed in this study from 2019 to 2021, which continued even after a notable decline in 2022.

In examining the findings in light of the employed methodologies, they were sorted into five categories: case/field study, documentary research and literature review, survey, bibliometric research, and the MGCAPB, as illustrated in Table 2.

Table 2. Most frequent methodologies.

METHODOLOGY	FREQUENCY
Case/field study	10
Documentary research and literature review	8
Survey	4
Bibliometric research	2
MGCAPB	1

Source: Research data.

In works 2, 3, 9, 10, 13, 1, 19, 20, 23, and 24, the case/field study methodology was employed. This approach was employed for a number of purposes, including the proposal of management models, the diagnosis and measurement of the level of KM maturity in organizations, the analysis of

the perception of KM among education administrators, the provision of KM tools and initiatives, and the analysis of aspects of organizational culture. It is noteworthy that this methodology has been employed with greater frequency in the evaluation of KM maturity. The institutions where the method was most frequently applied were public universities (six), city hall (one), industry (one), OSCIP (one), and environmental agency (one).

In works 4, 7, 8, 11, 14, 16, 21, and 25, documentary research and literature review methodologies were employed as research methods. The aforementioned methodologies were employed for a variety of purposes, including the reflection on the applicability of KM in the studied environment, the creation of a technical manual to support the collection process, and the construction of cases with KM tools. Moreover, these methodologies were employed to substantiate KM practices, assess the quality of managerial decisions regarding the applicability of KM, and furnish novel KM tools. The institutions or domains where the method was most frequently utilized were the public ministry (two), a public banking institution (one), public policies on sport and leisure (one), and the remainder pertained to KM in public administration/ service (four).

In works 1, 6, 17, and 18, the survey methodology was employed, thereby demonstrating its applicability in assessing the level of maturity and implementation of KM practices, as well as in identifying KM practices in public universities. It was observed that this method was employed by IPES (three) and municipalities (one). The survey, due to its efficacy in gathering comprehensive and representative data, as well as enabling the establishment of relationships between disparate variables (Moreira &

Caleffe, 2008), may be an appropriate means of analyzing KM trends in these public institutions.

In works 12 and 22, the bibliometric research methodology was employed, which was conducted at a public university and in the context of public administration and service. As Teixeira and Zan (2022) observe, bibliometrics, as a field of research within information science, plays a significant role in the evaluation of global scientific output. Its indicators are capable of portraying the behavior and evolution of a field of knowledge. Consequently, given the limited representation of this methodology in this study, there appears to be a need for further work employing this methodology.

In conclusion, with regard to the MGCAPB Public Management Assessment Instrument, an incident occurred in work 5, which was applied to the Military Firefighters Corps of Alagoas, and an adaptation was made in work 15 that was not included in the calculations for this instrument. As defined by Batista (2012), the MGCAPB is a generic, holistic, results-focused, and specific KM MGCAPB designed to assist public organizations in the implementation of KM. The Instrument for Public Management Assessment is a set of guidelines and parameters for management assessment based on the Model of Excellence in Public Management and the concepts and foundations advocated by the National Program for Public Management and Debureaucratization (Brazil, 2009). It is noteworthy that in some studies, multiple methodologies were employed in an integrated manner, whereby different methods were utilized within the same research project. For instance, studies 4, 14, 6, 21, and 25 employed both interview and observation procedures to enhance the research process.

This research has identified a number of public institutions in which KM is applied, as well as studies that have analyzed replicable methodologies for KM. Replication is fundamental for scientific progress, as it enables the comparison of data and the identification of similarities in the results (Maclennan & Avrichir, 2013). This view is supported by some authors who argue that observation, research, experimentation, and comparison with other studies are essential for the development of theories (Morrison et al., 2010).

4. CONCLUSION

This article presents a concise literature review on KM in the public sector within the context of information science. It considers the methodological tools recently employed in Brazil with a view to elucidating the methodological framework of research on KM in the public service. The research methodology employed enabled the listing of the methodologies used over the last five years. The studies presented a variety of methodologies that can be replicated, thus contributing to future research on the subject. Furthermore, they assist in continuous improvement and provide an understanding of the different contexts of KM.

The objective of this work was to provide a systematic overview of the diverse methodologies employed in the field of KM, offering researchers in this domain a comprehensive perspective on potential avenues for future research in the field of information science. Additionally, it is anticipated that this work will serve as a valuable resource for researchers in KM in Brazil, providing insights into the methods utilized by their peers over the past five years. This will enable them to assess possibilities, identify novel processes, and gain a deeper understanding of the field.

In future studies, it is recommended that the research be continued by deepening the methodologies and evaluating their particular characteristics. This will facilitate a more comprehensive understanding of the limitations and advantages. It is also advised that the reproducibility of the use of each methodology and its results be evaluated, which will allow for the verification of standards and, consequently, the making of comparisons between different departments and public bodies. Furthermore, it is proposed that this study be extended to longer longitudinal periods, such as, for example, the last 10 years.

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Environmental law research groups in Spanish public universities: Characterization and presence in social networks

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ABSTRACT
It is imperative that research in environmental law be conducted in order to facilitate scientific progress and the protection of the planet. University research groups are the fundamental units for the creation and generation of scientific knowledge. The dissemination of research processes and results is crucial for university research groups, as it facilitates access to information and enhances their reputation, thereby expanding their reach. This study's primary objective is to characterize environmental law research groups from Spanish public universities based on three key variables: size, gender, and lines of research. Additionally, it aims to assess the presence and activity of these groups on social networks "X" and "ResearchGate." The principal findings indicate that the majority of these groups are relatively small, comprising between three and 11 members. There is a moderate degree of gender equality within these groups, and their lines of research are broad and interdisciplinary in nature. Furthermore, it is evident that the visibility of these groups on social networks, particularly on X and ResearchGate, remains limited. Despite efforts to maintain an active digital presence, there is a clear need for continued work in this area to achieve the desired outcomes related to the dissemination of research activity and scientific production. The integration of social media into this process is a crucial element.

Keywords: research groups, university, Spain, environmental law, social networks

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1. INTRODUCTION

Research is the foundation of scientific and social advancement. Public universities should facilitate academic inquiry and analysis through the formation of research groups. These groups are essentially collectives of individuals with analogous backgrounds, led by one or two individuals responsible for coordinating their efforts, who direct their attention toward a particular field of knowledge, examining a range of subjects, and enhancing the quality of human life. Environmental law is a branch of administrative law that addresses the protection of the environment in a general sense. It is vitally important for all human beings and for the proper development of life. Research groups in environmental law contribute to the fulfillment of the sustainable development goals, given the transversality of the subject, which affects a range of areas including urban planning and sustainable mobility, biodiversity, and energy.

It is imperative that research be disseminated beyond the confines of the academic environment. It is essential to

ensure the comprehensive dissemination of the research process, extending beyond the conventional model of knowledge transfer through publications, articles, reports, and other traditional channels. Effective communication facilitates comprehensive understanding of the research context, including the identity of researchers, their areas of expertise, and the implications of their work. Social networks are instrumental in reaching both the intended audience (researchers, students, professors, etc.) and the broader public.

1.1. State of the Art

Despite the absence of studies on particular environmental law research groups in Spain, there are studies on other research groups that have been conducted with a view to characterizing them. Berbesí Chacón and Iregui (2002) characterized the research groups belonging to the Faculty of Engineering at the National University of Colombia. Pérez Angón (2004) offers an analysis of research groups at Mexican state universities, examining the number of researchers and the level of production. Ardanche et al. (2014) examine research groups at the Universidad de la República (Uruguay), emphasizing the advantages of collaboration and cooperation among group members and with external agents. In Spain, Altopiedi et al. (2015) conduct a characterization of the 101 groups situated in the autonomous community of Andalusia, within the Andalusian Plan for Research, Development and Innovation, focusing on their internal characteristics.

The relationship between communication and scientific research has also been the subject of study. Siso Calvo (2019) analyzes the digital dissemination strategies of research in documentation sciences, highlighting the idea

that the dissemination of groups is a key aspect to improve the projection and reputation of institutions. The use of social networks in academic settings has been the subject of extensive investigation, consistently demonstrating that an effective presence yields advantageous outcomes. González Díaz et al. (2015) assess the use of scientific digital social networks by Spanish universities, with a particular focus on ResearchGate and Academia.edu. Fernández Marcial and González Solar (2015) examine the promotion of research and the digital identity of the Universidade da Coruña. Campos Freire and Rúas Araújo (2016) investigate the use of professional social networks in Galician public universities. Pertuz et al. (2018) also study ResearchGate in the context of Colombian universities.

These studies collectively demonstrate that effective communication is a crucial element in maintaining a positive image and reputation for universities and the research groups they support. Furthermore, such communication facilitates the exchange of knowledge and the transfer of results, as a larger proportion of the population (including researchers) can access and reuse the information presented in this research. This underscores the importance of social networks as a communication tool in the context of research.

2. OBJECTIVES

The principal aim of this study is to profile the environmental law research groups of Spanish public universities and to examine their presence and activity on social networks X (formerly known as Twitter) and ResearchGate. This aim is broken down into the following specific objectives:

- To describe the groups in accordance with the variables of size, gender, and lines of research.

- To identify the digital presence of the groups on the selected social networks.
- To ascertain the degree of activity of the groups on the social networks.
- To determine the age of the groups on the social networks.

3. METHODOLOGY

The population is constituted of 57 research groups in environmental law affiliated with 35 Spanish public universities. To identify the relevant population, it was first necessary to locate all Spanish public universities. This was achieved by consulting the CRUE registry (https://www.crue.org/universidades/). Following an exhaustive examination of the corporate websites of these universities, the pertinent groups were identified. All environmental law research groups affiliated with the Department of Law, Social and Legal Sciences, or with similar departments at Spanish public universities, have been included in the study. Groups dependent on research centers with their own entity have been excluded. The selected groups have at least one line of research related to the environment in any of its aspects, including urban planning, biodiversity, water law, sustainable development, and others. The analysis is performed on the entire population, without sampling. To characterize the groups, three variables were analyzed: size, gender, and lines of research. For the study of size and gender, both principal members and regular collaborators or external members were included, with the distinction being made between the leader or principal investigator and the rest. A total of 634 members belonging to 57 research groups were located.

The analysis of size and gender variables was conducted on 51 groups and 629 members. To ensure the integrity of the results, six groups were excluded from the analysis due to the unavailability of comprehensive information regarding their composition. This was due to either the absence of complete data or the inclusion of only the principal investigator, without the members' details. To analyze the data pertaining to group size and gender, a spreadsheet was used to enumerate all members of the research groups. This spreadsheet indicated the following information for each member: university, group affiliation, first and last name, gender (coded as 1 = male and 2 = female), and position (coded as 0 = member and 1 = responsible). The statistical software package SPSS was employed to analyze the data, extract descriptive statistics, and calculate frequencies.

A total of 49 groups were included in the study of research lines, as eight groups did not provide this information on their websites. A comprehensive list of all the lines of research identified in the groups' respective sources of information has been compiled. Due to the heterogeneity of terminology employed by the groups, a standardized natural language has been used to facilitate the study. The text has been converted to a .txt format, with each word separated by a hyphen and each concept by a semicolon. The text has been imported into the online applications "Lexicool" and "Nube de palabras" to obtain the ranking of the most frequent concepts and the tag cloud.

To examine the prevalence of the groups on social networks, their profiles were identified on X and ResearchGate. The selection of X is predicated on the fact that it is one of the most pervasive social networks among the general population, which allows for the combination

of text, image, and photograph, thus becoming a means of communication with the average citizen. In contrast, ResearchGate is a social network designed specifically for the academic community, which lends further justification to its selection. These social networks are considered to be two of the most effective for the dissemination of research and communication of these groups. To search for groups, the name of the group was entered directly into the search box of the social network. In the case of ResearchGate, the tabs corresponding to "Research," "People," "Questions," "Job," and "Institutions" were selected. Finally, a Google search was conducted as a cross-check. Once the groups have been compiled, a table has been constructed for the purpose of studying the presence of the collection in X, with the objective of gathering the following data:

- Name of the group
- @ of the group
- Number of followers
- Number of followed
- Update
- Creation date

The data presented here were collected in October 2023. It is crucial to ascertain the frequency of updates in order to determine the group's status with regard to its continued validity or potential inactivity. Groups that have not published or republished anything in the last month will be considered as 0 = inactive and 1 = active if there has been at least one publication in the last month. Additionally, the date of creation of the profile is collected to study its age. However, it was not possible to study the activity of the groups on ResearchGate, as no research group with a profile on this network was identified.

4. RESULTS

4.1. Group Characterization

The characterization of the groups is based on three key aspects: size, gender, and lines of research. A total of 51 groups and 629 members were included in the study of size and gender, while 49 groups were included in the analysis of lines of research. With regard to size, the mean number of members is 12.33, with a standard error of the mean of 1.025 and a median of 11. The largest group comprises 31 members, while the smallest group has only three members. In comparison, the groups at the University of the Republic of Uruguay have an average of six members (Ardanche et al., 2014). It is estimated that the groups under investigation have a mean of approximately twice as many individuals, indicating a notable increase in population size. Based on an average of 12 individuals per group, the following classification scheme is proposed:

- Small groups (3–11 members)
- Medium-sized groups (12–24 members)
- Large groups (25 or more members)

The data indicate that 27 small groups (53%) comprise 190 members (30%), 20 medium-sized groups (39%) include 320 members (51%), and four large groups (8%) consist of 119 members (19%). It can be stated that the majority of groups are small, although the majority of members are in medium-sized groups. This result coincides with those of Ardanche et al. (2014) and Altopiedi et al. (2015) who observed that small and medium-sized research groups are in the majority. Some individuals were found to be part of two groups, representing a residual percentage of 0.6%.

With regard to gender, the 629 members in question were found to be distributed as follows: 336 men (53.4%) and 293 women (46.6%). A total of 54 leaders have been identified across the 51 groups included in the study. This figure includes three groups with two leaders each: Transport, Infrastructure and Territory (940,077); Bio-environmental law: Law, Ethics and Science (BIDA, E076-03); and Administrative Law Area (UCLM). The distribution of leaders across gender is as follows: 35 men (64.8%) and 19 women (35.2%). It can be stated that the level of participation in the groups is moderately equal, with a difference of 6.8%. However, the discrepancy in the distribution of positions of responsibility is more pronounced, with a ratio of almost 30% more men than women. Once the physical characteristics of the groups (gender and size) have been analyzed, we proceed to describe the main lines of research.

Table 1 illustrates the 10 most studied topics by the groups, with the number of times they appear. It can be observed that some groups indicate "environmental law" as the most general topic. It should be noted that the majority of groups have multiple lines of research, which may result in this specification being redundant in cases where the group is legal-environmental in origin and insufficient in generalist groups that do not specify which aspects of environmental law they study.

Table 1. Ranking of the 10 most studied topics.

SUBJECT	APPEARANCES
Environmental law	19
Fundamental rights	14
Public bodies	13

SUBJECT	APPEARANCES
Urban planning	12
International law	12
Environmental taxation	12
Community law	11
Sustainable development	11
Water	10
Climate change	9

Source: Own elaboration.

Figure 1 depicts the tag cloud, which illustrates the various lines of research. The size of the words represents the relative popularity of each topic. In this context, the larger the word, the greater the popularity. The presence of minor topics such as artificial intelligence, biotechnology, and the circular economy is noteworthy, underscoring the interdisciplinary nature of environmental law.

Figure 1. Label cloud with the lines of research. Note: The words in Spanish are kept. Source: Own elaboration.

4.2. Presence in Social Networks

4.2.1. X

In X, five research groups with distinct profiles were identified. Table 2 presents the data collected, arranged in alphabetical order by group name. The characteristics of the followers of each profile exhibit slight differences. The profile with the fewest followers (47) is the newest addition, although the profile with the most followers (1,143) is not the oldest. In terms of follower count, the oldest profile is the one with the most followers, and the newest profile is the one with the fewest followers. The average number of followers per profile is 406, while the average number of followed per profile is 280.

The mean ratio of followers to followers is 1.47:1, indicating that there are 1.47 followers for each followed. As indicated by Tonidandel (2023), an appropriate ratio is 3:1, or three followers for each account followed. In this regard, the Transport, Infrastructure and Territory group (Complutense University of Madrid) is the only one with a ratio above the average, indicated at 4.24:1. The reasons why a group has more or less followers are diverse. However, it is recommended that these groups increase the number of followers to raise this ratio through marketing campaigns, calls to action, and greater interaction with users.

The mean age of the profile of these groups is five years. The oldest group in X is ARMELA (Universidade de Santiago de Compostela), which was established 10 years ago. The most recent profile is that of Territori, Ciutadania i Sostenibilitat (Universitat Rovira i Virgili), which was created in June 2023. All groups are updated and post content that is relevant and pertinent, created either by themselves or by other people, institutions, and so on. This

Table 2. Analysis of presence in social networks.

GROUP	USER	FOLLOWERS	FOLLOWED	UPDATED	CREATION DATE
Compra Pública Verde	cpvuah	243	173	Yes	June2019 ,1
Grupo de Investigación de Alto Rendimiento en Transición Energética y Acción por el Clima .Global y Local) GLOCALRES(	Glocal_Res	112	375	Yes	May2017 ,1
Rede de Investigación en Igualdade ,Dereitos e Estado Social) ARMELA(	RedeArmela	488	429	Yes	June2013 ,1
Territori ,Ciutadania i Sostenibilitat	tcsURV	47	156	Yes	June2023 ,23
Transporte ,Infraestructura y Territorio	tGIS_ucm	1143	269	Yes	February,1 2017

Source: Own elaboration.

encourages interactivity. In addition to these profiles, publications about six other groups have been located. These were written by the university to which they belong, members, or other related institutions.

The publications identified pertain to activities conducted by the group in question or mention a member of the group. While the publications are uniformly positive and devoid of any negative criticism, the groups themselves lack control over these publications. Of the total number of groups (57), only 11 (19.29%) have a presence on X. Of these, five (8.77%) have their own profile, and six (10.52%) are mentioned by third parties. It is noteworthy that each group is from a different university, with groups from 11 universities (31.4% of the total) having a presence in X.

4.2.2. ResearchGate

A comprehensive search of ResearchGate revealed no evidence of the existence of any research groups on this social network. This is undoubtedly a negative fact, as the network is one of the most used by the academic and scientific communities, and it is essential for research groups to have a presence there. Furthermore, the research group lacks a distinct profile, which would confer upon it a unique identity, facilitate its identification and contact, and so on. Additionally, no references to these groups were discovered, whether by members who possess profiles and indicate their affiliation with a particular group or by third parties, including other groups, institutions, and so on.

5. CONCLUSIONS

Environmental law research is present in 35 of 50 public universities of Spain, with a total of 57 research groups

distributed throughout the country. The majority of researchers belong to medium-sized groups of between 12 and 24 members, although the majority of groups are small, with between three and 11 members. The composition of these groups is relatively equitable with regard to gender, although positions of responsibility are held by a slightly higher percentage of men. The research conducted by these groups is broad and general, encompassing areas such as environmental law, fundamental rights, and international law. However, there are also specific approaches to topics such as urban planning, economics, and sustainable development, as well as cutting-edge areas such as artificial intelligence.

It can be concluded that at this time, the presence of the subject in question on social networks is, at best, minimal. In X, only 19.29% of the groups have a presence, and only 8.77% have a specific profile for this purpose. Notwithstanding, the groups that have a profile in X are active and use the social network in an optimal manner. In ResearchGate, no groups were identified, nor was there any mention of them by members who might have an individual profile, which is detrimental to the group's image and hinders communication and dissemination of its academic and research activity. Academic networks are essential for dissemination, and groups should prioritize developing an adequate digital presence.

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Research trends on geographic information systems and academic libraries: A bibliometric approach using Web of Science

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ABSTRACT
This study employs the Web of Science database to conduct a bibliometric analysis of scientific output pertaining to geographic data and geographic information systems (GIS) in university libraries. The principal objective is to identify the current trends and topics within the scientific literature on this subject. The research encompasses a total of 455 documents published between 1993 and 2023. The results indicate a sustained growth in the literature from 1993 to 2007, followed by a slight decrease from 2008 to the present. China and the United States are identified as the primary contributors to scientific production in this field. Keyword co-occurrence analysis delineates the predominant thematic areas, emphasizing the relationships between GIS and academic libraries, although the frequency of the term "GIS" is notably higher. These findings are compared with previous research, providing a more comprehensive view of patterns and trends in scientific production. The results offer a deeper understanding of the role of GIS in academic library management and point out opportunities for future research in the field.

Keywords: geographic information systems, GIS, academic libraries, bibliometric study, Web of Science

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1. INTRODUCTION

University libraries serve as repositories for academic and research knowledge and, thus, bear the responsibility of spearheading the development and implementation of novel services. Geographic data, in addition to serving as a valuable research tool, represent a significant component of any library's collections, reflecting not only the resources available for consultation but also the tangible outcomes of research projects conducted by the university. In this context, Granell and Aguilar Moreno (2013) posit that the quantity of georeferenced data currently being generated presents a potential opportunity for libraries and information units to serve as intermediaries for this type of data and their users. The management of geographic data from digital tools has facilitated the development of information services designed to preserve documentary and cultural heritage. This synergy has enhanced the visibility of a diverse array of collections, including historical maps, photographic archives, and engravings, as well as academic publications. This has facilitated access to information and enabled the management of an ever-growing community of users. In this regard, Vardakosta and Kapidakis (2012) conducted an analysis of the various types of digital

geospatial data in academic libraries worldwide. Their findings revealed that 136 university libraries offer geographic information services via their websites, although structured policies for the treatment of such information have yet to be established.

Geographic information systems (GIS) are digital tools for the management, storage, and visualization of geographic data, playing an essential role in decision-making in a variety of contexts. As Galeano Castillo (2017) notes, these systems represent a specialized category in geographic information management, distinguishing themselves from traditional information management platforms. They offer advanced capabilities, including data manipulation and query, analysis, and visualization. As defined by Carmona and Monsalve (2004), a GIS is comprised of three essential elements: hardware, software, and procedures. These elements are meticulously designed to support the capture, management, manipulation, analysis, modeling, and graphic representation of spatially referenced data. GIS tools manage geographic data in various layers. The application of GIS has expanded beyond its traditional domain in the field of geographic sciences, successfully extending to urban planning, medicine, biology, and the social sciences.

Geographic information systems are technologies that have been incorporated into the management of libraries, playing a pivotal role in the administration of collections, user management, data storage, and the visualization of documentation. As asserted by Aguilar Moreno and Granell Canut (2015), there is a notable inclination towards the aggregation of data pertaining to GIS software, the establishment of directories comprising links to data sources, and the curation of digital resources pertaining

to collections, publications, congresses, and other pertinent materials. A number of bibliometric studies have examined the convergence of GIS and libraries. Fish and Piekielek (2016) examine the expansion of geospatial services provided by academic libraries to facilitate teaching and research. The researchers employed a bibliometric analysis encompassing searches across 95 departments representing diverse academic areas, including hospitality management, religious studies, veterinary science, biology, and other university disciplines. This approach enabled them to identify trends in the utilization of GIS and collaboration with librarians as "change agents" to facilitate the integration of these services in disciplines less familiar with GIS. The overarching objective was to foster effective collaboration between library GIS service providers and university faculty.

In a recent study, Mandel et al. (2023) conducted a comprehensive literature review in databases such as Library and Information Science Source (LISS) and Library, Information Science and Technology Abstracts (LISTA) with the aim of identifying the current trends in GIS and libraries. Similarly, the pioneering studies by Vardakosta and Kapidakis (2012) explored the field of geographic information management as it relates to academic libraries. Furthermore, the examination of information literacy for the utilization of geographic information has also been conducted (Branch, 2014). These studies yield results that provide new insights into the context of GIS and librarianship. However, there is a paucity of studies that address the analysis of scientific literature in the field of GIS on a global scale, with a particular focus on university libraries in databases such as Web of Science (WoS). This type of bibliometric approach allows for the identification of

previous trends or patterns that may influence or manifest themselves in scientific activity (Mandel et al., 2023). This is crucial as the evaluation of scientific production represents the materialization of academic and scientific activity at the level of the researcher, institution, or country. Its analysis across various fields of knowledge reveals a wealth of data and results that are vital for advancing and improving scientific research in development (Martínez et al., 2019).

Considering the above, the following research questions are posed:

- RQ_1: What is the current scenario of scientific production on geographic data and GIS in the university library environment?
- RQ_2: What gaps or research gaps are detected in the analysis that may represent an opportunity for future research?

The principal aim of this study is to analyze the scientific output of GIS and libraries in WoS, as well as to examine its evolution and identify the key areas of research. Given the growing influence of GIS in library management and its associated services, this study is presented as an opportunity to provide a visual representation of the field, identify gaps in the research landscape, and position GIS as a significant player in geographic data management.

2. METHODOLOGY

2.1. Data Collection and Definition of Search Strategy

A bibliometric approach was employed in the WoS database to examine research production and explore the

synergies between GIS and libraries. Bibliometrics is a field within documentation that employs quantitative analysis of bibliographic output, enabling the assessment of patterns, trends, and relationships within the scientific literature of an academic context. Ardanuy (2012) posits that bibliometrics utilizes a set of indicators that facilitate the quantitative expression of bibliographic characteristics of the studied document set and the existing relationships between these characteristics. Bibliometric indicators are numerical data derived from the bibliographic characteristics observed in published documents. They facilitate the analysis of various features of scientific activity pertaining to both the production and consumption of information. Production indicators are obtained by counting scientific publications, which are typically regarded as a measure of scientific activity (Martínez et al., 2019). To perform the analysis, a search strategy was initially developed and subsequently applied to the abstract, title, and keywords (TS field) in the WoS main collection, resulting in a total of 455 results. The strategy incorporates terms in both Spanish and English (Sistema Información Geográfico and geographic information systems). The search strategy is defined as follows:

> TS = ("Geographic Information System*" OR "GIS" OR "Sistema Información Geográfico" OR "SIG") AND TS = ("University Librar*" OR "Academic Librar*" OR "Library Service*" OR "Library Resource*" OR "Information Service*")

The data were downloaded on October 9, 2023, and included all documents (articles, reviews, conference papers, etc.) with no time limit.

2.2. Bibliometric Indicators

Following the download of the documents, the data were subjected to analysis, with the following indicators defined.

2.2.1. *Research Patterns*

- Annual scientific evolution: total number of documents per year.
- Scientific production by country: total number of articles per country in absolute values.
- Scientific production by universities or scientific institutions: most prolific institutions in the scientific production on the subject.

2.2.2. *Research Themes*

- Keyword co-occurrence analysis: This is a method of examining the thematic profile of a field by analyzing the frequency of simultaneous occurrence of a specific group of keywords in scientific articles. To this end, the VOSviewer tool was employed to identify the co-occurrence of article and author keywords. Each node's size indicates the number of publications associated with the keyword. Concurrently, the links represent the co-occurrences between two terms (the greater the number of instances of their joint occurrence, the higher the value), and the colors (clusters) indicate a higher affinity for topics. The terms have been normalized for visualization purposes, with a minimum frequency of five repetitions required to determine their relevance. The

normalization method employed was the Ling/Long modularity (Van Eck & Waltman, 2018).

3. RESULTS

The results are presented below, considering the indicators analyzed in the WoS database.

3.1. Annual Scientific Evolution

The search yielded a total of 95.82% scientific articles or conference papers (proceeding papers; Table 1), which constituted the majority of the search results.

Table 1. Distribution of the number of documents by type of document.

DOCUMENT TYPE	NUMBER OF DOCUMENTS OUT OF 455	PERCENTAGE (%)
Conference papers	226	49.67
Articles	210	46.15
Book review	7	1.53
Review article	6	1.31
Book chapter	3	0.65
Editorial material	3	0.65

Source: WoS and the authors.

The recovered documents span the period from 1993 to 2023, encompassing three decades of fluctuating trends in scientific production (Figure 1).

The number of publications per year exhibited a range between one and six articles between the years 1993 and 2001. However, from 2002 onwards, there was

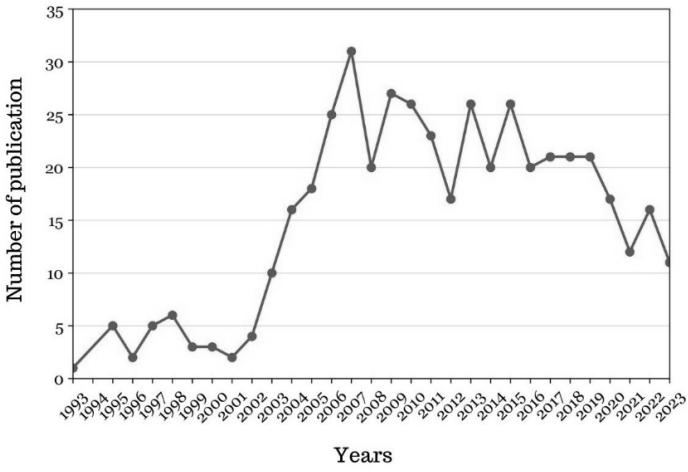

Figure 1. Evolution of the number of publications per year.
Source: WoS (2023).

a considerable increase in the number of publications, reaching 31 articles in 2007, which represented 87% of the initial value. From 2008 to 2023, there is a discernible downward trend in the number of publications, with 12 articles in 2021, representing the lowest annual figure over this period. It is important to note that the initial growth phase was relatively rapid, whereas the subsequent decline was both gradual and prolonged. The results indicate that the most notable scientific interest in GIS and academic libraries was observed between the years 2002 and 2003, with a gradual increase in subsequent years. The surge in scientific output between 2002 and 2007 coincides with the advent of GIS and the introduction of new technologies such as Nokia Maps (2001), Google Earth (2001), OpenStreet Maps (2004), Google Maps (2005), Microsoft Bing Maps (2005), and social networks. Furthermore, this period coincides with the advent of open-source versions

of GIS, including QGIS (Quantum GIS, 2001), PostGIS (2001), GeoServer (2003), and Mapnik (2005). In this context, GIS technologies, which had existed since 1960, could be used by non-specialized users to solve problems in other areas. However, this trend has not been increasing, with a 61% decrease between 2008 and 2023.

Table 2 presents a ranking of the 10 most frequently published journals in the field of GIS and university libraries. As can be observed, the journals with the highest number of publications are those in the areas of documentation and geography. The *Journal of Map & Geography Libraries* is a specialized journal that published the highest number of articles (33; 7.25%) on the subject between 2006 and 2022. The studies published in this journal address a range of topics related to GIS in libraries, including the availability of GIS in libraries, collaboration for the implementation of GIS projects, the evolution of GIS services in academic libraries, user analysis of library GIS services on mobile devices, collection management on digital maps, and case studies.

Table 2. Top 10 journals with the highest productivity between 2002 and 2023.

JOURNAL NAME	NUMBER OF JOURNALS OUT OF 455	PERCENTAGE (%)
Journal of Map & Geography Libraries	33	7.25
Journal of Academic Librarianship	13	2.86
Library Hi Tech	10	2.20
Library & Information Science Research	9	1.98

JOURNAL NAME	NUMBER OF JOURNALS OUT OF 455	PERCENTAGE (%)
ISPRS International Journal of Geo-Information	8	1.76
2009 17th International Conference on Geoinformatics, Vols 1 and 2	6	1.32
2010 18th International Conference on Geoinformatics	6	1.32
Library Trends	6	1.32
Geoinformatics 2007: Geospatial Information Technology and Applications, Pts 1 and 2	5	1.10
Information Technology and Libraries	5	1.10

Source: WoS and own elaboration.

It should be noted that other journals, which are not specifically focused on the field of documentation, have also published relevant material. These include the published proceedings of the annual IEEE International Geoscience and Remote Sensing Symposium (IGARSS) event from 2002 to 2005 and the Geoinformatics: The Geospatial Information Technology conference from 2006 and 2007 that published studies on new GIS models and trends, with the objective of increasing the scope of application of these technologies in other academic areas. The articles from these journals concentrate on the analysis and development of geographic information services for governments, utilizing online maps

on mobile devices with global positioning system (GPS) technology, geographic information services in the administration of public health information systems, and decision-making based on geographic information. Despite these subjects not falling within the remit of traditional library services, they have the potential to reinforce the provision of online information services, creating avenues for libraries to influence and address emerging information requirements.

3.2. Output by Country

It was determined that authors from 46 countries published on the subject of the study. Figure 2 illustrates a world distribution map by country according to the number of publications in absolute values.

Figure 2. Distribution of production by country. Source: WoS and own elaboration (2023).

China is among the most prolific countries, with 188 publications (41.31%), spanning the period from 2003 to

2023. The year 2007 saw the highest number of published articles (20). The United States follows with 121 publications (26.59%), with 2006 being the most productive year (10 publications). Subsequently, South Korea has contributed 17 publications (3.7%), Canada has contributed 15 publications (3.2%), Spain has contributed 12 publications (2.63%), the United Kingdom has contributed 11 publications (2.4%), and India, Italy, and Japan have contributed 10 publications each (2.1%). The remaining 46 countries have contributed between one and eight publications each. In the case of China, the studies address technical aspects of GIS, as well as information and data structure. An analysis of the keywords corresponding to these articles reveals a focus on map applications embedded in mobile devices, remote sensing, wireless technologies, data standards for GIS use, case studies, data reference models, data storage systems, and specialized geographic information services in areas such as marine, agriculture, fisheries, and urban planning.

The articles retrieved from the United States also encompass technical topics. Nevertheless, it is the country with the greatest number of publications, including academic libraries, that has the potential to make use of GIS. The articles retrieved from the United States include a variety of topics related to GIS, such as collection management, georeferencing services for libraries, mapping for the social sciences, the use of GIS in libraries during the coronavirus disease 2019 (COVID-19) pandemic for information and document exchange while libraries were closed, geolocated images of photo libraries, and geographic information management for librarians. It is noteworthy to mention the significant contributions of authors from this country in prominent journals such as the *Journal of Map &*

Geography Libraries (currently linked to the American Geographical Society Library), which has 24 publications.

3.3. Output per Institutions

Following an examination of the institutions in question, a set of 511 affiliations was identified that respond to universities and research centers. Figure 3 illustrates the 30 institutions that have published the most on GIS and university libraries. A total of 30 institutions (5.8%) have contributed at least four articles. The majority of these institutions are located in countries with a high level of output in this field, including China and the United States. Wuhan University in China is the leading institution, with 36 articles. These contributions are from various faculties, including the Wuhan University Faculty of Information Sciences, the Wuhan University Faculty of Sciences, the Wuhan University School of Resource and Environmental Sciences, the Wuhan University School of Remote Sensing and Information Engineering, and the Wuhan University State Key Laboratory of Information Engineering in Surveying, Mapping and Remote Sensing.

In the case of U.S. universities, the production of these institutions varies between four and seven articles from departments and research groups from different areas. However, research groups from the area of documentation participated. Within this panorama, the university systems of California and Ohio, together with North Carolina State University, are the ones that publish the most, with seven articles each, leading the publications with 14 articles that deal with topics where GIS and university libraries explicitly converge. The Universitat Jaume I (Spain), Harokopio University (Athens, Greece), and Liaoning Technical University (South Korea) have collectively published four

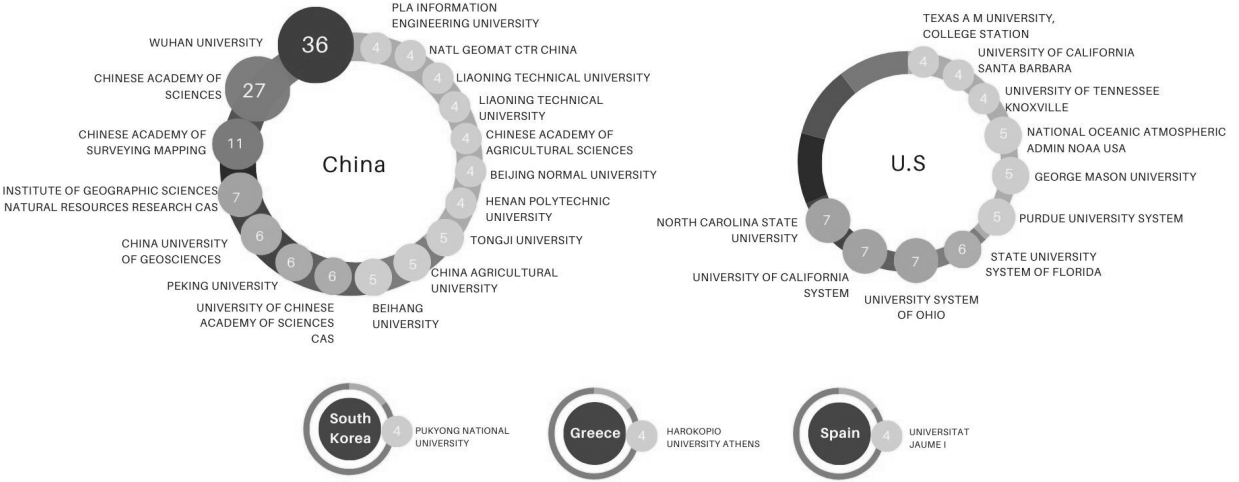

Figure 3. Top 30 institutions with the most publications. Source: WoS and own elaboration.

articles. These institutions have demonstrated a notable level of independence from China and the United States in their research output. The role of the Universitat Jaume I is particularly noteworthy, as three of its four articles are linked to researchers from the documentation departments.

3.4. Research Themes

Thematic analysis is employed to elucidate the central research axes present in the publications and their interrelationships. Figure 4 depicts the co-occurrence map. The nodes represent the key terms (keywords), while the links represent the connections between retrieved documents. Six clusters of topics are identified, each visualized with a unique color. The green cluster encompasses topics related to geography, library services, maps, and digital humanities. The light cluster includes web services, libraries, GIS, and information. The red zone in the center relates to spatial data and implementation. The nodes that make up the yellow cluster cover terms related to spatial data and implementation. The purple zone, although smaller, focuses on equity.

The most frequently occurring terms are "GIS" (180), "academic-libraries" (30), and "web-service" (22). The nodes with the strongest connections are GIS academic libraries (24), GIS and web service (13), and GIS and service (13). The largest cluster is that of GIS (red), which has 10 nodes and covers technical topics such as GPS, spatial analysis, and web, as well as the relevant nodes of academic libraries and information. The data demonstrate a notable discrepancy in frequency between the terms "GIS" and "academic libraries," which also exhibit the highest number of connections in the network. This suggests a growing thematic concentration on GIS in academic library

research. Clusters with fewer relationships and co-occurrences may influence research opportunities with GIS and other nodes within the network.

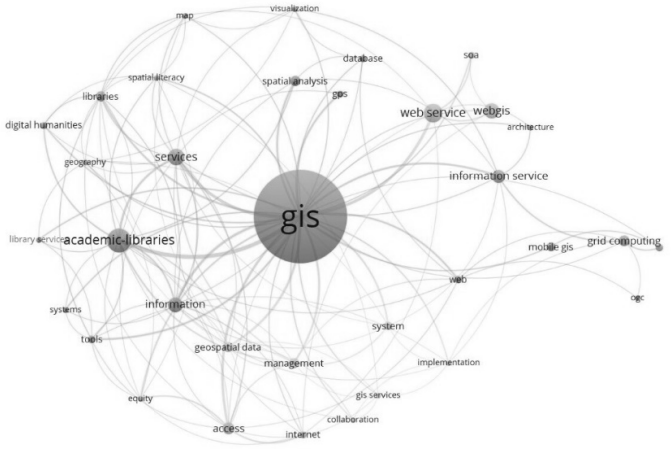

Figure 4. Keyword co-occurrence analysis. Source: WoS and own elaboration.

4. DISCUSSION

The results demonstrate a notable increase in studies related to GIS and academic libraries over the past two decades. This increase is most evident at the conclusion of the first decade of the 21st century, marking a period of sustained growth in research in this area and concomitant with the proliferation of GIS. However, as we approach the year 2023, there is a decrease in the production of new studies, which could indicate a stabilization or redirection of research efforts in this area. In response to RQ1, there is an irregular dynamic in academic interest and attention to the convergence between GIS and university libraries.

These findings align with those previously reported by Mandel et al. (2023), who conducted a comprehensive review of the scientific literature on GIS and libraries, utilizing the LISA and LISTA databases. The authors examined the titles and abstracts of the search results and collected articles that used GIS to measure and support library services, obtaining a total of 449 articles. Similarly, the data indicate a growth in publications in 2004 and a slight decrease from 2009 to 2019. Thus, it can be stated that the United States and China lead the scientific production in the field, generating a significant gap in comparison with European, Latin American, and Asian countries, which present fewer publications concerning these two main actors.

Wuhan University in China is the pre-eminent institution in the field. However, several of its publications originate from departments or faculties that are not entirely aligned with the aforementioned interests. These are associated with technical studies of systems and computing, as evidenced by the contributions of the Wuhan University Faculty of Information Sciences. Consequently, research opportunities are distinguished by a low degree of co-occurrence in relation to RQ2. Topics such as mobile GIS services and academic libraries are not identified with relationships within the network, which suggests the potential for influencing the development of geographic information services for academic libraries from mobile devices. Other terms such as "preservation," "collection management," "dissemination," "users," "pedagogy," and "open access" have a co-occurrence of less than five, indicating a limited connection with GIS and academic libraries. Despite the importance of these terms in advancing library services, their limited connection to GIS indicates specific areas that could benefit from further research and exploration.

The studies by Bishop and Mandel (2010) and Madel et al. (2023) reflect the introduction of two new categories: facility management and collection management. However, the authors do not mention "digital humanities," as illustrated in Figure 4. Digital humanities is a category directly related to GIS and their application in the social sciences and documentation. It is another area that conditions several lines of research that can enhance librarians' use of GIS technologies. Mandel et al. (2023), when compared to those of earlier studies conducted in 2010, indicate that the continued proliferation of technology and data analysis in libraries and among library researchers does not yet appear to result in substantial growth in the use of GIS. Despite the potential of GIS to facilitate research in a multitude of disciplines, the current evidence suggests that its uptake remains limited. To gain insight into this phenomenon, a comprehensive investigation is necessary, encompassing factors such as training, effective utilization of open-source software, and user literacy regarding GIS utilization.

This concept is corroborated by an analysis of reports from professional institutions, as evidenced by ACRL Research Planning and Review Committee (2022) and its annual top trends in academic libraries. In this publication, a section is dedicated to highlighting developments related to the utilization of library spaces during the course of the COVID-19 pandemic. While GIS are not expressly identified as pivotal tools for the development of library services or as a novel space for interaction with users, they are nevertheless referenced in a number of documents. However, an analysis of the retrieved documents reveals two publications that examine the use of GIS in the context of the pandemic. These are published in the *Journal of Map & Geography Libraries* and *Portal: Libraries and the Academy*. This

imbalance between interest and actual knowledge in the professional field on the application of these tools has a direct impact on the education and training of library staff. It is essential to emphasize the significance of WoS as a pivotal instrument in the present research, although its scope is inherently constrained. Undoubtedly, other bibliographic databases exist, which present a valuable avenue for future studies. A comparable analysis in LISA, LISTA, or Scopus would expand the research outcomes and potentially offer new insights, providing a foundation for further exploration and enhanced comprehension.

5. CONCLUSIONS

The findings of this study indicate that, despite the notable expansion of GIS research in academic libraries, the number of articles published over the past decade suggests that the topic is still evolving and has not yet attained the status of a fully established field of study. China and the United States are the leading countries in scientific production in the field of GIS and academic libraries. This position paper proposes that the predominant methodologies, techniques, and case studies in GIS are significantly influenced by the cultures and interests of the most prolific universities in scientific production. The direction of research in GIS and academic libraries appears to be shaped by the outstanding contributions of these nations, establishing sources of inspiration and a benchmark for the rest of the academic world.

The analysis of the topics addressed in the publications indicates a concentration of practical research and case studies, as opposed to theoretical research. Education, skills development, and training on GIS for librarians are rare topics, yet they are essential for promoting greater

scientific production, both theoretical and practical. This reality presents opportunities for research and innovation in academic library functions and may favor the future idea of consolidating the area. It is important to acknowledge the limitations of this study. First, we identified the articles explicitly related to each topic, that is, the "core" that includes the title, abstract, and keywords in the search terms. It is, therefore, possible that articles related to the topic that do not explicitly include the search terms may have been omitted. In future research, other search techniques (expansion methods through direct citations) will be included, in addition to defining a theoretical framework with a content-based analysis of the articles. Future studies on the topic could be complemented with qualitative research methods to discover motivations for GIS implementation in library contexts and their potential uses.

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